Mechanisms for private sector investment in plantation forestry in Australia

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Southern Cross University
MECHANISMS FOR PRIVATE SECTOR INVESTMENT IN PLANTATION FORESTRY IN AUSTRALIA

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Submission as fulfilment for the degree of Master of Science, by research.
School of Environment, Science and Engineering, Southern Cross University,
Lismore, New South Wales, Australia.

Thinned and high pruned 28-year old stand of Pinus radiata
planted and managed by the author near Jingellic NSW.
Declaration

I certify that the work presented in this thesis is, to the best of my knowledge and belief, original, except as acknowledged in the text, and that the material has not been submitted, either in whole or in part for a degree at this or any other University. I acknowledge that I have read and understood the rules, requirements, procedures and policy relating to my higher degree research award and to my thesis. I certify that I will and have complied with the rules, requirements, procedures and policy of the Southern Cross University (as they may be from time to time).

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Dedication

This thesis is dedicated to the late Dr Maxwell Ralph Jacobs ISO PhD (Yale), the former Principal of The Australian Forestry School, Canberra, ACT, with the motto: “mihi cura futori”, “To me the care of the future”. Also to the late Geoffrey Chandler OBE and the late Michael Hall AM, of APM Forests Ltd, both outstanding foundation members of the AFDI/AFG. All three were Fellows of the Institute of Foresters of Australia.

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Abstract

This thesis examines the prerequisites for a durable private sector investment policy for exotic softwood plantations and their management. *Pinus radiata* is used as a case study as it comprises about 80% of the Australian softwood plantation area, but the principles are generic for industrial plantations. The issue is topical as plantation areas have declined in recent years and significant expansion is needed to satisfy domestic demand. Issues canvased in this thesis include the challenges of long rotations, the costs of suitable land, and the possibility of a market for immature plantations. This study reveals that the industrial plantations cannot compete in the current investment environment and explores the potential for an industry levy system to support plantation expansion.
Acknowledgements

The guidance and support in preparation of the thesis is much appreciated from:

Jerome K. Vanclay D.Sc. (For)., F.I.F.A., Professor of Sustainable Forestry and Dean of Science, Southern Cross University, Lismore NSW as the main supervisor.

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Personal communications:

The author would also like to place on record his thanks, to those people who have mentored, counselled, taught or worked with him as colleagues and students during his forestry career lasting 70 years, of which 60 years are as a Professional Forester, and during this thesis candidature. The knowledge gained from such a range of interactions has allowed him to have confidence to undertake this thesis. They are mainly professional foresters and are acknowledged in personal communications in the text and recorded together in Appendix 7.1.
**Acronyms**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABS</td>
<td>Australian Bureau of Statistics.</td>
</tr>
<tr>
<td>AFC</td>
<td>Australian Forestry Council (AFC 1964-1993). Now known as Agriculture Ministers Forum (AGMIN) Senior officials Committee.</td>
</tr>
<tr>
<td>AFG</td>
<td>Australian Forest Growers new name for AFDI from 1991.</td>
</tr>
<tr>
<td>AFPA</td>
<td>Australian Forest Products Association. Successor to NAFI.</td>
</tr>
<tr>
<td>ANM</td>
<td>Australian Newsprint Mills Ltd. Now Norske Skog Ltd.</td>
</tr>
<tr>
<td>ASIC</td>
<td>Australian Securities and Investments Commission, Sydney.</td>
</tr>
<tr>
<td>ATO</td>
<td>Australian Taxation Office, Canberra.</td>
</tr>
<tr>
<td>BRS</td>
<td>Bureau of Rural Sciences. Now part of ABARES.</td>
</tr>
<tr>
<td>COAG</td>
<td>Council of Australian Governments.</td>
</tr>
<tr>
<td>DAWR</td>
<td>Department of Agriculture and Water Resources (replaced DAFF in 2016).</td>
</tr>
<tr>
<td>DAFF</td>
<td>Federal Department of Agriculture Fisheries and Forestry (until 2016).</td>
</tr>
<tr>
<td>FCNSW</td>
<td>Forestry Corporation of NSW, originally Forestry Commission NSW.</td>
</tr>
<tr>
<td>FIAC</td>
<td>Federal Forest Industry Advisory Council, Canberra.</td>
</tr>
<tr>
<td>FWPA</td>
<td>Forests and Wood Products Australia, Melbourne.</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product.</td>
</tr>
<tr>
<td>IFA</td>
<td>Institute of Foresters of Australia, Canberra.</td>
</tr>
<tr>
<td>IRR</td>
<td>Internal Rate of Return.</td>
</tr>
<tr>
<td>MIS</td>
<td>Managed Investment Schemes.</td>
</tr>
<tr>
<td>MAI</td>
<td>Mean Annual Increment., the average volume growth of a forest.</td>
</tr>
<tr>
<td>NAFI</td>
<td>National Association of Forest Industries (Now AFPA Canberra).</td>
</tr>
<tr>
<td>NPV</td>
<td>Net Present Value.</td>
</tr>
<tr>
<td>NSWFC</td>
<td>NSW Forestry Commission, now Forestry Corporation of NSW.</td>
</tr>
<tr>
<td>PDS</td>
<td>Product Disclosure Statement (similar to prospectus).</td>
</tr>
<tr>
<td>PEFC</td>
<td>Programme for the Endorsement of Forest Certification, UK.</td>
</tr>
<tr>
<td>PPMA</td>
<td>Perpetual Plantation Management Areas (proposed in this thesis).</td>
</tr>
<tr>
<td>RFA</td>
<td>Regional Forest Agreement between States and the Commonwealth.</td>
</tr>
<tr>
<td>RPF</td>
<td>Registered Professional Forester, an accreditation by the IFA.</td>
</tr>
<tr>
<td>RWE</td>
<td>Roundwood equivalent: the log volume needed to provide the final product.</td>
</tr>
<tr>
<td>SAPFOR</td>
<td>Southern Australia Perpetual Forests, Limited.</td>
</tr>
<tr>
<td>TIMO</td>
<td>Timber Industry Management Organisations.</td>
</tr>
</tbody>
</table>
Selected definitions

AUSTRALIAN FORESTRY COUNCIL: Operated by the federal Government to serve as a National Advisory body on forestry matters from 1964-1993. Ensuring that its work was co-ordinated with related activities in the forest services of the States and Territories under the Forestry and Timber Bureau Act. It is now known as the Forest and Forest Products Committee.

CUSTODIAN: Is a person with legal and management experience who is capable of protecting, in the case of forestry, the interests of people whose investment has lost its Responsible Entity, because of financial failure of a project. Described in a Federal Act of Parliament called The Management Investment Act of 1998/99.

FORESTRY RIGHTS: Forestry rights allow an owner of trees to enter, without trespass, on a land area owned by another party. To ensure there is no trespass, an agreement is made if the owner of the trees and the owner of the land are different entities.

MULTIPLE OR SINGLE USE NATURAL FOREST LAND: Multiple use infers that commercial harvest use, with environment care and sustainability, can occur within the same designated land and at the same time as activities of recreation or agreed upon other uses. Single use infers that harvesting of timber should not take place.

REGISTERED PROFESSIONAL FORESTER: A person judged by the Board of the Institute of Foresters of Australia to be competent through training and experience, to be relied upon to provide specialist advice concerning aspects of forestry and forestry products, about which the person is skilled.

RESPONSIBLE ENTITY: Is a person or a company, identified in law responsible for the good order of a MIS project in all its aspects (Managed Investment Act 1998/99)
1.0 Chapter One: Foundations of Australian Forestry

1.1 Contents list

1.2 Introduction
1.3 Early History of Australian Forests
1.4 Forestry dominated by Government management and regulation.
1.5 Arrival of Modern Economic Rationale.
1.6 Implications for Timber supply.
1.7 Conclusions

1.2 Introduction

Wood is an important and substantial resource in Australia with recent harvests exceeding 25 million cubic metres of roundwood, largely from softwood plantations (ABARES, 2015). Despite this resource, Australia has long had a trade deficit in wood products, and this thesis examines how plantations could be expanded to meet anticipated domestic demand. This thesis seeks to identify appropriate policy mechanisms to expand the supply of domestic softwood timber in Australia.

This Chapter reviews forest activity in Australia since European settlement, tracing its evolution from exploitive harvesting of natural forests prior to the 1920s, the transition to sustainable forest management by 1985, and the current period of 1985-2017 during which production restraints have become evident.

Exotic forest plantations were first established in the 1870s in South Australia, when a shortage of native forest resources became evident. Other States passed forestry legislation during 1880-1910, and professional forestry education commenced in 1910 (Youl et al., 2010). Victoria appointed its first Secretary for Forestry in 1882 (pers. comm. A. Wallis, 1988). Federal loans to the States (Softwood Forestry Loan Agreements, 1967) stimulated softwood plantings during 1960-80. More recently, the rise of modern economic rationale (Smith, 1976), coupled with concerns about the environmental impacts of timber harvesting, have restricted the national timber supply.
1.3 Early brief history of forest management

Table 1 summarizes some key forest policy and management aspects of these periods.

<table>
<thead>
<tr>
<th>Table 1. Australian natural forest use and plantation management</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First period</strong> 1788-1910</td>
</tr>
<tr>
<td><strong>Second period</strong> 1910-1985</td>
</tr>
<tr>
<td><strong>Third period</strong> 1985-2017</td>
</tr>
</tbody>
</table>

**Victoria, South Australia, Western Australia, Tasmania and Queensland**

| **First period** 1840-1920 | Minimal native forest management (South Australia commenced softwood plantations in 1873; Algar, 1988). |
| **Second period** 1920-1985 | Successful native forest and plantation management. |
| **Third period** 1985-2017 | Decline in natural hardwood harvest but plantation activity (softwood and hardwood) continue. |

**Australian Capital Territory**

| **Second period** 1929-1985 | Successful softwood plantations |
| **Third period** 1985-2017 | Plantation management until 2003, not replaced after major wildfire (10,000 ha). |

**Northern Territory**

| **Second period** 1955-1995 | Initiation of plantation species trials. |
| **Third period** 1995-2017 | Establishment of tropical hardwood plantations |


European settlement from 1788 to 1920 was dominated by land clearance for agriculture. During the period 1920 and 1985 native forests were successfully managed and exotic softwood plantations were established, and since 1985, two major drivers of forest policy have been public environmental concerns and modern economic rationale. Some observations on these three periods are offered:

**The first period 1788-1920**

The responsibility for forests was directed by government land departments as colonies in Australia were established (Carron, 1985). Natural forest management commenced in NSW in the 1850s, and in Victoria from the 1870s (pers. comm. A. Wallis, 1988). Forest management was stimulated by the visits of foresters from the Indian Forest Service, the establishment of State Parliamentary Forestry Acts, and with the commencement of professional forestry education in the twentieth century (Youl *et al.*, 2010).
Until well into the 20th century, large areas of natural forests remained unprotected, and regeneration of forests after harvesting was neglected due to lack of supervision, knowledge and planning (Carron, 1985). Thus natural forests were continually subject to substantial removals. The absence of any major resource of natural forest in South Australia, and the success of early plantings of *Pinus radiata* in the Ballarat area, prompted successful establishment of plantations in South Australia from 1873 (Algar, 1988; Youl *et al.*, 2010).

**The second period 1920-1985**

Early success with plantations stimulated southern States to establish exotic softwood plantations, particularly *Pinus radiata*, to provide employment during and after the great depression (1929-1939) and during and after the Second World War. After the Second World War, softwood planting was rapidly expanded to service timber supply during the post war decades of rapid economic development in Australia. These plantations later enabled a reduction in softwood imports which persisted from about 1850, largely through ports in NSW, Victoria and South Australia (pers. comm. F. Reed and B. Peters, 2015).

This period saw the commencement of resource survey and active forest management, as well as advances in sawmilling techniques, timber drying, timber preservation timber, and paper making. Research was also initiated to improve natural regeneration, stimulate tree growth and control wildfires. Studies on the silvicultural treatment of natural forest were accelerated, as was the successful establishment of extensive softwood plantations. State governments clarified forest policies and plantation objectives (Carron, 1985), and drew attention to the depletion of native hardwood resources. Plans to establish plantations to expand additional wood supply were also advocated (Boas, 1947; Carron, 1985; National Association of Forest Industries, 1990; Moulds, 1991; Youl *et al.*, 2010).

**The third period 1985-2017**

The rise of modern economic rationale that advocated recompense of government expenditure over a relatively short period (Smith 1976), hampered long-term investment in forests and led to a focus on plantation planning and cost reduction. The period was also influenced by other international and domestic policies affecting forest management, particularly through legislation for environmental sustainability (Williams, 2014), causing major restructuring of
public forest management services, particularly those involved in softwood plantations. It also led to the Federal Resource Assessment Commission Act of 1989, the Forest and Timber Inquiry in 1992, and Regional Forest Agreements of 1995 that paved the way for forest harvesting in the 21st century.

The anticipated shortfall in wood production led to the development of the “Vision 2020” to increase the plantation estate from 1 million to 3 million hectares by 2020 (Australian Government 1991). This proposal was established as policy in 2002. However, by then State governments had largely withdrawn from softwood plantations, and progress relied on the private sector attracting investments to satisfy future softwood requirements (Australian Forest Development Institute, 1985 and 1986).

The Vision 2020 was described in the National Forest Policy Statement in 1992 as a strategic partnership between the Australian, State and Territory Governments and the plantation timber growing and processing Industry. The principal thrust of the shared vision, reflected in the Resource Assessment Commission Act was: “A central target to treble the area of commercial plantation tree crops between 1997 and 2020 from 1.1 million ha to three million ha by 2020”. The policies agreed upon for the vision are set out in Table 2.

| Protection of nature conservation values in forests |
| Sustainable economic use of natural forests and plantations for wood production. |
| Maintenance of the existing private forest cover. |
| Facilitation of the ecologically sustainable management of private natural forests, for nature conservation, catchment protection and wood production or other economic pursuits. |
| Increased commercial plantation development on cleared agricultural land including integration with other agricultural land uses. |
| Improved productivity of existing plantations. |
| Expansion of plantation base by industrial grower and public forestry agencies to satisfy specific requirements. |
| These matters embraced the scope of growing commercial wood sustainably and within the good management of the environment. |

The national plantation area had reached about 2 million ha in 2008, but the 3 million ha target relied on an annual planting rate exceeding 100,000 ha/year, and is no longer achievable.
1.4 Forestry dominated by government management and regulation

Several inquiries into forestry matters during 1990-2017 set the stage for the next phase of plantation forestry, which relied on attracting finance from private and public sectors. State Governments had largely retired from commercial plantation management (except in NSW and WA). The Australian Forest Development Institute (AFDI, later Australian Forest Growers) expanded to represent the private sector in plantation management and promote the need to increase the domestic supply of exotic softwood (Hall, 1992; Hall et al., 1986a, 1986b; Hall and Newman 1996, 2009; Hall, 2009). Table 3 highlights key inquiries during this period.

Table 3. Inquiries and submissions 1990-2015 regarding plantation expansion policies.

<table>
<thead>
<tr>
<th>Inquiry</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inquiry into options for the use of Australia’s Forest and Timber Resources. Submission to the Resource Assessment Commission by NAFL.</td>
<td>1990</td>
</tr>
<tr>
<td>Regional Forest Agreements (RFA) 1995 emanated from the Forest and Timber Inquiry established through the Resource Assessment Commission Act of 1989.</td>
<td>1992</td>
</tr>
<tr>
<td>Australian State of the Forests (Five yearly reporting commenced in 1997)</td>
<td>1992</td>
</tr>
<tr>
<td>Programme for the endorsement of forest certification (PEFC)</td>
<td>1992</td>
</tr>
<tr>
<td>Models for a sustainable forest plantation industry (Low et al, 2010)</td>
<td>2010</td>
</tr>
<tr>
<td>House of Representatives Forestry and Forest Products Inquiry and parliament response</td>
<td>2011/2013</td>
</tr>
<tr>
<td>Forest and Wood Products Australia (FWPA). Submission of a Review of Policies and Investments</td>
<td>2011</td>
</tr>
<tr>
<td>Australian Forest Products Association AFPA Submission of Priorities for government regarding plantations.</td>
<td>2012</td>
</tr>
<tr>
<td>Meeting future market demand strategic objectives Forest Industry Advisory Committee (FIAC)</td>
<td>2015</td>
</tr>
</tbody>
</table>

Table 4 illustrates the keys to sustainable management in the process of certifying proposed management actions listed below.

Table 4. Requirements for forest management within the Regional Forest Agreements.

<table>
<thead>
<tr>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manage forests in a systematic manner that address laws, policy requirements, acceptable best practices and forest management plans.</td>
</tr>
<tr>
<td>Provide for public participation by developing relationships with all stake holders.</td>
</tr>
<tr>
<td>Protect and maintain the biological diversity of the forest.</td>
</tr>
<tr>
<td>Maintain the productive capacity of the forest.</td>
</tr>
<tr>
<td>Maintain healthy ecosystems.</td>
</tr>
<tr>
<td>Protect waterways and soil qualities.</td>
</tr>
</tbody>
</table>


Maintain the capacity of the forest to capture and store greenhouse gases.

Protect and maintain the natural, cultural, social, religious, and spiritual heritage values of all forest users.

Maintain and enhance the long term social and economic benefits of forests.

ABARES 2013

de Fegely et al. (2011) summarized the profitability of timber plantations in Australia (Table 5) and in several other countries (Table 6), illustrating the challenges Australia faces to remain competitively.

**Table 5. Profitability of softwood and hardwood sawlog plantations in Australia.**

<table>
<thead>
<tr>
<th>Sawlog Plantations</th>
<th>Units</th>
<th>Softwood</th>
<th>Hardwood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land price</td>
<td>$/ha</td>
<td>5,000</td>
<td>5,000</td>
</tr>
<tr>
<td>Establishment and Perodic Costs</td>
<td>$/ha</td>
<td>2,800</td>
<td>3,000</td>
</tr>
<tr>
<td>Annual Maintenance</td>
<td>$/ha</td>
<td>120</td>
<td>150</td>
</tr>
<tr>
<td>MAI</td>
<td>m³/ha/yr</td>
<td>21</td>
<td>15</td>
</tr>
<tr>
<td>Rotation length</td>
<td>years</td>
<td>33</td>
<td>35</td>
</tr>
<tr>
<td>Average log price</td>
<td>IRR</td>
<td>4.6%</td>
<td>3.3%</td>
</tr>
<tr>
<td>Addition of Carbon @$20/t CO2e</td>
<td>IRR</td>
<td>6.0%</td>
<td>4.7%</td>
</tr>
</tbody>
</table>

(de Fegely et al., 2011)

The de Fegely et al. (2011) report was “designed to provide an indicative rather than a definitive Australian softwood or hardwood regime. The IRRs could be significant if higher growth rates and log prices could be achieved”.

**Table 6. IRR for selected countries and species.**

<table>
<thead>
<tr>
<th>Country</th>
<th>Species</th>
<th>% IRR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil</td>
<td><em>Pinus taeda</em></td>
<td>20.8</td>
</tr>
<tr>
<td></td>
<td><em>Eucalyptus grandis</em></td>
<td>25.5</td>
</tr>
<tr>
<td>Chile</td>
<td><em>Pinus radiata</em>-sawn timber-good sites</td>
<td>15.6</td>
</tr>
<tr>
<td></td>
<td><em>Pinus radiata</em>-pulpwood-poor sites</td>
<td>13.1</td>
</tr>
<tr>
<td>New Zealand</td>
<td><em>Pinus radiata</em></td>
<td>7.6</td>
</tr>
<tr>
<td>Uruguay</td>
<td><em>Eucalyptus grandis</em></td>
<td>13.9</td>
</tr>
<tr>
<td></td>
<td><em>Eucalyptus globulus</em></td>
<td>22.9</td>
</tr>
<tr>
<td></td>
<td><em>Pinus taeda</em></td>
<td>12.8</td>
</tr>
</tbody>
</table>

(Cubbage et al., 2009)

de Fegely recorded in the FWPA submission: “To compare Australia under the same assumptions as Cubbage (2009) the softwood and hardwood regimes would have an IRR of 7.6% and 5.9% respectively”. Some advisors (pers. comm., R. Dew, 2016) caution that 7.6 % IRR remains too low to attract investors, given the long interval to financial maturity of plantations.
The Australian Forest Products Association (AFPA 2012) suggested nine priorities for plantation forestry that could be influenced by government (Table 7). The AFPA 2012 submission reflects how industry saw the need for action, but by 2017 there has been little expansion in the plantation area.

**Table 7. Nine Priorities for Government from AFPA, 2012.**

<table>
<thead>
<tr>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Install a program of direct action for commercialization of carbon sequestration</td>
</tr>
<tr>
<td>Build resource security</td>
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<tr>
<td>Stimulate capital investment in softwood and hardwood plantations</td>
</tr>
<tr>
<td>Deliver low cost energy networks for manufacturing</td>
</tr>
<tr>
<td>Support certification and building codes for environmental advantages</td>
</tr>
<tr>
<td>Develop public communications</td>
</tr>
<tr>
<td>Promote sustainable forest management</td>
</tr>
<tr>
<td>Facilitate investments, reduce sovereign risk, better tailor incentives for investment infrastructure</td>
</tr>
<tr>
<td>Resume funding of research and development in sustainable forest industries</td>
</tr>
</tbody>
</table>

The 2020 Vision agreed by Governments was launched in 1997 established standards, covering the concerns expressed for the environment and the need to reorientate some forestry policy (Australian Government 1997). Unfortunately it failed to stimulate establishment of softwood plantations and since 1995 planting has almost ceased as shown in Figure 1 below.

**Figure 1. Graph of Australian plantation area expansion between 1994 and 2014.**

Australian plantation statistics 2014 (pers. comm., M. Gavran, ABARES, 2014)

In spite of the inquiries listed and submissions on forestry over the period 1990 to 2011 the need for expansion of exotic softwoods has not yet been solved by either the private sector or Government management or regulation. The 2011 report of the House of Representatives “Inquiry into the future of the Australian Forest Industries” included an expectation of finding a solution to exotic softwood plantation expansion. Recommendations from that Inquiry related
to softwood were responded to by Federal Parliament (House of Representatives Federal Parliament Standing Committee on Agriculture, Resources, Fisheries and Forestry, 2013).

The Inquiry also reported reasons contributing to the failure of hardwood Management Investment Schemes (MIS) during the Global Financial Crisis (GFC), which, at that time, were funded the most hardwood plantation investment. Many of these were to have been funded largely by individual investors. The investors were able to write off their plantation costs against their personal income as primary producers. The demand to invest was so strong that MIS projects found it hard to fund enough private land to purchase. As a solution, some plantation MIS projects also offered agribusiness MIS to assist plantation land purchases required by 30th of June cut off for investors. However this approach failed mainly because the Tax Department was apparently too slow in making decisions required in Product Disclosure Statements of the projects for other agribusiness MIS being managed by the Timber Industry. As a result, funds held by the MIS plantation project managers could not be used because sufficient land could not be purchased in time (Cummine, 2010). These factors affected activity by the plantation forest industry profoundly. Table 8 sets out some of these important factors.

Table 8. Features of plantation Management Investment Schemes (MIS).

<p>| | |</p>
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<thead>
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<tbody>
<tr>
<td>1.</td>
<td>MISs are not Government Schemes. It is not unique to forestry or other agribusiness, but are part of Corporations law which applies to most retail pooled investment funds, compared with funds under management through MIS Structures in Australia.</td>
</tr>
<tr>
<td>2.</td>
<td>Private plantation forestry enterprises are subject to the same tax laws as all business, including primary production.</td>
</tr>
<tr>
<td>3.</td>
<td>Forestry MISs are always focused on supplying future target markets.</td>
</tr>
<tr>
<td>4.</td>
<td>The Government made a new statutory deduction (Div.394 of ITAA) for forestry MISs as exists under the general deduction provisions8-1of ITAA 1997 to synchronise tax payment times between investors payments and project requirements - but it applies four strict integrity measures with noncompliance penalties for any failure.</td>
</tr>
<tr>
<td>5.</td>
<td>The collapse of the two largest forestry MIS companies (Timber Corporation and Great Southern Plantations) during the GFC in 2008/9, was caused by the global financial climate, the actions of the tax commissioner and the decision of the Banks.</td>
</tr>
<tr>
<td>6.</td>
<td>Recently there has been a tightening of closure requirements for MIS Responsible entities legislation in the Management Investment Act of 1998/9 and are designed to increase the levels of protection and confidence in MIS.</td>
</tr>
<tr>
<td>7.</td>
<td>For the future, to keep the low level needed for investment risk some form of creditor protection whilst restructuring an MIS should be considered. This applies in the USA.</td>
</tr>
<tr>
<td>8.</td>
<td>One feature which could tighten up a MIS project would be to only allow an investment specified for an identified project to fund that particular project, identified through a Project Disclosure Statement.</td>
</tr>
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</table>

(No 1 to 6 Cummine, 2005, and potential No 7 and 8 added by the author).
Federal Parliament responded in 2013 to the Inquiry’s recommendations (House of Representatives Federal Parliament Standing Committee on Agriculture, Resources, Fisheries and Forestry, 2011/2013), and selected key responses are as follows:

**Recommendation 1:** Through the Council of Australian Governments (COAG) Standing Committee on primary industries, an assessment for publicly reporting on likely wood demand and supply scenarios over at least 40 years, should be carried out.

**Parliamentary response:** Subject to budgetary constraints on timing for completion, the main recommendation is supported for the production of demand and supply scenarios for the next forty years (This has, as yet, not been completed in 2017).

**Recommendation 2:** The Council of Australian Governments (COAG) Standing Committee led a process to consider and publicly report on whether Australia should aim for wood supply self-sufficiency.

**Parliamentary response:** The Australian Government does not agree that self-sufficiency, by fulfilling Australia’s annual timber and wood supply demand for home grown sources of plantation and natural timber would not be a goal for Government policy. The Government does and would support a market based approach. The Government however supports a strong, viable and sustainable [domestic] forest industry.

**Recommendation 10:** The COAG Standing Committee on Forestry lead a process to create a national plan for plantations to ensure that plantations of appropriate species are planted in appropriate locations and an appropriate regional infrastructure exists, or is planned and funded.

**Parliamentary response:** The Australian Government agrees in principle with the recommendation to have a national plan for plantations. The 2020 Vision provides for this and is agreed to by the Commonwealth Government, in partnership with industry and State and Territory Governments in 1997, and was renewed in 2002, with an existing policy framework providing it was adhered to. The fact that there were no suitable options in the 2011 report referring to means of actually stimulating the expansion of exotic softwood plantations was unfortunate and might be considered a lost opportunity to set policy.
**Recommendation 11:** This dealt with plantations as identified in Table 9.

**Table 9. Federal House of Representatives Committee Recommendation 11.**

<table>
<thead>
<tr>
<th>Plantation Recommendations:</th>
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**Parliamentary response:** “The first priority is to assess and publicly report on likely wood demand and supply scenarios over at least the next 40 years and this work should be completed, subject to budget constraints, in a year”. When this report response was tabled in the Federal Parliament in June 2013 the view was expressed that the report could be responded to positively when the earlier recommendations were completed. That response was relatively brief, however, a relevant report had not been tabled by early 2017.

Models were used to examine the potential for a sustainable industry (Low *et al.* 2010). A further policy response was requested by an incoming Federal government from the Forest Industry Advisory Council (FIAC) in March 2015 by inviting interested parties to respond to a number of policy issues highlighted in Table 10 (FIAC 2016).

**Table 10. Meeting future market demand: Strategic Directions FIAC, 2016.**

<table>
<thead>
<tr>
<th>Issue 1.</th>
<th>Market trends and pressures.</th>
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<tbody>
<tr>
<td>Issue 2.</td>
<td>Emerging uses and markets Issue</td>
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<tr>
<td>Issue 3.</td>
<td>Forest resources Issues</td>
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<td>Issue 4.</td>
<td>Innovation, research and development</td>
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<td>Issue 5.</td>
<td>Consumer and community engagement</td>
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<tr>
<td>Issue 6.</td>
<td>Strengthened regional approaches</td>
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<tr>
<td>Issue 7.</td>
<td>Infrastructure Issues</td>
</tr>
<tr>
<td>Issue 8.</td>
<td>Industry skills and training</td>
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</tbody>
</table>
This request provides a constructive range of statistical and associated information to assist considered responses, which were presented in May 2016, as a new vision with objectives for the forest industry. The emphasis was that the forest industry will lead the transition to a bio economy of which Australians can be proud. The objective will be to triple the economic value of the forest industry by 2050. This will be achieved by the forest industry distinguishing itself by being environmentally friendly, socially responsible and valued by the community (FIAC, 2016). If this occurred, the contribution to GDP would go from approximately $20 billion to $60 billion per annum. An increase to national GDP from 0.5% to 1.5%. A large contribution to national GDP.

The impact of the eleven Inquiries affecting forestry

The eleven reports and submissions led to an improvement in forestry field regulation (pers. comm. P. Crowe, 2013). The enacted policies provided a better understanding of commercial forest objectives amongst the wider community. However, the overall industry profitability has not improved as a result of the eleven Inquiries. One of the difficulties which occurred with the upheaval is that much silvicultural history was lost or forgotten (pers. comm. A. Brown, 2014). New administrators are inclined to see change as a justification for new and sometimes already failed field forest operations in National Parks (pers. comm. P. Crowe, 2013).

1.5 The effect of modern economic rationale

Modern economic rationale means that decisions for the purchase of goods and services should be determined by price transaction responses, limited by time. That means policy should take precedence over price considerations arising from such matters as domestic employment and manufacturing of the product or service. In the case of forestry, economic rationale is difficult to apply because of the long rotation length to the final rotation harvest. There is, therefore, a need to justify extending the area of plantations, instead of relying on uncertainty in purchases of imported timber for instance. The case for expanding domestic softwood plantations is given in Table 11.
Table 11. The case for expanding domestic softwood plantations.

1. Plantations are a resource essential for the security of the nation. Its uses, range from the construction of dwellings, infrastructure, paper making and recreational opportunities.

2. Plantations can provide employment opportunities and have a multiplier effect of 1.5 providing support and other job opportunities, for families and other local community activities (ABARES).

3. Plantations produce commercial wood volumes far quicker and larger in size than natural softwoods or hardwood forests.

4. Plantation timber used for manufactured products needs to be available without any delays and continually up to the quality required, for manufacturing.

5. The interest of timber producing nations is best and usually served by selling processed timber not domestically required, to the highest overseas bidder generally on a spot sale basis an example is New Zealand, easily the closest grower of *Pinus radiata* to Australia.

6. Plantations can provide of recreation opportunities, water and soil conservation, and biodiversity protection.

7. While economic rationale does work against long term costs, plantations are sustainable and can be profitable. Chapter 4 discusses this.

8. Plantations are a regionally significant source of employment, with 49% (660 out of 1353) ABS reporting areas depending on the timber industry (in 2014).

9. Because of the policy changes in the 1980s, the consumption of sawn natural eucalypt timber dropped from 1,259,000m\(^3\) to 717,000m\(^3\), whilst softwood consumption rose from 2,236,000m\(^3\) to 4,090,000 m\(^3\) in the same period (1998-2014).

10. Australia needs to expand plantation areas to meet the wood demands of increasing populations, and to provide feedstock for extending manufacturing opportunities.

11. There has been a steady decline in real timber price over a long period (Moog 2016), and this may be a deterrent to investors. However, returns to plantation growers in Australia may be increased as indicated in chapter 4.

Currently Australia has a wood production domestic trade deficit costing two billion dollars per annum in imports of timber or timber products. The thesis identifies a number of possibilities to reduce imports and at least providing a minimum continuing per capita consumption target of 1m\(^3\) Round Wood Equivalent (RWE). The ABARES 2013/2014 figures referenced in ABARES (2015) report, show the Round Wood Equivalent (RWE) can reach up to 1.1 m\(^3\) per capita. It fluctuates around that figure, depending on the number of new houses being built in any one year and the effect of any expanding major wood processing by manufacturers, or expansion of housing projects using timber extensively.

Each nation, is and would want to remain independent for selling its timber products in excess of their own requirements to the highest bidder. Experience has shown that potential exporters to Australia could fluctuate their log or sawn timber selling prices, and might be an inconsistent
source of supply (Wood Resources International, 2015). Australia would be well advised to ensure it has sufficient exotic softwood plantations to counter, for instance, any wood imports at higher prices, in peace or war, or to meet inconsistency of local supply.

The focus on Modern Economic Rationale in the period 1985-2017 relating to forest management and its commercial activities caused people to view public land use management as an activity which must lean towards non-disturbance. Brueckner (2007) reflected on what might be called the intransigence of both the caretakers of the forests—the administrators, and those who often have an intermittent, visiting use of natural forests which equates with their understanding of the value of physical exercise, pristine water catchments, art, the freedom of wild animals and the silence or song of a natural forest undisturbed by harvesting or other forest management activity.

Possibly the most disturbing element in recent policy changes arising from MER, was creating an administrative division between the management of multiple use and single use forests (pers. comm., M. Hall, 1988). A more efficient option could have been to maintain the foresters overall administration role and direct harvesting funds to overall forest management, which had served states such as Queensland and Tasmania well for many years. The division into commercial and single use Departments such as National Parks has resulted in the loss of some forestry management administrators, well trained and dedicated (pers. comm. P. Crowe, 2015).

It is useful to cite a consequence of this— the reduction in controlled burning within single use forests has caused considerable structural and tree damage losses from bushfires including loss of life, in recent times in three States; NSW, Victoria and Western Australia (Bushfire Cooperative Research Centre, 2014). Additionally, the reduction in forest research and the impact of a strong non-scientific based environmental lobby has not been helpful either, in plantation expansion needs generally.

Public agencies have established so far the bulk of Australia’s exotic softwood plantation estate. But since 1924 there have been several private plantation projects. The private sector expanded its interest in exotic softwood plantations through private and public company investments, particularly after the Second World War and the advent of the private tree growers organisation (McEwen, 1936; AFDI/AFG, 1969/2017). The private money market has had to take over the role of financing of plantation expansion and management, after the Federal

This meant the private sector is now responsible for reversing the almost total disinterest of annual exotic softwood planting expansion and meeting part of the 1997 Government and Industry target for a plantation estate of 3 million ha. However the 2020 Vision did not specify species which might need financial support. Consequently hardwood plantations outstripped softwoods, because of their shorter rotation length and the international demand for woodchips. As a result there has been little planting of softwoods since 1994 (Table 2 and Figure 1).

The introduction of a levy grant could compensate for financial shortfalls in plantation stumpage, but broader adjustments are also needed within the national timber industry. This is so important that the next section discusses various factors involving timber supply.

**1.6 Implications for timber supply**

One way to stimulate exotic softwood plantation expansion is to create an environment in which the return to investors is comparable to other opportunities in the private money market. A grant system funded through a levy on beneficiaries in the timber industry to assist with some plantation costs may assist further investment, and this is considered in chapters 3 and 4. A formal secondary market for young plantations would offer investors greater flexibility in entering and exiting the plantation sector.

The first policy input when modern economic rationale became policy, occurred about the time of the enactment of the Resource Assessment Commission (RAC Act 1989). The decision on Forestry commercial activities resulting from the Act was the reduction of the Public managed commercial multiple use natural forests to 7,500,000 ha (ABARES, 2015) which has left only 75% of multiple use of public hardwood commercial forest area of 10 million ha, estimated to be needed in 1920, 95 years previously, at a heads of forest service meetings (Musselwhite and Herath, 2007; Department of Agriculture and Water Resources, 2013). Even though demands for timber may change over 95 years the switch from multiple to single use forests and other legislative changes have been difficult to cope with over a short period in forestry terms for management implementation. Consequently the finance for equipping and servicing fire protection facilities, roads, employment changes and the loss of capital investment in Eucalypt
cutting sawmills have become a problem for the commercial industry as a whole. The NSW and Canberra border fire due to lightning strikes in 2003 was an illustration of this too.

**Recent phases of Plantation development since 1995 (ABARES, 2012-2013).**

The exotic softwood plantation area, which reached 1 million ha by the year 1990 has not been able to replace the loss of future volume from natural forests, nor has private plantation expansion been sufficient to take up the short fall in demand, or able to meet population and manufacturing expansion.

The vision of 3 million ha of plantations replacing the loss of commercially identified timber from reductions in natural forests harvesting and the implications of this, now have an unrealistic time target to reach the set figure by 2020. This is because much initial Eucalypt short rotation planting areas will not receive a second rotation due to using some unsuitable poor quality sites and the decline of exotic softwood planting related in part to having a much longer rotation. The rate of inflation too had been remarkably high from 1971 to around 1991 but declined sharply thereafter.

The selling price of stumpage logs became too low to attract investments into exotic softwood plantations, whilst investment in short rotation eucalypt pulpwood plantations boomed.

**Figure 2. Forecast of plantation log supply 2005-2049 (BRS 2005).**

Recent forecasts of the log supply from domestic exotic softwood plantations indicate a peak harvest of 18 million m³, and that this production is unlikely to increase without new plantations which may not yield substantial harvests before 2045 (ABARES, 2015). Australia
has had a $2 billion deficit in the trade of forest products for over two decades. This shortfall requires urgent plantation expansion.

Table 12 sets out the some policy initiatives that could stimulate plantation expansion.

<table>
<thead>
<tr>
<th>Table 12. Market access and development report contribution (FWPA, 2011).</th>
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<tbody>
<tr>
<td>Strong industry, Government and community support is required for the mechanisms, underpinned by a clear comprehensive plan, for the future of the plantation industry.</td>
</tr>
<tr>
<td>Simple and transparent approaches are needed as they can limit the potential for undesirable economic, social and environmental outcomes.</td>
</tr>
<tr>
<td>Approaches that promote industry “buy in” and industry partnership with Government are desirable as they ensure commercial decisions are made on key planning issues.</td>
</tr>
<tr>
<td>As with other countries, facilitation of plantation development by Governments can be justified for a range of reasons, including:</td>
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<tr>
<td>The long investment horizon (from planting to harvest) for forest plantations compared to other land use investments (e.g., Cereal cropping).</td>
</tr>
<tr>
<td>Deficiencies in plantation investment markets because of high initial costs, the long investment time frame and lack of information on future wood markets needs a positive response.</td>
</tr>
<tr>
<td>The inability of traditional markets to capture the public good benefits of plantations, such as soil and salinity amelioration, water quality improvement, landscape protection, biodiversity benefits and visual amenity need to be a consideration.</td>
</tr>
<tr>
<td>Broader Government policy objectives are required relating to regional development and job creation. Again these policies were also in keeping with the wood growing communities view.</td>
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</tbody>
</table>

1.7 Conclusions

1. The implications for timber supply

Policy changes are needed to stimulate the expansion of exotic softwood plantation timber areas for domestic use, and to encourage the private sector to sustain continuous development of a viable exotic softwood plantation sector. It is critical to explore ways of meeting future demand, and to ensure the plantation industry takes advantage of available and future quality research. Several reports indicate potential ways forward but there has been little little progress in stimulating expansion of exotic softwood plantations.

2. Selling of State plantations to the TIMOs

An added problem is that Governments in four States have sold plantations to private overseas interests in order to service deficits in their consolidated revenue funds and to free up capital for investment in other public infrastructure. That is, Governments have used the forest
revenues to finance other State activities. The State Governments may no longer have plantation profit to plough back into important funding of administration and research for continuing rotations.

Both the FWPA and the AFPA reports thoroughly consider the future for wood. The 2011 report by the standing committee of the House of Representatives appropriately was succinct and allowed Federal Parliament to respond to that report with care. It is essential to drive operational actions from the reports.

3. Partnership with Government

There needs to be a recognition that the private plantation base needs to take up the challenge for more exotic softwood plantations in the form of a partnership with Government support and advice. If Industry and Government are to reach the target vision of 3 million ha, some continuous Government administrative support will be required, with ensuring a satisfactory dividend for investors.

4. The effect of reduced involvement by Governments

Arrangements for native forest management declined considerably during the period 1985-2015. As an example, many district forestry offices were shut down or downgraded, hampering management of the resource. There were, in some forest areas, foresters with little fire protection and suppression training or authority for community leadership. This occurred in the 2003 ACT fire and the 2003 and 2009 Victorian fires where loss of lives were associated with an apparent lack of skill in firm leadership in fire protection and suppression. This skill of forest management needs revitalizing (Raymond and Underwood, 2014). It is a potential concern for private plantation growers in terms of fire protection alone. The extent and frequency of major bushfires depends in part on controlled burning of forest debris. In aggregate, major Bushfires damaged native trees and vegetation (much grass) on approximately 6 million ha, over a period of 88 years since 1926, with some areas having burnt more than once: About 40,000 ha of mainly exotic softwood areas have been damaged or destroyed over the same period (Cooperative Bushfire Research Centre, 2014).
The reduction in public forest management occurred at a time when there was a surge of activity in eucalypt plantation development on private land, by private growers through MIS. Subsequently the eucalypt plantation activity was dramatically reduced in scale because of the Global Financial Crisis in 2008-2009 and associated financial losses due to the effect of the GFC, and the tax department timing for decision making required by project owners, concerned with a mixture of investment covering both plantations and other MIS agribusiness.

5. Enough land suitable for exotic softwood plantations

Land suitable for plantations with a mean annual volume growth assessed increment of at least 17.8 m$^3$/ha over say 30 years is available (Simfendorfer, 1975). Sufficient land is assumed in the Vision 2020 statement of 3 million ha of plantation. The House of Representatives Standing Committee on Agriculture, Resources, Fisheries and Forestry report (2011), clearly indicates that those who determine national policy for commercial forestry activity, support a sustainable domestic forest industry as a strong national activity for plantations and natural forests. Their recommendations were appropriate in reporting the needs and concerns of forest management, but did not deal with stimulation options required for the mechanics of solutions, nor the effect of shortages of professional foresters in training. These factors all need attention.

6. The effect of losing organisation structures

The House of Representatives (2011) report did not consider the effect of the reduction occurring in the long term strong organisational structures such as the State Forest Services and CSIRO research. Such changes might be considered as largely unnecessary, as changes in forest services are reformed, resulting from organisational reviews from the 1980s to 1990s. However the decline in the establishment of exotic softwood plantations have been dramatic and contrary to the future needs of communities for domestic timber.

7. Environmental pressures

Compounding some of the issues facing plantation management are some of the problems arising from environment pressures which have dictated the transfer of multiple use forests to National Park single use, instead of supporting additional finance for multiple purpose forest management for overall Forestry activity and its management.
8. Encouraging private investment in managing native forests

The reports and submissions show a need for more plantations with higher growth rates, to be funded by a combination of private investment with strong Government support because of the long period it takes to grow trees for various markets. As well, there is a need to create financial conditions to encourage land owners to make privately owned natural forests more attractive as an asset to be managed or leased, particularly in proximity to existing or potential plantations. This could lead to lower insurance values and more efficient fire management.

9. Reasons for continuing State Supervision

It is worthwhile reflecting on the views of Professor Schlich in Box 1. The need emanating from the various reports and submissions in this text requires still the supervision of Governments to meet targets, inspections of plantations, research and policies concerning finance, e.g. levy grants to ensure success. These views of Schlich still have relevance to the forestry situation in Australia. They support forestry professional opinion that Government supervision remains essential to meet plantation targets through the private sector.
Box 1. Supervision of private forests by the State.

“It has been alleged that amongst the general tasks of the State is comprised the duty of seeing that articles necessary for the welfare of the people are forthcoming, and that they are suitably distributed over the country. In the case of forestry such articles must be produced without occupying more land than is necessary, unless the absolute forest soil is more than required for the purpose. Wood, it is said is an important article of consumption which is absolutely necessary.

It is further maintained that measures taken in the above direction for the public welfare do not constitute an illegal interference with private interests, because forests have always been subject to restrictions so that present owners obtained them burdened with the right of interference.

Thirdly, it is said, that by such interference the owner is not deprived of anything to which he is entitled, since the objective of interference is to secure the best utilisation of the forests, and to check abuse of the property. Hence, it is said, State supervision is necessary and desirable because:

The economic means of private persons are not sufficient for regular forest management. It is said that private persons rarely have the necessary knowledge to introduce and conduct systematic management; their properties are too small to secure the services of a competent manager, frequently they do not possess the necessary funds; hence private forestry, if, uncontrolled, leads to devastation.

Supervision, it is further said, is necessary, because private persons cannot estimate the total requirements of the country, nor arrange the management of the forests accordingly; to do this requires joint action, and not action distorted by the personal interests of each individual.

Special stress is laid upon the point that private motives are opposed to the true aims and objects of forestry. It is said that the returns of forestry occur so late that he that sows does not reap; hence private owners are inclined to favour their own momentary interests to the disadvantage of future generations. They will frequently meet pecuniary demands by converting growing stock into money. The consequence might be overstocking the market at one time, and a wood famine at another. Without State Supervision, the rights of third persons over private forests might be interfered with.”

2.0 Chapter Two: Fundamentals of forestry investment

2.1 Contents list

2.2 Introduction
2.3 Market, supply and demand
2.4 Land availability and tenure
2.5 Growth rates and IRRs
2.6 Establishment and management costs
2.7 Conclusions

2.2 Introduction

The purpose of this thesis is to determine a strategy to stimulate plantation expansion in Australia. Comparable timber resources abroad are projected to increase, particularly in Brazil (4,982,000 ha), Chile (2,017,000 ha) and New Zealand (1,542,000 ha), all of which have sufficient resources to support substantial exports (Bull et al., 2006). In addition, plantation forestry enterprises in South America exhibit higher IRRs than those typical of Australia and New Zealand (Cubbage et al., 2009).

Kelly et al. (2005) argued that most fund managers are risk averse. Financial liquidity is an important consideration and is an obstacle in young plantations. There is a culture of short-term thinking with the long term nature of obligations: It is the largest funds, particularly those associated with industry superannuation schemes that appear to have the greatest appetite for investment in new plantations. Low sovereign risk requires rights to harvesting of planted forests and consistent regulations for plantation establishment, management, harvesting and transport, particularly with respect to codes of practice and local government regulations.

The stimulation will be partly driven by persistent government concerns with stable domestic wood supply, job creation, industrial desire to find lower cost of raw material and the assumption that intensifying production in some areas would decrease pressure on the native forest, thus enabling reservation for conservation or protection.

Fundamentals of forestry investment guidelines for projects requiring finance are summarised in Table 13 (Asibey and Siaw, 1999; Cormick and Aarman, 1988; McGaughey and Gregsen,
Table 13. Guideline fundamentals for projects.

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<tr>
<td>1</td>
<td>Clarify the role of Government.</td>
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<td>2</td>
<td>Create stable conditions where market driven forest based development can take place,</td>
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<td></td>
<td>(Vincent and Binkley, 1992).</td>
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<tr>
<td>3</td>
<td>Make forest plantation development an attractive proposition to the ordinary person (Asibey and Siaw, 1999).</td>
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<tr>
<td>4</td>
<td>Underwrite the costs of local social and environmental benefits.</td>
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<tr>
<td>5</td>
<td>Find appropriate mechanism for research and extension services.</td>
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<tr>
<td>6</td>
<td>Create links between capital market instruments and sustainability.</td>
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<td>7</td>
<td>The private sector is a logical source of capital, and opportunities include:</td>
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<td></td>
<td>Target early stage venture capital funds or sector defining funds (debt and equity);</td>
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<td></td>
<td>Seek Private financing from both foreign and domestic sources;</td>
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<td>Encourage mixed public and private funding and generate tax exempt bonds.</td>
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<td>8</td>
<td>Beware of side effects: planting may take place in sub-optimal locations.</td>
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<td>9</td>
<td>Watch for overestimates of plantation establishment costs.</td>
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<tr>
<td>10</td>
<td>Watch for individual or groups outside the target plantation harvest receipt group becoming the main beneficiaries and ensure business approaches are assessed for any short or long term problems affecting projects.</td>
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</table>

The issue in attracting forestry investment is discussed by Clark (2001, 2004). It is important in the context of whether or not there will be a future global shortage of timber. Clark (2001, 2004) found no evidence of increasing real prices for wood in the long term, and implied that there would be no looming shortage of wood. This is open to debate. Timber use will be maintained following the preferential use of timber as a building material as has occurred in the past. Whether this continuum will result in lower or higher prices is one determined by manufacturing costs coupled with supply and demand. It will be up to the skill of the timber industry to deal with those variability factors.

Australia currently has no spare capacity to harvest further supplies from commercially managed existing domestic sources of hardwood or softwood (pers. comm. ABARES staff, 2016). It is expected that the population of Australia will grow by about 50% by 2045 from 24 million to 36 million. The current usage of timber in Australia is of the order of one cubic metre round wood equivalent (RWE) per capita. This demand will require plantation areas to expand by 600,000 ha by the year 2045 (assuming good sites that average 17.8m$^3$/yr, corresponding to the current plantation estate average; ABARES, 2015).
In recent times, price increases in *Pinus radiata* sawlogs have been less than the rate of inflation (Tables 15 and 16), because of competition from softwood imports (pers. comm. P. Duncan, 2016). A summary of policy options for plantation investment for expanding supply of exotic softwood is shown in Table 14.

**Table 14. Summary of policy options for plantation investment. (ABARES, 2010)**

<table>
<thead>
<tr>
<th>Tax based mechanisms</th>
<th>Tax credits on establishment costs or based on rotation length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government investment or support of forest enterprises</td>
<td>Flow on through tax schemes</td>
</tr>
<tr>
<td>Government R&amp;D and Public/private partnerships extension programs</td>
<td>Levis</td>
</tr>
<tr>
<td>Indirect government policy.</td>
<td>Facilitation of partnerships</td>
</tr>
<tr>
<td></td>
<td>Unit trusts, MIS, cooperatives</td>
</tr>
<tr>
<td></td>
<td>Joint venture Agroforestry programmes</td>
</tr>
<tr>
<td></td>
<td>Improving data quality for investment decision</td>
</tr>
<tr>
<td></td>
<td>Market regulations</td>
</tr>
<tr>
<td></td>
<td>Competitive neutrality policy between Government and private enterprise</td>
</tr>
<tr>
<td></td>
<td>Emissions trading scheme</td>
</tr>
<tr>
<td></td>
<td>Environmental regulations to increase the demand for timber</td>
</tr>
</tbody>
</table>

Uruguay, New Zealand, Norway, United States, Canada and Indonesia have stimulated plantation establishment through up-front grants (ABARES, 2010; Bull *et al.*, 2006; UK Confederation of Forest Industry, 2010).

The Australian tax based mechanism listed number one at the start of Table 14 is currently used in relation to individual investors. It has been successful in stimulating investment in different environments. The use of grants rather than tax deductions for costs to improve profitability has advantages of ensuring standards are maintained. Low risk investment can occur as all three have or can have appropriate restraints.

As the Australian population increases, with median numbers estimated to rise by 12 million by 2045, (ABS, 2015) supply will have to come from plantation establishment of about 20,000 ha per annum, or a much larger import bill will have to be met (Bureau of Rural Sciences, 2005).

A shortage of exotic softwood would hamper manufacturing continuity and infrastructure requirements such as domestic housing (Australasian Pulp and Paper Industry Council, 2009).
Currently, public native forests now provide only 17% of native hardwood, totalling 25,300,000 m$^3$ per annum. This has declined in the last 10 years by 60% (BRS 2005, ABARES, 2015). Thus there is an opportunity to meet future demand by establishing more softwood plantations. The Forest Products industry cannot expand significantly, unless exotic softwood plantations plantings can be grown through to maturity. An IRR above the current figure of 4-6% already stated will be desirable to meet this need (de Fegely, 2011; House of Representatives Federal Parliament Standing Committee, 2011).

New Zealand has substantial supplies of *Pinus radiata*, but to date little has been exported to Australia, and it is anticipated that New Zealand will continue to supply North American markets (pers. comm. F. Reed, and B. Peters, 2015). North American softwoods are already under domestic pressure and this will continue (Wood Resources International, 2016). *Pinus radiata* or its equivalent from South American sources would face large freight costs to reach Australian markets.

The Radiata Pine Association of Australia became prominent in successfully marketing and establishing quality standards. The Australian Forest Development Institute (AFDI, 1969-1991, now called AFG, 1992-2017) has also been effective in attracting investment interest in establishing plantations particularly with private sector investment conferences in 1986. However, there is currently limited establishment of exotic softwood plantations, in part because of stagnant prices. Table 14 and 15 reflect the need for an urgent price increase, as stumpage prices have barely increased over the past 20 years.

<table>
<thead>
<tr>
<th>Table 15. Price movement of <em>Pinus radiata</em> stumpage between 1995 and 2015.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small sawlog</td>
</tr>
<tr>
<td>&lt;24.0</td>
</tr>
<tr>
<td>1995</td>
</tr>
<tr>
<td>2015</td>
</tr>
<tr>
<td>20-year change</td>
</tr>
<tr>
<td>Annual increase</td>
</tr>
</tbody>
</table>

(KPMG 1995/2015)

Table 16 shows the effect of raising stumpage prices. If stumpage had followed inflation this would have negated the need to provide financial support to attract investors (KPMG Index). This example is for 1000 ha and over a 20 year period with all sizes of log diameter.
Table 16. The effect of raising stumpage prices.
The change in income, if stumpage had risen with 2.7% average inflation

<table>
<thead>
<tr>
<th>Sawlogs</th>
<th>$/m³ Volume price non inflated 1995-2015</th>
<th>$/m³ Volume price inflated 1995-2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>32.4–39.0 x 800,000 = 31,200,000</td>
<td>49.3 x 800,000 = 39,440,000</td>
</tr>
<tr>
<td>Intermediate</td>
<td>45.4-53.3 x 920,000 = 49,036.000</td>
<td>69.2 x 920,000 = 64,308,000</td>
</tr>
<tr>
<td>Medium</td>
<td>60.3-72.3 x 695,000 = 50,248.500</td>
<td>92.5 x 695,000 = 64,565,000</td>
</tr>
<tr>
<td>Large</td>
<td>68.8 – 84.6 x 150,000 = 12,690,000</td>
<td>105.5 x 150,000 = 15,900,000</td>
</tr>
<tr>
<td>Total value</td>
<td>$143,174,500</td>
<td>$179,998,372</td>
</tr>
<tr>
<td>Difference = $36,803,872 = stumpage increase due to inflation=2.57%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1995-2015 KPMG Index)

It is apparent that if stumpage prices had increased with inflation during 1995 to 2015 then plantations could attain an IRR of 8% which could attract investor interest. By comparison, a steel fabricator, in competition with the Canberra house framing market remarked that prices consistently followed inflation (pers. comm. A. Potter, 2016). However, a levy grant initially to stimulate investment would be a positive factor to provide confidence about investing in exotic softwood plantations. It is also important that the selling prices calculated for general distribution are real. That is inflation must be subtracted to calculate a real IRR figure. To obtain a view of investment yields on a stock exchange by comparison, Table 24 is shown.

There have been since 1985 some low returns of profit from shares and the fluctuations are significant. A stable calculated IRR just above cash and Australian bonds could provide an incentive to invest.

2.3 Land availability and tenure, including the concept of PPMA

One of the problems involved with the identification of suitable land for optimum growth of exotic softwood plantations is the difficulty of constraining private land owners, in selecting unknowingly poor land for growing trees for profit. A Management Investment Scheme (MIS) system which has been devised to allow a number of investors to own or rent a clearly identified area in an overall property suitable for growing plantations has seen success (Managed Investment Act, 1998/99; Cummine, 2005, 2008), but has been short lived because of financial issues. Great Southern Plantations and Timber Corporation financial MIS failure in 2008/9 was due to the global financial Crisis and drought conditions, to a large extent (Cummine, 2010).

It is apparent that Governments should provide independent Registered Forestry experts to use their knowledge to grade suitable land for growth potential. It is the private sector as well which
will need accurate, as possible, confirmation of growth rates. That sector has invested, on behalf of small investors, the most area of plantations of the period 1994 to 2008 in a MIS system for pulp hardwood growth because of the short rotation.

Much suitable plantation land has already been identified based on rainfall (at least 500 mm/yr) with sandy and friable deep soils with water holding capacity, and ease of access. Areas of suitable land, with plantations already exist in those areas are listed in Table 17 (Newman and Griffith, 1998) as an example, and includes a spread in each State and Territory covering the Green Triangle, NE Victoria, Gippsland, South Eastern NSW, Northern Tasmania and SW Western Australia. Much of the current exotic softwood plantation resource has been established on public land, and there is still land of suitable quality within areas listed in Table 17 (pers. comm. P. Crowe P. Griffiths, and N. Cooper, 2015).

By the late 1970s, several large MIS were established with Pinus radiata on land of suitable site quality, with much faster growth rate compared with natural forests (Lawrence and Dandy, 2014). For instance, a Product Disclosure Statement (PDS) issued in May 1989 (SEAS SAPFOR, 1989) recorded that selected South Australian SQ4 plantations would have a mean annual increment of 22m$^3$ per ha per annum, compared with natural eucalypt forests MAIs of 1.5m$^3$ per ha per annum (Jacobs, 1954; Barlow and Cocklin, 2003; Knoot and Rickenbach, 2014; Korhonen et al., 2014).

There are a number of elements in the fundamental issues for forestry investment apart from the attraction needed to offer a low risk competitive investment rate, which include two other main requirements for success. These are preferably, a large aggregation of plantations in a specified area where soils and rainfall are satisfactory. The need to physically have checked soil profiles with the ability for investors to sell or buy areas of potential or satisfactory tree growth. To meet this need a secondary market too will need establishing. Chapter Three deals with formal arrangements for financial transactions known as secondary marketing.

Whilst it might take a while to establish an IRR at 8% to attract investors, the concept of creating perpetual plantation management areas (PPMA) with Government backing, may help to attract investors. Table 17 lists areas where PPMA are present or potentially so.
Table 17. Suitable land for *Pinus radiata* plantations.

<table>
<thead>
<tr>
<th>Location</th>
<th>Suitable areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Australia</td>
<td>South West (<em>Pinus radiata</em>)</td>
</tr>
<tr>
<td>South Australia</td>
<td>Green Triangle South Australia &amp; Western Victoria (<em>Pinus radiata</em>).</td>
</tr>
<tr>
<td>Victoria</td>
<td>Bright, Myrtleford (<em>P. radiata</em>) Western Vic (<em>P radiata</em> and <em>Euc. globulus</em>).</td>
</tr>
<tr>
<td>Tasmania</td>
<td>Huon and Florentine valleys (<em>P. radiata</em>)</td>
</tr>
<tr>
<td></td>
<td>Smithton Areas (<em>Acacia melanoxylon, P. radiata</em>) Scottsdale (<em>P. radiata</em> and <em>E. nitens</em>). Cambridge near Hobart (<em>Pinus radiata</em>)</td>
</tr>
<tr>
<td>New South Wales</td>
<td>Upper Murray, Tumut etc., (<em>P. radiata</em>) Oberon, Orange (<em>P. radiata</em>)</td>
</tr>
<tr>
<td>ACT</td>
<td><em>Pinus radiata</em>.</td>
</tr>
</tbody>
</table>

(Newman and Griffiths 1998)

In addition to creating a low risk environment, PPMA will concentrate plantation activities spatially, which will in turn attract support services and foster a qualified workforce. Even if stumpage pricing is increased for investment purposes there will be a necessity to keep costs low enough to compete with imports. The purposes and intents of PPMAs are summarised in Table 18.
Table 18. Establishing a Perpetual Plantation Management Area.

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>A prescribed PPMA area must give priority to Timber plantation establishment if on public land. If within such an area, legally identified, and constituting an economic distance to a processing or potential major industry, private agricultural landowners could also consider growing small plantations, with a set minimum size on their properties.</td>
<td></td>
</tr>
<tr>
<td>80% of stumpage feedstock from thinnings and clear fell would need to go to a designated processor, or processors from the plantations within that area. That rule could be amended for commercial reasons by a local PPMA committee defined in a table of requirements.</td>
<td></td>
</tr>
<tr>
<td>The definition of economic, would confirm a maximum cost delivery to processors. And those areas broadly defined in Table 17 which have already substantial successful plantations, would be approved and developed further first.</td>
<td></td>
</tr>
<tr>
<td>The PPMA could apply to native public forest land, which could be offered first to an Australian managed MIS or other private or public Corporations, with the purpose of developing sustainable exotic softwood plantations. The sale would include a sign off that a plantation would have a satisfactory MAI, calculated by Government officials with appropriate research.</td>
<td></td>
</tr>
<tr>
<td>An IRR of at least 6.0% without levy grant support would entitle a project to receive a maximum 2% IRR finance levy support, to ensure an IRR of 8% capped, could be achieved by the investors.</td>
<td></td>
</tr>
<tr>
<td>The right of access to a levy grant funded project by industry would last for the whole period to clear fall harvest, which would be 25 years or a nominated time, or when the CAI became lower than the MAI. The top limit would likely be 36 years.</td>
<td></td>
</tr>
<tr>
<td>Following research, reduction of the length of time needed for growing the timber to a strength appropriate for structural design could occur with the local PPMA committee recommending it to the PPMA national board.</td>
<td></td>
</tr>
<tr>
<td>In the case of private property within a prescribed PPMA, a minimum of 15 ha in one configuration, or 10% of a suitable property, could be requested to be established, with the same species and processor requirements. Landholders would be entitled to a levy grant for costs incurred in establishing and management, and Government would have access to both private and public plantation properties to monitor plantation performance.</td>
<td></td>
</tr>
<tr>
<td>The annual prices for stumpage would be determined at the stump and should apply for all growers in the PPMA to prevent discounting of stumpage sales, after such a long time</td>
<td></td>
</tr>
<tr>
<td>Vegetation clearance needs would be given and signed off by Governments to ensure the project remains intact for several rotations, to clear fell.</td>
<td></td>
</tr>
<tr>
<td>If the project changes hands (after a minimum of four years), the thesis proposes that Government support would legally need to continue with a different owner. A record of planted areas has to be part of a national target plan for planting each year, which has to be realized and correct statistics maintained.</td>
<td></td>
</tr>
<tr>
<td>It is essential a plantation must be checked at an early stage for satisfactory development by a contracted Registered Professional Forester paid for by the Government. An inspection report at least every second year up to about year 10 is desirable, and afterwards with frequency depending upon any problems noted by an RPF/ACFA Forester. Cost of this would be borne by Governments as part of their administration to reach targets.</td>
<td></td>
</tr>
<tr>
<td>If the management of a project is unsatisfactory in a PPMA, and there is no response to redress a poor management or growth situation, the State Government could demand a valuation and the investor could be paid out by auction or valuation, with the State and PPMA committee making arrangements for a new owner via a secondary market.</td>
<td></td>
</tr>
</tbody>
</table>

A comment on a number of critical PPMA items follows:
**Making a decision to invest and tenure security:**

The first action of a potential plantation investor to buy or rent land is to determine the owner, by referral to a State land registration office. The second action is to ensure that the Government plan showing suitability of the site, has been signed off by the State Government. The third action is to check that the Product Disclosure Statement for the project has been signed off by the Government through ASIC and any entitlement to a levy.

**Planning needed:**

Proposals to extend crops or manufacturing would need planning. If the price of stumpage rises at least related to inflation, a levy grant may not, in time, be necessary. However to stimulate investment activity as part of the initial expansion programme, it would be necessary to establish levy grants capped at 2% to reach 8%, starting at 6% IRR unsupported with any grant. The establishment of an IRR of 8% is considered necessary to attract investors.

**Change in ownership:**

A levy grant should continue with a new owner, and the Government would retain a right of access. Experience has demonstrated that within a given area an annual stumpage selling price should apply and would be set by a local PPMA Committee as agents. There have been too many instances of competing selling stumpage prices causing depressed prices after a period of investment as long as 25 or more years. Investors have not been impressed (Newman, 1993). There have been instances for depressed prices of stumpage or a direction to take too much harvest volume being decided upon by non-forestry managers including one example in the ACT which caused ongoing shortages of harvest volumes (McKenzie-Smith, 1993).

**Formation of a local PPMA Committee:**

A proposed system of PPMA would be managed by a local committee of plantation owners, which would also include a Government official responsible for ensuring plantations are grown to maturity, over-seeing the selling of product to a processor, and looking after research needs. Local PPCMC would report to a national PPMA Committee (PPMC) who would advise and receive advice from the Federal Government.
Land price considerations:

From the Excel spreadsheet example, the cost of rent of land is significant and is about 70% of annual maintenance costs. The decision to rent public land or buy it for plantation establishment must be taken with great care to ensure the land quality is satisfactory at the purchase price, and not subject to any substantial increase in inflation through to clear fell. That is, unless the renter receives some definite part of a profitable land increase in value at the main harvest, through to clear fell.

Rental of ground:

Consider the example of the MIS manager, as the project promoter & responsible entity (RE) buying the land to promote lessees for tree investment. It would be possible, as an example, for the Responsible Entity (RE) to pay for the land as follows.

<table>
<thead>
<tr>
<th>Table 19. Land costs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of land to project interest at 6%=$120 av. per year plus paying off capital $200 per annum</td>
</tr>
<tr>
<td>Cost to lessee= $200 per annum</td>
</tr>
<tr>
<td>Result: Project would need to meet capital of $50 per annum over 20 years</td>
</tr>
<tr>
<td>Profit to project manager =$1000 per hectare</td>
</tr>
</tbody>
</table>

Cost of Land preparation:

The cost, shown as an example in the spreadsheet, covers clearing scrub and heavy weeds and constructing roads for coupe boundaries in the planting year one phase. The example of setting out access tracks initially pays off, both for future inspections, dealing with poisoning vermin and weeds, as well as providing access or retreat to and from bush fires.

Regulations preventing clearance of natural private land for plantations:

Laws in several Australian States prevent trees on private agricultural land from being cleared without a permit, and these may increase the area costs of land and rental. For instance, between 1993 and 2008 in Western Australia, land for plantations rose from $1,500 to over $5,000 per
hectare (pers. comm. Elders Albany Staff, 1999). This would annual rental increase of annual rental at 5% from $75, to $250 per/ha per annum. This inflation caused some MIS Companies to float on the stock exchange using the mortgage value of previous years purchased land for the value of the float, to purchase further land. That is why there is a case for investment funds received to be applied only to a specified project.

2.4 Growth rates and internal rates of return

Bulletin 23 documents the yield of plantations in South Australian (Lewis et al., 1976), and provides a summary of the growth of *Pinus radiata* on a range of sites. There is considerable difference of growth with various qualities of soils. This is illustrated in Table 20 for volumes to 10cm top under bark.

<table>
<thead>
<tr>
<th>Site Quality</th>
<th>Volume m³ at 27 years</th>
<th>Volume m³ at 30 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>SQ1</td>
<td>903</td>
<td>1001</td>
</tr>
<tr>
<td>SQ2</td>
<td>801</td>
<td>892</td>
</tr>
<tr>
<td>SQ3</td>
<td>700</td>
<td>782</td>
</tr>
<tr>
<td>SQ4</td>
<td>592</td>
<td>666</td>
</tr>
<tr>
<td>SQ5</td>
<td>472</td>
<td>535</td>
</tr>
<tr>
<td>SQ6</td>
<td>351</td>
<td>399</td>
</tr>
<tr>
<td>SQ7</td>
<td>236</td>
<td>266</td>
</tr>
</tbody>
</table>

*(Lewis et al., 1976)*

It is important in studying the spreadsheet to note that for a 1000 hectare annual project that the rent is modest to a lessee, because it is the rent which is the major cost in maintenance (69%) which also includes a capped annual fire insurance of $12,000 per 1000 ha in the example. MIS Investors would need to be kept informed formally if a project became illiquid, as fire would certainly destroy more than one individual investment.

There are some risks of pests and disease, but well managed plantations should monitor hazards and take control measures as required (National Sirex Co-ordination Committee, 2000).

2.5 Plantation establishment and management costs

Tables 21-23 now lists some detail of costs per ha and income per ha. Because of the strength needs of the timber usage, 25 years currently constitutes the minimum clear fell rotation for *Pinus radiata* (Lewis et al., 1976).
Table 21. Costs for softwood plantation management (Plantation area = 1,000 ha).

<table>
<thead>
<tr>
<th>Costs</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotation period</td>
<td>27 years</td>
</tr>
<tr>
<td>Thinnings</td>
<td>15 and 22 years</td>
</tr>
<tr>
<td>Average price of C/F stumpage</td>
<td>$55/m³</td>
</tr>
<tr>
<td><strong>Preparatory work</strong></td>
<td>$134,500</td>
</tr>
<tr>
<td><strong>Plantation-establishment</strong></td>
<td>$1,203,000</td>
</tr>
<tr>
<td><strong>25 yrs. of annual maintenance</strong></td>
<td>$7,741,500</td>
</tr>
<tr>
<td><strong>Periodic costs 27 years +fire Insurance=</strong></td>
<td>$210,500+$ 228,544</td>
</tr>
<tr>
<td><strong>Total costs</strong></td>
<td>$9,518,044</td>
</tr>
</tbody>
</table>

Table 22. Example of Growth of Timber per hectare over 27 years.

<table>
<thead>
<tr>
<th>Growth of Trees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume at end of year 10</td>
</tr>
<tr>
<td>Mean annual increment (MAI 27 years, must be over 25 years for strength)</td>
</tr>
<tr>
<td>First thinning harvest volume at aged 15 yrs.</td>
</tr>
<tr>
<td>Second thinning harvest volume at age 22 yrs.</td>
</tr>
<tr>
<td>Clear fell harvest volume 27 yrs.</td>
</tr>
<tr>
<td><strong>Sum total of volume rotation growth</strong></td>
</tr>
</tbody>
</table>

Table 23. Stumpage Log Prices 2013.

<table>
<thead>
<tr>
<th>Log Prices at Stump</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average $ per m³ at clear fell-age 27</td>
</tr>
<tr>
<td>First thinning m³ age 15</td>
</tr>
<tr>
<td>Second thinning m³ age 22</td>
</tr>
</tbody>
</table>

(pers. comm. P. Crowe and B. Royal, 2014)

Preface concerning rotation period: It should be noted that the spreadsheet starts at 0 to reflect an initial year that is required for management planning and to seek regulatory policies, operation costs and income detail. Each plantation will have different costs and the inclusion of the spreadsheet is to show readers how they can vary their estimated costs.

Cost examples of project management:

1. Managers Salary and overheads: The salary, in the example, has been assessed as being part time to establish and manage 1000ha. This provides $20,000 per annum with flexibility to reach $30,000 each year for the entire 1,000 ha project with a total of overheads of half those figures to service vehicle use, travel and superannuation etc., as a project gets larger the costs of management would increase.
2. **Registration and other legal cost**: This includes contracts between the owner of the crop and the responsible entity which would allow access to the land by the manager and would deal with the law requirements for the ASIC and the Commissioner of Taxation.

3. **Plantation fire Insurance and public liability costs**: A figure has been used from Insurance brokers of 0.55% per hectare of costs right through the plantation life until the value of the plantation reaches a capping of $12,000 per hectare at about 22 years used by Insurance Facilitators Ltd (pers. comm. D. Hawke, 2013).

4. **Planting year one costs**: It has been assumed that the select of a site for a PPMA would not exceed 150kms from a Timber processor or for export. This would allow an area of up to 40,000 ha for a Perpetual Plantation Management Area planting.

5. **Cost of Planting supervision and plantation maintenance**: Planting is carried out by contractor, with supervision, if necessary, by a staff member. While the annual budget in the spreadsheet shows a similar cost annually; it is possible some maintenance costs could be accumulated for two years to match particular maintenance needs.

6. **Tree planting replacement, up to a year after original planting is possible**: Costs would include direct costs of plants, delivery, planting and supervision.

7. **Tree measurement**: The cost of periodic measurement of plots to ascertain growth progress is included with the manager’s function.

8. **Project registration**: An ASIC compliance plan has to be submitted by the responsible entity of a MIS project covering compliance with corporate law, the relevant constitution and agreements, by the ASIC (pers. comm. N. Cooper, 2012).

**Management roles:**

9. **Site Investigation checking**: This is a role for the Independent Forester and reliance initially would be on State Government and private owner necessary information.

10. **Custodian of assets**: This is legally and therefore mandatory for MIS, and the role requires obligations and duties imposed by corporate law. Its cost is included in the administrator’s
budget. The prime responsibility for managing an MIS project is the promoter and manager of a project as the responsible entity (RE) and in house custodian when a failure happens, in ensuring the constitution of each project, and the lease and management agreement, or forest right and management agreement are performed correctly as recorded in the project constitution. Costs are covered by the manager and administrators budgets in the example.

11. **Thinnings and clear fall timings:** For the rotation example, SQ4 thinnings have been set at age 15 and 22, with clear fall at 27. That is 2 years after the minimum period for a rotation to clear fell for mature *Pinus radiata*.

12. **Carrying out preparation and establishment:** What is clear from Tables 19-23 is the importance of preparing and establishing a project. Annual maintenance costs accumulate and are critical to the success of an enterprise. The largest cost of maintenance is rental and fire insurance, about 70% of those costs. If some other activity, such as grazing can be introduced this could have a significant positive effect on the IRR. Or if significant public land is available at a price which can allow an increase in a IRR that would assist in making any levy grants lower in value.

13. **A review of the need to assess the risk of investing:** A revival in the expansion of exotic softwood plantation forestry depends on a plantation project that can yield financial returns competitive with other forms of investment which have no delay in dividends. There are also other factors which need taken into account, to keep the risk of investing as low as possible. For instance, to attract exotic softwood investors, a Timber Industry a levy grant of the order of 2% above the unsupported IRR shown in the spreadsheet of 4 to 6% would be necessary, described in this Chapter and would be important for investor interest (de Fegely, 2011; Standing Committee, 2011).

2.6 **Conclusions**

Levy grants should interest the market for plantation investment (pers. comm. R. Dew, 2013). On calculations from the spreadsheet example, it is possible for Timber Industry levy granters to receive a profit dividend from clear fall of 15%, which would include inflation. The levy grant could potentially apply to the paper making industry sales and the sawn softwood timber
sales. Neither appear to support available industry levies at the moment. The levy would be small to a maximum of $2,450 per hectare over 25 years.

If applied equally to the two timber manufacturing companies currently it would equal $1,225 per hectare or $1,225,000 per annum each on a 1000 hectare area on a rotation of 30 years, that is 0.87 cents a tonne on paper production annually of 10,616,000 tonnes on average (Industry Edge 2007-2012), and 3.5 cents per m$^3$ per annum for exotic softwood sawn timber processors producing 4,327,000 m$^3$ annually (ABARES, 2015.) But a long period before any small income would occur from thinnings at 15 and 22 years.

A proposed target of 3 million ha by 2020 is no longer possible. Exotic softwood plantations need an expansion of at least 600,000 ha over 30 years, equalling 20,000ha of establishment per annum. This could be achieved within the target of 3 million ha already set in the parliamentary Vision statement of 1997. Potential investors would include Corporations involving in manufacturing, private sector landowners, TIMOs and MIS. Since the GFC there has been very little interest in softwood plantation expansion at all. Only 2,200 ha were established in 2012-2013 covering all commercial plantation species, of which 320 ha were recorded as exotic softwood (ABARES, 2014).

There has been and is such a strong demand for exotic softwood use, that there is a strong case to increase domestic supply to meet the market. The amount of harvest of native hardwoods has been reduced by 60% in recent years (ABARES 2015). Growth rates can be improved, but are close to a Site Quality value which should produce sufficient timber for a RWE of 1m$^3$ per capita. The spreadsheet figure of a plantation stumpage cost close to $9,518 per hectare is taken from information of two examples provided by Professional Foresters (pers. comm. N. Cameron and N. Cooper, 2013).

It might be concluded therefore the fundamentals of forestry investment are achievable. There would be a market demand in the future. A very strong one if further manufacturing of paper products takes place and the population continues to rise according to ABS median predictions to 36 million by 2045. There would be sufficient land but land prices would need to be sensitive to the financial needs of plantation expansion. Public land should be identified first for plantation expansion. This would reduce the amount of concern private sector agribusiness land
owners have about there not being sufficient agricultural land for any expansion needed, except for inflated higher prices competing for purchases.

There are plenty of examples of growth rate values in keeping with an MAI of 20 m³ (pers. comm. O’Heir, 2013). It is likely that demand for Pinus radiata will continue to be strong by the time any current plantation expansion becomes available in thinnings around 2032, or clear felling in the 2040s.

Currently, there are no substantial available volumes from native forest grown on public commercial forest or from plantations of hardwood and softwood that are not currently committed for commercial sales. In order to provide definite sustainability for ongoing crops of Pinus radiata this thesis recommends that specific land area boundaries be legally defined for establishing sustainable exotic softwood plantations as a priority. This would improve efficiency in relation to processors costs needs, confidence that land can continue to grow forests as a classification, and would be a confirmation of suitable areas for plantations by having government determined suitability. Both government and private sector confidence with infrastructure facilities in a suitable identified area would assist in keeping committed work forces and other service industries available. The focus on PPMA’s would suit industry confidence to spend capital. Also provide confidence to individual investors and finance houses to provide funding through their clients that, such an investment would be a low risk one.
3.0 Chapter Three: Features and Drivers of Plantation Investment

3.1 Contents list

3.2 Introduction
3.3 The identification and features of the investment classes
3.4 The Drivers of Investment classes
3.5 Where would the investment come from?
3.6 Determining the investment Term
3.7 Making a decision to invest and tenure security
3.8 Secondary markets
3.9 Taxation and statutory requirement
3.10 Market dynamics
3.11 Conclusions

3.2 Introduction

The species *Pinus radiata* grows softwood particular fibre with a wide use ranging from the sawn and veneer industry to papermaking and pellet production. The species also absorbs wood preservatives under moderate pressure for long term performance in outside placement (Australian Standard: 1604, 1980). The species also dries quickly under high temperature and low humidity when Kiln Dried. This chapter illustrates its ubiquity by listing the range of the activities using the species.

An examination of the history and virtual ceasing of funding for the development of the Management Investment Schemes (MIS), which constitute the large hardwood plantation investment approach during the period 1993 to their failure during the GFC in 2008/09, indicates that there are five main factors for success. To satisfy this hypothesis, experience has shown a whole approach to low risk investment, plans and arrangements need to be in place for all five main factors. Preferably also other ancillary factors to achieve the best results, before the start of any major plantation project. In summary, the main factors to meet the hypothesis are:
1. **Attractive and competitive IRR per hectare.**

If some form of grant to achieve such a figure has to be offered to potential investors capping might be necessary, based on current IRR’s of between 4 and 6% (de Fegely, 2011; Standing Committee 2011). To lift IRR’s by 2% currently it appears a lifting of the price of stumpage to reflect inflation as it is reported quarterly by the ABS, or providing grants from levies on the exotic softwood sawn timber and paper manufacturing industries and imports, would obtain the difference between an IRR of 6% and a competitive 8% for investment interest. These approaches could circumvent the federal government providing such a funding.

2. **Perpetual Plantation Management Areas in each State and Territory (PPMA’s).**

Suitably defined for plantations for softwood expansion, could benefit from grants to lift the stumpage price to a competitive level, if necessary. The Site Quality to determine satisfactory volume yields being determined by independent checks supervised by Governments. Governments would also provide services to ensure satisfactory standards are sustained, research co-ordinated and annual planting targets met. They also provide infrastructure services such as power, roads and construction of social facilities such as communication and community facilities.

3. **Ensure a formal arrangement is in place with the Australian Stock Exchange.**

To include buying and selling of plantation assets both for new projects and meeting the need of secondary markets for buying or selling plantation assets.

4. **Long term acceptance of plantation expansion.**

To meet 20,000 ha of softwood plantation expansion needed per annum over 30 years, calculated on an ABS medium assessment of population increase of 12 million by 2045 and using a MAI of no less than 15m³ per ha per annum.

5. **Management of projects would require local PPMA Committees.**

With managers for each entity drawn from local projects, a central overriding office, and appropriate Government representation. Overseen by a National PPM Committee. For
instance, to satisfy the range of interest entities would include Governments, Farmers, Private investors, Private landowners, Commercial investors, Timber Industry Management Organizations, MIS project, Responsible entities (Res), Corporations without manufacturing and with manufacturing, The Armed Services for explosives, Heat for power generators. For the wood requirements of a nation cover wide use and a constant close distance for volume availability in a PPMA, would constitute a security in the national interest.

In distinction to the investors interested in plantation investment the drivers of plantation establishment and management are not necessarily the same skilled people. Required are those people with technical knowledge and persistence with access to an administration structure for projects in a defined PPMA. This should ensure reaching a satisfactory return for Investors and a national volume growth target, using research purposes such as improving growth rates and control of costs.

The skill set of project managers who are either given the responsibility by a Corporation or those who are declared as Responsible Entities is needed. As indicated above, Project managers require a financial structure for attracting investors consisting of an attractive rate of return, a low risk investment for such a long period to harvesting, a current or potential market within an economic distance with access to a secondary market which can sell investments, or buy further into a plantation management investment.

For this thesis is a contribution to stimulating a low risk solution for an investor interest in exotic softwood plantations. The evidence presented by Government and Industry in Chapter one indicates the needs since 1990, but the specific mechanisms and options or action for expansion of exotic softwood plantations have not, so far, been presented by 2017. This chapter therefore reviews options to reach a set of decisions involving the five major factors and some important ancillary ones too.

3.3 The identification and features of Investment Classes

There are a number of investment classes which use, or could use Pinus radiata and this section summaries them to confirm the extent of the uses for the species.

The tools required to meet the needs for Investment classes vary, and in order to determine the most likely success this section, first of all, identifies the support that governments will still need to provide as an ongoing service. First of all, both the Investors and the Drivers of projects will need the support of a strong and positive overall administration. That administration would be carrying out a national responsibility to ensure enough wood fibre is available for current and future communities as a private sector function, instead of the main leadership operating function coming directly from governments. Never the less, strong Government support services will still to be required, providing probably financial incentives, such as continuing tax deductions, for any Government agreed planting outside PPMA’s.

A research function too will be necessary in order to particularly reduce establishment costs with more mechanisation. An example would be, for instance, the current confirming of suitable equipment for tree planting technology. Advances in mechanization should produce savings in time and physical labour costs (Van Horlich, 2016).

Statistics too will need keeping to assist in keeping up information to identify national targets, setting of standards of plantation management, and the infrastructure funding of local infrastructure for education and development of local business functions. The management interest by Federal and State Governments and the Territories, should ensure rotations are completed and produce a profitable harvest. Statistics showing little softwood planting in softwood has occurred since 1995, which constitutes two thirds of a mature rotation.

Indirect benefits occur with plantation establishment for creating jobs, training and employment external to forestry and this helps to ensuring the nation’s population is widespread in the Australian Continent (ABS, 2015). In making a decision to follow an option arrangements need to be simple and be able to be audited by Governments, requiring continual checks with liaison for keeping planting to a national target, providing research findings, covering standards and growth improvements and identifying field training courses. Support too for infrastructure will also be needed.

The arrangements could be achieved at a perpetual and sustainable level of timber volumes but would require support from a representation of private investors, growers and project managers
in the form of a local PPMA committee under a National committee (PPMC) with a
determination to reach an annual target setting for plantation establishment. Recommending
prices for project managers to charge and attending to any legal matters. The purchase of
equipment and fertilisers for instance too, to keep the whole national operation running
efficiently to clear fell could all be handled by each local PPMA Committee under a PPM
Committee representing local committees and their interests.

From about 1967 to 1978, the Federal Government offered loan finance to State Governments
at very modest conditions of no interest for the first 10 years of a Government plantation project
and then single digit interest with loans to be repaid at the latest at 36 years (Softwood loan
agreement Acts, 1967-78). This means of Commonwealth funding resulted in establishing a
high proportion of the current 1 million ha of Pine species growing in Australia of which
760,000 ha are of *Pinus radiata* (ABARES 2015). Located mainly in public land areas of NSW,
Victoria and to a lesser extent in South Australia, Tasmania, Western Australia and the ACT.

Nearly all projects funded by Federal Government loans were on State owned or suitable public
land and this continued through to the early nineteen eighties. The programme was to alleviate
the reduction of use of native commercial hardwood growing on Public land having been
transferred into non harvesting areas described as National Parks. Several State governments
withdrew totally from funding plantation projects, except Western Australia and New South
Wales. These two Governments continue to fund their plantation expansion from cash flows
from harvests from the original plantation investments. Publically the WA Government has in
2016, announced a budget of 21 million dollars for a mainly *Pinus radiata* plantation expansion
of 10,000 ha which will probably include the cost of a land base (Hampton, 2016). The Forestry
Corporation of NSW also purchases satisfactorily growing immature private plantations of
*Pinus radiata*, as well as buying parcels of private land for softwood planting. South Australia
mainly leaves plantation ownership and expansion to existing private plantation companies.
Tasmania and Victoria may have to rely on Timber Industry Management Organisations, such
as New Forests, who have planted about 6,500 ha in Tasmania in 2016, with replanting and
also fellow land (TIMO, 2015).

Private funding to increase the stumpage prices to be more attractive could come from grants
provided by a Bond Market (Fell, 1983) rather than from corporate levies by some timber
processors. The former could keep government funding for infrastructure needs.
A formal secondary Australian Stock exchange (ASX) market to handle the changes of ownership through to clear fell for a minimum of 25 years could be listed in equity listed transactions. Successful Plantation companies who could have accepted an option of an Industry levy grant described in a Product Disclosure Statement (PDS) might lose any tax related benefit if a first investor did not hold the project equity, at establishment for less than probably 4 years. This period exists for primary industry tax deductions from income, and potentially for future grants. The concept of a grant would be a new approach for Australia but common in the UK and available under certain conditions (Snowdon, 2003; UK Confederation of Forest Industry, 2010). Those conditions include no income tax on plantation produce sales but no consideration occurs for discounting income against costs incurred in plantation management, outside grants.

**Plantation Investment Class: Farmers on their land.**

Whilst the thesis is focussed on large contiguous plantation areas there will be occasions when those integrating farming activity with plantation management, outside a declared PPMA, will be interested in developing plantations with a long term view of being part of a new PPMA. The advantages that farmers have, or will need, is the understanding of climate and soils. The need will be to plant *Pinus radiata* in a minimum area for an economical harvest and in a location generally of a maximum of a log cartage distance of some 150 kms to a processors activity. Financially the use of a tax deduction for costs against an individual income has been an advantage. Forestry being incorporated into the Federal Income Tax Assessment Act in 1961 as a primary producer. Even if the planting in one of several years is restricted, because of an individual income limit for discounting, their individual income against costs, a minimum area of 5 ha would be economically desirable. Multiple properties sharing equipment might be needed to ensure success too.

A potential option would be a grant in a PPMA or a bank loan against a property mortgage. The loan being paid off from a cash flow from other activity. Forming a cooperative with other farmers would also be a positive move in terms of an approach to pricing of harvests. However a grant could be greater than the cost reductions on a person’s income allowing a larger area to be considered within a PPMA.
Plantation Investment Class: Private Investors.

This group would need a technical person for advice from the beginning of the consideration of making a personal investment as one a low risk. Whether for investment in a MIS having a Responsible Entity with a professional forester, or for an individual investor such as a Professional person not living on his land, wishing to control and manage their own land asset. Some connection to a processor would be desirable for this option, with an individual investor owning the trees and land and accepting a tax deduction for costs. This could also assist in ensuring pricing value is not lost at harvest time. The limitations would be the understanding that accepting a tax or grant concession or a potential one would mean governments ought to have access for management inspection of a plantation until after the main sawlog harvest. This class of investment would consider having access to a secondary equity market to sell or buy being part of the overall service available. This class can benefit strongly from being members of the Australian Forest Growers Organisation, to keep up to date on advances of management techniques and overall management advice.

Plantation Investment Class: Private landowners.

This Investment class of private landowners would be that part of the community who buy a parcel of land wanting flexibility for its use, only using parts of the property in a plantation that is not suitable for other crops, or intense animal production. Great care has to be taken before any tax concession, or potential grant used for such an investment, is agreed to by the government or a potential grant or loan from a finance house. This is because it is essential any subsidy concession as part of an investment, must result in a satisfactory standard and the suitability for sufficient growth can be checked for areas established as a plantation.

Plantation Investment Class: Commercial investors.

On enquiry to agents for stock broking investors who deal in equities or small firms wanting to be a part of a main investment by others, like to have the opportunity to have access to facilities to withdraw from an investment. Often well before ten or eleven years of growth and this is possible if a secondary market is available (pers. comm. R. Dew, 2014). Many investors might see a well-managed plantation at around age 10-11 as being a low risk investment. The history of immature plantation sales is that investors like to buy at around 10-12 years when it
is possible to confirm the growth rates of a plantation and a large part of establishment and maintenance has, by that age, been paid. It is essential to get the best stumpage return for the investor. This has a chance of occurring if this group has access to a secondary market with more than one buyer for selling competition to a new owner.

**Plantation Investment Class: Managed Investment Schemes.**

The largest investment in MIS hardwood plantations, needing only 10-12 years of life before harvesting for overseas hardwood pulpwood sales, were established during the period 1983 to 2008 until the global financial crisis occurred. The result of which caused an almost complete cessation of investment funds into expansion of softwood and hardwood plantations. The MIS concept for plantations allows by law a minimum of one acre investment to receive any tax support, in an amalgam of investment, amended and strengthened by an Act of Parliament in 1998/99. It suits people with low incomes investing on the same property, each one have defined boundaries needed checking for ownership and soil quality. The MIS projects are promoted by have a Responsible Entity for plantation management (Managed Investments Act 1998/99, No. 62 Clth) assisted by a Professional forester. The shortness of the rotation for hardwood plantations for pulp compared with a minimum of 25 years for *Pinus radiata* resulted in very little new softwood planting occurring because of the lack of a formal secondary market to allow exit or purchases. Even though the spreadsheets associated with this submission show it is possible to achieve an IRR of 8% for a 10 to 12 year investment for softwood over such a period. Thus allowing competition with hardwood plantations. This feature did not appear to be emphasized at all during the strong interest in hardwood pulp investment.

**Plantation Investment Class: Timber industry Management Organisations.**

This group of Investment Classes became dominant in Australia as a result of the Global Financial crisis. It is a group emanating in the USA and Canada who bought plantations and pay rent or purchase the land as well as the crop in several countries. This is has resulted in the TIMOs owning a substantial proportion of the hardwood plantations in Australia, mainly *Eucalyptus globulus* and *Eucalyptus nitens*, constituting about 500,000 ha and some processing facilities. They have formed Australian registered companies. The group also have plantation investment in South Asia and North America. A recent profitability annual report of the aggregated area investment of a TIMO called new forests, was a successful one for
superannuation funds (Australian Forests and Timber News, 2015). Hopefully they could form an interest in softwood plantation investment in Australia, having already started in a modest way. They could be an investment attraction in several classes listed.

**Plantation Investment Class: Corporations with manufacturing Facilities.**

As an example, in the late 1930s Australian Firms built increased facilities for manufacturing various forms of Paper. Indeed Australian Paper Mills first built a paper mill manufacturing in Melbourne even in the 1890s (Algar, 1988). The successful research conducted in the Perth, W.A. Technical College in the 1920s resulted in Australian Newsprint Mills building a facility at New Norfolk, in Tasmania, which came on stream during the Second World War (Australian Newsprint Mills, ANM, 1988). The ANM New Norfolk development and also that of the Associated Pulp and Paper manufacturers at Burnie (APPM) were only possible because of the resource made available in native hardwood in Tasmania. Over the years from 1946 to the 1970s, increasing amounts of New Zealand *Pinus radiata* became available and were added in the pulp furnish. *Pinus radiata* is used extensively for Newsprint production at The Norse Skog timber processing operation in Albury, NSW.

All paper manufacturing companies have established their plantations with professional foresters and have paid for their establishment and management or pay long term Royalties for their requirements. Some of these Corporations have also produced sawn Timber and wood pellets, but are in a position to have sources of funds for capital available and may not require special attractive investment funds. Liaison with the Government for the continuing management of their plantations are usually satisfactory but Corporations would benefit probably from industry knowledge, without the need for formal inspections. Indirect support for them does occur for infrastructure such as roads, power reticulation and local schools.

**Plantation Investment Class: By Corporations without manufacturing Products.**

These Corporations have a serious disadvantage in times of low demand, or exposure to stumpage price contraction because of competition at the stump. Investors might only consider a financial commitment to invest if some contractual marketing conditions are in place, or the risk can be definitely low for substantial annual sales. Some hardwood MIS Corporations of a substantial size failed when the GFC occurred because of a lack of a cash flow from the trees
not able to be sold, because of immaturity and financial balance sheets showing too much spending on the increasing price of land purchased, which had been just planted so selling the asset, was not an option.

**Plantation Investment Class: The National Security.**

Armed services and Heat for Power Generation facilities require substantial volumes for the manufacture of explosives and increasingly heat generators using pellets for electricity generation. Suitable pellets can be supplied by *Pinus radiata* plantation residues. However these items need to be available in constant supply on an annual basis, but servicing for these industries may not present a need for them to establish their own plantations.

**3.4 The drivers of investment classes**

There are two forms of drivers: Finance, location and secondary markets, and the skill of leadership to attract investment using a low investment risk strategy capable of producing and delivering satisfactory profit results.

1. **A proportion of funds for projects** should be reliant on stock market investors, if a formal arrangement was negotiated with the Australian Stock Exchange.

2. **A stimulation of activity will come from** agriculturists, Private investors and Private landowners from an acceptable IRR and market potential, with satisfactory field checks of soils and climate, together with ongoing intermittent forestry professional advice, coupled with using a tax concession, or if in a PPMA, a potential grant.

3. **MIS project investors and Corporations** with manufacturing facilities would be attracted with a competitive IRR and the availability of a grant if in a PPMA. Manufacturing Corporations should be capable of receiving grants on the basis that a project would otherwise reduce company profits for long periods.

4. **Corporations without manufacturing facilities** would be acceptable to receive a grant in a PPMA, but when seeking investment their Product Disclosure Statement must show clearly any contracted or marketing potential to indicate low risk potential investment. The same would apply for a MIS.
3.5 Investment sources

There are a number of investment approaches available for investing in low risk major softwood plantations.

1. From Government agencies providing initial funding to stimulate activity.

2. Stock exchange listing: This approach would provide the constancy of a market being available at a stated age and IRR for establishment, or the selling of profitable immature plantations based on an acceptable IRR. One important means would be making available a stock exchange listing. This could serve as a continuing means of listing projects for investment in softwood plantation establishment and management and buying or selling of immature and mature plantations, or defined parts thereof.

The use of the stock exchange could provide an option of a simple effective means to offer investment in trees giving a wide exposure to potential clients. Such an option would require an ongoing administrative connection to be established, so that an investment opportunity becomes known that the private forestry sector have an opportunity, capable of competing with equity investments, and bank investment options at low risk.

The costs for setting up and maintaining rights for stock exchange membership would need to be initially arranged through a National Perpetual Plantation Management Committee (PPMC) representing all local PPMAs. Then the buyers or sellers would pay a usual commission for each transaction undertaken to the stock exchange company (pers. comm. R. Dew, 2016).

A secondary market could bring in new and overseas investors as well, at a nominated 8% IRR for instance. However such a stock exchange forestry classification does not currently exist, because of the small number of public companies in the timber plantation growing industry. There is only an intercontinental exchange for agricultural commodities which suits a small number of products such as coffee, cocoa, sugar and wheat. However domestic agricultural companies are listed on stock exchange equity markets which might be suitable to use, as an example.

3. Some investment classes may need to use an ASX listing when commencing plantation establishment only, such as manufacturing corporations.
4. Experience so far has shown individual investors have been prominent in investing, on the advice of accountancy firms, particularly with MIS.

5. Learning of investment opportunities through word of mouth, through Government agencies, and through industry associations.

6. There could be two streams of investment for plantation projects stock exchange listings. The first stream could by the project owner of the land, or a promoter leasing the land through to harvest, who has the option of having a group of investors with him buying or renting the land and sharing in the proceeds of selling or buying shares in the promoters company servicing the tree investors.

7. The second stream could consist of investors using a stock exchange to change owners. This is an important requirement for a low risk investment. Table 24 for stock exchange results can be used as an example from Vanguard Co., stock brokers to the AMP Society, to indicate that an IRR of 8% is sufficiently high for plantation purchase with a levy grant or price adherence to inflation rises (Table 16), if necessary, to attract investors away from bank and other forms of interest. The Stock exchange approach could ensure the Government does not have to subsidise the IRR for obtaining investment. If the investment price known as stumpage, rises with inflation the price can be attractive (Table 16).

8. If the price of investment is not able to be raised then a recourse to an industrial levy could be considered from companies producing sawn timber and paper manufacture who currently do not pay a levy for forestry and industry use, subscribed to by Government and Industry (Forestry and Wood Products Levy, 2016).

9. If the softwood plantation Investment is made for a period of say 10 to 12 Years and a stock exchange arrangement is in place, this could be an alternative to investing in a hardwood plantation.

10. Raising funds from the Bond Market. If the timber industry organised a Bond market (Fell, 1983), for plantation funding, which at the moment (late 2016) is 2.1% for 10 year period for Commonwealth Bonds, then an IRR of 8% depending on site quality being capable of an IRR of 6% without support, could be an attraction.
11. **Superannuation funds.** Could be a long investment provider even at a low risk IRR of 8% as superannuation funds look for over 9% profit annually. However finance for softwood plantations could still interest State Governments particularly during the first few years because of the negative financial effect on investors who invested in hardwood plantations caused by the GFC.

12. **Other options:** Growers and other commodity traders advertising in their Client newsletters. Real Estate Agents in a proposed PPMA would also be a good source of investment information. Industry and State commercial forest services could also direct enquiries to a local PPMA committee or to the AFG to obtain information as to how to invest.

3.6 **Determining the term of the investment**

Spreadsheet calculations would need to indicate how long investors are required to hold an investment. This is currently four years or otherwise a concession would have be returned to the tax commissioner. But for grants no discussion has, as yet, been discussed. Records of transactions indicate second owners prefer to pay for an immature plantation in softwood between 10-12 years old (See item 10, section 3.5).

The first thinning harvest would yield of the order of 225$m^3$ per hectare at age 15 and would only consist of wood pellets and pulpwood and a second owner would have to wait until about age 22 for small sawlogs and round wood for recreation construction and pay some of the annual maintenance from a modest cash flow. Thus the second owner would either buy for a further period of a maximum of 10 years and sell to another, or keep the investment to clear fell until age 30, certainly to at least age 25.

It is important for the second and third owners to maintain their corporation potential grant status for maintenance, or as private individuals the ability to discount their maintenance costs against their income.

A project must continue until clear fell either under the original investor or a succession of owners. From the Governments point of view it is essential a successful plantation is not clear felled before age 25. This is because the timber growing in a tree must reach a certain strength to meet standards set by standards of Australia for structural use. It is preferably to only finish the rotation when the annual current increment is less than the MAI which is nominated,
depending on the Site Quality tables shown in Table 20 (Lewis et al., 1976). What is most important is for the checking of the potential growth rate of a proposed plantation to have been determined before any plans of a project are completed and shown in a Product Disclosure Statement (PDS).

The site quality for a plantation should be estimated by independent field checking by State Governments, via Registered Professional Foresters with safeguards to prevent the investor suing if the final result lies outside the forecast because of poor rainfall, or a disease or a factor not attributable to the promoter (National Sirex Coordination Committee, 2000).

3.7 Making a decision to invest and tenure security

The success of Governments in establishing plantations up to about 1985 should ensure some of the factors contributing to that success could be retained. There are several ways that Governments could stimulate investment in softwood plantations. NSW has bought some early age plantations from the corporate sector, and is a corporation able to establish plantations in their own right. There are many examples of interest free loans for an initial 10 years (Softwood Forestry Agreements, 1967-1978), and tax incentives have also been used to stimulate private investment. The UK Forestry Commission arranges grants of various sizes for their private clients - but investors do not pay income tax on the harvesting income (Snowdon, 2003). Investors generally have access to stock Exchanges (ASX) and Table 24 shows comparable investment returns.
Superannuation funds, even with the Bond rate being currently at 2.1%, expect an annual return of a minimum of 9% with the equity market averaging an average of 12% annual profit (Table 24; Vanguard Ltd., 2014). Softwood plantations in Australia are returning about 6% IRR. This is lower than quoted overseas plantation IRR stumpage.

A legally secured tenure and Company Registration is an absolute necessity for a project involving any size of land to be recorded for Target purposes alone. Each State or the Commonwealth Government does maintain a suitable register of owners. Intending investors should sight the registration of the ownership of the land. If the site is mortgaged they also need to receive advice that payments by the owner of the land are up to date. The responsible entity

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### Table 24. Vanguard Investment Returns Chart 1985-2014.

| Year  | Australian Shares | International Shares (Hedged)
<table>
<thead>
<tr>
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<tbody>
<tr>
<td></td>
<td>Australian Bonds</td>
<td>International Bonds (Hedged)</td>
</tr>
<tr>
<td>1985</td>
<td>39.5</td>
<td>61.6</td>
</tr>
<tr>
<td>1986</td>
<td>47.5</td>
<td>55.2</td>
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<tr>
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<td>54.0</td>
<td>32.6</td>
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<td>1988</td>
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<td>-10.0</td>
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<td>18.1</td>
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<tr>
<td>1997</td>
<td>26.6</td>
<td>20.6</td>
</tr>
<tr>
<td>1998</td>
<td>1.6</td>
<td>42.2</td>
</tr>
<tr>
<td>1999</td>
<td>15.3</td>
<td>8.2</td>
</tr>
<tr>
<td>2000</td>
<td>13.7</td>
<td>23.8</td>
</tr>
<tr>
<td>2001</td>
<td>8.8</td>
<td>-8.0</td>
</tr>
<tr>
<td>2002</td>
<td>4.5</td>
<td>-25.5</td>
</tr>
<tr>
<td>2003</td>
<td>-1.1</td>
<td>-16.5</td>
</tr>
<tr>
<td>2004</td>
<td>22.4</td>
<td>19.4</td>
</tr>
<tr>
<td>2005</td>
<td>24.7</td>
<td>0.1</td>
</tr>
<tr>
<td>2006</td>
<td>24.2</td>
<td>19.9</td>
</tr>
<tr>
<td>2007</td>
<td>38.3</td>
<td>7.8</td>
</tr>
<tr>
<td>2008</td>
<td>-12.1</td>
<td>-21.3</td>
</tr>
<tr>
<td>2009</td>
<td>-22.1</td>
<td>-16.3</td>
</tr>
<tr>
<td>2010</td>
<td>13.8</td>
<td>5.2</td>
</tr>
<tr>
<td>2011</td>
<td>12.2</td>
<td>2.7</td>
</tr>
<tr>
<td>2012</td>
<td>-7.0</td>
<td>-0.5</td>
</tr>
<tr>
<td>2013</td>
<td>20.7</td>
<td>33.1</td>
</tr>
<tr>
<td>2014</td>
<td>17.6</td>
<td>20.4</td>
</tr>
<tr>
<td>Average</td>
<td>12.9</td>
<td>11.4</td>
</tr>
<tr>
<td>Best</td>
<td>54.0 (4)</td>
<td>61.6 (4)</td>
</tr>
<tr>
<td>Worst</td>
<td>-22.1 (2)</td>
<td>-23.5 (5)</td>
</tr>
</tbody>
</table>
to be identified under the Management Investment Act of 1998/99 of a project is either the land owner, the promoter or general manager, or a company. A complaint can be legally made to a Responsible Entity of a project for non-compliance of a project Product Disclosure Statement (Formerly known as a prospectus).

The PDS prepared by the promoter must be checked to ensure for recording all the information requirements of a project by Law, prior to a project starting. For example the cost of a project per hectare, including management overheads, and current clear fall incomes, with specifications on required field management and responsibility. Checking is carried out by the relevant Federal Government department known as the Australian Securities and Investments Commission (ASIC), coupled with a relevant State Departments.

A default of a tree grower for maintenance payments to the project company, if persistent, should allow the promoter, in cooperation with a local PPMA committee, to sell that persons interest after suitable warnings. The cost of finding another investor may need to be borne from the proceeds of selling a failed investors interest. A tree grower may auction his interest as an option. However the plantation promoter should have a right to receive at least a year’s forward maintenance costs.

3.8 Secondary markets

Plans for a secondary market were being laid by the Tree Owners Association, a division of the Australian Forest Growers (AFG) prior to the Global Financial Crisis (GFC), but these plans were not advanced sufficiently to report upon (pers. comm. A. Cummine, 2014). A secondary market would provide greater flexibility for investors, and enable them to plan investment returns at intervals independent of plantation rotation lengths. Such a service could be encouraged by the PPMA local committee as the first option with finding a suitable buyer to help reduce risk to investors.

The AFG and The Association of Consulting Foresters of Australia (ACFA) could advise a structure to ensure transactions are valid, particularly area measurements. As the Managed Investment Schemes have played a strong financial role of drawing in finance there is also a need for local PPMA to have access to a set of satisfactory PDSs maintained by the ASIC.
From experience the author of this text would consider an introduction of a formal secondary market as essential to success of stimulating a revival of exotic softwood plantations. This would allow the opportunity to enter or leave an investment to be flexible, after an initial period of four years through to the maturity of a plantation. Because the demand for exotic softwoods will continue there would also be a need for a second rotation on areas which have produced anticipated growth.

A secondary market would also allow overseas buyers and sellers to observe the price movement of plantation market transactions which should lead to plantations over a long period to maturity, to be valued often for changing hands. The value of a secondary market would be enhanced by investor interest, if the concept of the local PPMA was established, it could provide leadership for optimising firm prices, and could pave the way for attractive IRR results to compete in stock exchanges.

The effect of the GFC in causing cash flows to cease might have been less with a secondary market in place. Instead cash flows stopped with banks calling in their loan money. As a result the investment market for many plantations hardwoods failed. The exotic softwood investments, at all events, were outcompeted in number and value by the shorter rotation hardwoods mainly fast growing Eucalypts.

3.9 Taxation and statutory requirements

1. The current position regarding tax payments

Rebated costs from income for an individual investing in the plantation industry does not confer any advantage which is not available to any member of the public (Cummine, 2005, 2008, 2010). The AFG has spent much time since its inception in 1969 on tax matters. Submissions for the benefits of the Federal Government policy that forestry was a primary producing industry and therefore a commercial plantation management operation resulted in obtaining the same tax benefits as other agricultural producers, with only one not being granted that of no spread of five years to be income tax on the business.
2. Information concerning tax issues

The plantation industry has to operate a profitable free market activity and to respond to tax laws and its regulations in relation to current plantation operational. The Managed Investments Act covers mainly rules for administration of the MIS. The formal identification of having only a Responsible Entity for performance judgment and not including a dual role with a trustee, was an important improvement in arrangements. This ensured the management responsibility of a project lay clearly with one person or corporate entity.

3. Equity in timing of tax returns

However timing from investors for the collection of tax had been a main problem but has been resolved. It could have become known as a non-synchronized tax collection (Figure 3) with tax collection required before the invested money could be utilised. Plantation management concerns arose strongly in 1998/99 from the issue of the Government not accepting the inequity of timing of Plantation investment requirements concerning the payment of tax on profits. This was brought about by the non-synchronisation of timing of taxes to be paid to a project by the investors and the immediate tax payment by June the 30th before the majority of the land purchase and field assessment and planting had taken place by the project. As the project would have received the money as income it could not have been spent immediately on costs which could be set against income.

This had to be rectified, and this caused the Government to examine the Managed Investment Act of 1998/1999. The regulations under the Act were changed and plantation projects pay any tax due at the end of June the following year. This now gives sufficient time to complete necessary land purchases and establish the investors plantations paid for in the previous financial year. For many investors, their tax return for a particular year is not assessed well into the following year (Hansard and Dean, 1991).

After such a long time, the grower will get taxed at the highest rate when by far the largest income comes at rotation’s end. The regulation for agribusiness projects is that tax on profit can be paid over a period of five years so that peaks of tax are smoothed out, but the rule included a need for the agribusiness profit to have a profit return in the previous year, when the smoothing out could then be claimed starting the next year. Forestry cannot comply with that
rule, having only two or three thinnings and then one main harvest at the rotation end. It still requires alteration to give a fairer basis for tax payments being spread over 5 years at least when the main harvest occurs.

Planting for a first or subsequent crop will almost certainly occur across the end of the financial year because plantations are established in the winter period. Thus bridging the tax year does create an inequity in 30th June tax timing. The effect of paying a full year’s tax at the end of the same financial year is shown in Figure 3. Challenges of seedling supply and land acquisition coincide with 30th June tax obligations, creating operational difficulties If the majority of plants had been exotic softwoods taking longer to be ready for planting, the effect could be most severe with potential enormous income tax being paid by the project itself before costs were met against the income already received. The Eucalypt plantation industry responded with a satisfactory performance to succeed with carrying out the regulation for one year but it came with difficult supply and financial consequences. Fortunately good parliamentary sense prevailed and the rule for forestry was changed so that investors’ money, paid right up to the 30th of June, could be used to plant for the following 12 months to June 30th, hence the coining of the term ‘twelve month rule’. An example of this problem is shown in Figure 3 and Table 25 (Parliamentary Joint Committee on Corporations and Financial Services Inquiry into Agribusiness Managed Investment Schemes, 2009).

**Figure 3. The effect of negative tax policy changes for plantation establishment.**
A summary of current tax arrangements are listed in Table 25.

**Table 25. Current Taxation arrangements.**

1. Every plantation project, offering investment must have a responsible entity. This can be a person or company who, by law is responsible for the conduct of a project (MIS Act 1989/1990.)
2. Individuals investing in plantations, even though they are not part of an on-site plantation management project can declare themselves as a primary producer for tax purposes.
3. This status allowed individuals to deduct the costs associated with plantation establishment and management to be deducted against their income, before tax is paid.
4. To provide a balance between the need to invest before 30th June and to ensure sufficient properties are available for planting, the promoter has until the end of the next financial year to claim costs from the previous year’s investment funds before paying company or individual Tax on the resulting profit. This applies only for the establishment year.
5. The promoter must spend at least 70% of the overall project management charge to an investor for the project’s field operations and a proportion of the cost of land.
6. Costs of fire insurance and maintenance are deductible against the investors overall income each year.

(In the references see also ATO Rulings, 2015: IT360, IT2195, T/R95/6, T/R2000/8, T/R 2001/14, PR/99/95, and PR2014/18 which covers specific detail).

The tax issues took from 1969 until 2009 to be resolved from an initial position when forestry activities were first allowed a status of being a primary producer to the current position, following the passing of the Resource Assessment Commission Act in 1988/9 with further negotiations concerning regulations into the early 2000’s. It is to the credit of the AFG that success was achieved to interest private sector investors. A code of practice disclosure (Table 26) covers essential tax basics and policy statements creating the future for private forestry. This includes information on the following:

**Table 26. The code of practice regarding Product Disclosure Statements (PDS).**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The form of the investment: Hectare holding, covenant, share, syndicate</td>
</tr>
<tr>
<td>2</td>
<td>Taxation aspects of an afforestation project explained</td>
</tr>
<tr>
<td>3</td>
<td>Project description.</td>
</tr>
<tr>
<td>4</td>
<td>Land details.</td>
</tr>
<tr>
<td>5</td>
<td>Comprehensive land description</td>
</tr>
<tr>
<td>6</td>
<td>Professional Foresters to report on silviculture and ongoing management.</td>
</tr>
<tr>
<td>7</td>
<td>Reserves to meet future costs available in case of failure.</td>
</tr>
<tr>
<td>8</td>
<td>Estimates of future returns</td>
</tr>
<tr>
<td>9</td>
<td>Any minimum protection of investors at time of harvesting</td>
</tr>
<tr>
<td>10</td>
<td>An annual report on actual operations report reflecting the pre establishment.</td>
</tr>
<tr>
<td>11</td>
<td>Investors should all be provided with annual reports and financial statements.</td>
</tr>
</tbody>
</table>
In examining Wood Resources International and ABARES reports, it is clear that sales of logs in price and volume of softwoods fluctuate internationally, to the extent that for national security alone, a minimum of 1m$^3$ RWE per capita sustainably, as a feature should be achieved. That is an important issue. This would provide comfort for investors for a low investment risk. If the principle is maintained and it is deemed necessary, as a policy review, a minimum per capita RWE of exotic softwood timber could be adjusted. Couple this continual fluctuation of changing of international exchange rates which are posted daily even on television, it would be wise to give investors a policy of domestic certainty, as far as possible. An example of activity globally is in Table 27.

<table>
<thead>
<tr>
<th>Table 27. Excerpts, 2015 Wood Resources International Fourth Quarter Report.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Global sawlog prices fell again and the Global Sawlog Price Index (GSPI) has declined 14.7% in one year (Meaning poorer profit).</td>
</tr>
<tr>
<td>2. Global trade of softwood lumber reached the highest level in ten years in 2015. Import volume is up for imports to the US, year over year (Meaning demand outstrips domestic supply).</td>
</tr>
<tr>
<td>3. The GSPI fell another 4.8% in the fourth quarter of 2015.</td>
</tr>
<tr>
<td>4. Trade of softwood sawlogs reached its highest level since 2007, last financial year when 1.6 million m$^3$ of logs were imported from other Scandinavian countries primarily to sawmill for processing in Sweden (Meaning Sweden is short of wood for industry consumption).</td>
</tr>
</tbody>
</table>

**3.10 Market Dynamics**

This Section is reviewed as a precursor to the presentation of a new Model for investment. There is still an Australian current continuing balance of payments deficit related to wood products. The need for the security of a wood supply for the Nation in times of war, being able to present a low risk investment, with the difficulty of an IRR with a long rotation length, not reaching or exceeding an IRR of other available investments in the financial market should always be a serious, continuing investment interest by the nation’s leaders.

For project funding, the most successful method of attraction investment has been Managed Investment Schemes. Among investors the system of MIS has come under scrutiny, and currently there appears to be only one major exotic softwood project currently seeking investors (Agriwealth, 2014). Because of this and the current 20 year disinterest in investment in softwood plantations it may be necessary for State governments to offer incentives for plantation expansion. A secondary market could then be established to assist in overcoming the current disinterest. Domestic processors of softwood timber should be at the forefront of
expansion of plantations. They have an enviable record of successful plantation performance in that regard in the past. This section records some of the major drivers.

Managed Investment Schemes (MIS) emerged as a market driver in the late 1970s, and have provided substantial investment from that source, amounting to about 730,000 ha of a total hardwood plantation estate before the GFC (ABARES, 2015). Only one State, NSW, continues to own and manage exotic softwood plantations of a substantial size of about 392,000 ha, including some joint venture plantations (ABARES, 2015).

Only 2,100 ha were established from all species, softwood and hardwood in 2012/2013 in Australia compared with a peak in 1999/2000 of 137,000 ha (ABARES 2014). This has resulted in a reduction in the softwood exotic plantation estate with implications for future wood supply. Concluded in this thesis, a range of some 20,000 ha of new exotic conifer plantations per annum needs establishment. The private sector’s first endeavours into MIS were stimulated in the 1920’s when Southern Australia Perpetual Forests (SAPFOR) plantation projects set up a scheme driven by Charles H. Holmes of Melbourne (McEwen, 1936; Algar, 1988). That Company arranged plantings of *Pinus radiata* around the Victorian south west Border and South-East of South Australia now known as the Green Triangle.

The principles of MIS which already applied in other primary industry businesses were introduced for exotic softwood plantations to interest groups to invest in a single plantation, by surveying an area into small acre or subdivided hectare blocks capable of being bought by people with modest incomes. The system was designed to attract a large number of investors as it could be seen as a low risk venture. However there is need to have a stimulation for investing at the start. It requires entrepreneurs, in some cases, to succeed in projects which may require limitations on their enthusiasm, because of lack of soil suitability, or to be outside economic distances. That is why the setting of growth standards and soil quality checking by a Government contract Professional Forestry Group, with independence is so important. It would also place a focus for servicing and protecting plantation targets.

Access to plantation investment for the public at large requires Product Disclosure Statements being available, prepared by an incorporated body, where the cost of entering a scheme that is required by an individual investor, can be as low as 0.4 of a hectare. In Australia, most State Forest Services were no longer involved with funding plantations by the late 1980’s. After the
arrival of Government policy supporting MER, an initiation phase for funding had to be
developed, by private and corporate investment. That is in an industry where there is an
investor/grower and public view that investing in timber producing plantations is a high risk
activity with poor IRR. This is currently compounded by the public knowledge of the public
loss of most major Eucalypt Managed Investment Schemes (pers. comm. A. Brown, 2010).

A number of significant MIS for Eucalypt plantation establishment were put into receivership
by Banks in 2009 related to the Global Financial Crisis in 2008/9. In part, this was because of
high gearing of debt, due to promoters borrowing from the Banks to buy land to meet pressure
from interested investors, almost demanding involvement in a plantation project. This land
demand needed suitable financial end results, needing vigorous growth on land which escalated
in value when major Eucalypt MIS commenced strongly about 1993/4. However, close
observers of the collapse of MIS projects have blamed a particular element which caused
financial failure. This was a lack of understanding of how important it was for the ATO to
issue decisions on announced tax change arrangements promptly. This was the case at a critical time
of the Global Financial Crisis (GFC) when at the same time, MIS in forestry needed to have
tax decisions, in order to proceed, with field operations on their MIS establishment, using
investors’ funds already collected in by June 1998/9 and needed in operations at the start of the
1990 tax year. Cummine (2010) observed

“The failure of Timber Corporation and Great Southern has had, and will have
profound, painful and far reaching consequences for investors in the projects these
companies ran, and for their shareholders, employees and shareholders. There
were immediate and severe knock on effects in FY2009, with wood lots sales falling
from around $700 million to around $230 million. It is imperative to recognise that
it is the companies that collapsed, not the schemes that the companies managed.

Most of the informed commentators agree that no single factor would alone have
caused the collapse of either company. Rather, the cause was the untimely
convergence of several events that affected the business models of these particular
companies more than any others in the retail forestry sector.” – Alan Cummine,
2010.

It is important to recognise that the Banks and other lending Institutions did not allow enough
time for the promoters of MIS to make arrangements to weather the financial problems before
calling in receivers. Indeed the banks, whilst they probably had their own problems with liquidity, ignored the effect on the whole investment community, if and when the word “receiver” was used. The whole structure of MIS management was enormously affected by the GFC causing losses by investors. They needed protection against an immature asset, in the middle of a rotation, being depreciated, or lost for short term reasons.

The net result has been the sale of many collapsed projects to international timber plantations buyers called TIMO’s. About 500,000 ha of MIS was sold to leading interests representing North American pension funds (Brand, 2014) and the Australian original investors have become out of pocket. Only Three major Schemes remained by 2010 (pers. comm. A. Cummine, 2013). They were Tropical Forest Services (TPS), who were able to obtain funds internationally to continue developing Sandalwood Plantations in the Northern Territory, W.A. Blue Gums who had low debt levels in managing Eucalypt plantations, and Agriwealth who are extending their plantation estate in softwoods (Agriwealth, 2014).

In the calendar year 2005, some $700 million had been invested in some 70,000 ha of plantations. If that level had continued the vision of 3 million ha of plantations might have been reached close to 2020. But the proportion of softwood plantings would certainly have needed to be higher because of projected increases in population, expansion of the domestic manufacturing and construction industry (ABARES, 2014).

**Timber Investment Management organisations and processing Corporations.**

The significance of 25% or 500,000 ha of Australia’s plantations, mostly hardwood, now being owned by overseas investors represented in TIMO’s, (Brand, 2013, 2014) is that they too, should consider driving exotic softwood plantation expansion. They should be entitled to any industry levy grants for expansion establishment, and then maintenance. A further incentive which would assist second rotation establishment would be for the TIMO’s to establish a second rotation using the cash flow from their hardwood mature plantation harvests. But any new owner should maintain the crop or sell it with the caveat that the plantation would be sustained through to a clear fell.
Corporations, with ongoing manufacture with plantation investment

Federal and States forestry policies have encouraged wood using industries to establish their own plantations with shareholder funds. This is what Australian Newsprint Mills achieved in areas close to their plant near New Norfolk in Tasmania and when constructing their Albury Newsprint Mills (ANM, 1938-1988). FCNSW Tumut based \textit{Pinus radiata} plantations planted in the 1950’s are still maintained. The combination of public and private interests have enabled wood supply security and encouraged private investment in the vicinity. This area is an example of a PPMA (Forestry Commission of NSW, 1984; Clark, 2004).

Use of Carbon Credits

The raising of the IRR to 8%, with potentially an available Industry levy grant of 2% of capped costs is important in such a stimulation to attract investors. With annual timber production statistics showing continuity, Australia’s economy will be requiring larger future volumes of timber either with increases in imports of exotic softwoods or the use of some more expensive alternate building materials. An added bonus for expanding exotic softwood plantations is that they can add to carbon sequestration. Figure 4 illustrates the increase in greenhouse emissions which could occur with manufacturing and using other building materials.

\textbf{Figure 4. Greenhouse emission from timber and other building materials}

![Greenhouse emission from timber and other building materials](image)

Source: FWPRDC and CRC accounting, provided by AFPA (2014). (Gustavsson et al., 2006). Approximate Emission figures for an average home in Tonnes CO2: Concrete = 12.0, Steel = 18.6, Ceramic tiles = 5.0, Brick = 6.80, Aluminium = 2.2, Timber = 3.5. Other materials shown = 44.6 total Tonnes. The amount of carbon dioxide emissions for other materials is therefore about 12 times higher than timber.
Whilst Australia currently has few opportunities for trading of carbon sequestration, this possibility needs to be watched (Nijnik and Bizikova, 2008). The possible level of CO2 equivalent cash flow from sequestration in a 1,000 hectare plantation with an overall MAI of 20.8m³/ha on a rotation of 27 years is shown in Table 28 (West, 2009). The expansion factor is the ratio of stem versus the total tree weight and calculates the tree volume of tree roots.

**Table 28. Cash flows from Carbon Credits one hectare.**

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
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<tbody>
<tr>
<td>From 1-10 yrs. of the rotation, Total volume = 125 m³ = MAI of 13.10 m³</td>
<td></td>
</tr>
<tr>
<td>Stem density x 0.40 m³ = 5.00 m³/ha Expansion factor x 1.2 m³/ha = 6.0 m³</td>
<td></td>
</tr>
<tr>
<td>Carbon dry wt. ratio x 0.45 = 2.7 m³/t of C02 equivalent x 3.67 = 9.90 m³</td>
<td>99.00</td>
</tr>
<tr>
<td>x10yrs=</td>
<td></td>
</tr>
<tr>
<td>From 11-27 yrs. of the main rotation Total Volume = 436.5 m³ = MAI 22.83</td>
<td></td>
</tr>
<tr>
<td>Stem density x 0.4 = 9.13m³. Expansion factor x 1.2 m³ ha=109.56 m³</td>
<td></td>
</tr>
<tr>
<td>Carbon dry wt. ratio x 0.45= 4.93 m³/ tonnes of C02 equivalent x 3.67=18.09</td>
<td></td>
</tr>
<tr>
<td>tonnes. Equals=18.09 x 17 yrs. = 307.53 =</td>
<td>307.44</td>
</tr>
<tr>
<td>Grand Total = 99.00+307.53 = tonne</td>
<td>406.53</td>
</tr>
</tbody>
</table>

(West 2009)

As an example, at a C02 equivalent price of $5.00 per tonne and carbon sequestration averaging about 50% during a rotation, discounting the weight of water in the trees, the value would be 50% of $2,017.2 per ha divided by 27 years, and would give an average annual maintenance contribution over 27 years of $37.35 per annum, per hectare. This could cover most of Fire Insurance and public liability costs per hectare, but not annual maintenance or rent. A higher price for carbon could have a useful financial effect on maintenance costs. That figure is also based on the assumption that a plantation would operate for several rotations, as at the end of a rotation the carbon credit would be a cost against a carbon credit cash flow at tree removal (Newman, 1998). A number of European countries are interested obtaining financial credits from carbon sequestration. Countries such as the UK, the Netherlands, Slovakia, and the Ukraine have numerous carbon policy initiatives directed towards both woodland expansion and as a substitution for fossil fuels (Nijnik and Bizikova, 2008).
Contribution to GDP

It can also be shown that a plantation industry is an essential contributor to the economics of Australian GDP (ABARES, 2014). The timber industry as a whole, in 2013/2014, has an annual contribution to GDP of 0.5%.

Table 29. GDP Statistics in recent years

<table>
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<tbody>
<tr>
<td>Growth in GDP %</td>
<td>1.0%</td>
<td>0.7%</td>
<td>0.6%</td>
<td>0.6 %</td>
<td>0.5 %</td>
</tr>
</tbody>
</table>

The Timber Industry employs over 70,000 people directly with a multiplier of local employment of 1.5 in addition (ABARES, 2015). Domestic supplies are desirable for stability in the wood-based industries, which are expected to grow as population increase affects building activity and paper demand. The current trade deficit in wood products amounts to $2,104 million (Sutton, 1998; ABARES, 2015).

The Countryside as a benefit for features and drivers

In many instances the level of profit required for Government plantation projects in the past, whether corporate in name or not, whilst a consideration, has been balanced against the commercial demands of helping to balance payments for imports of both raw and dressed sawn timber or manufactured timber products including paper. Much countryside economic and population stability and growth has occurred because of plantation establishment. Northern Tasmania, Mount Gambier, Gippsland, Tumut, Bathurst and SW of WA are fine examples (SAPFOR, 1987; SEAS SAPFOR, 1989; Bunning Ltd, WA 1990; Forestry Commission NSW, 1984, 20101987). Professional Forester Kessell, then head of the WA Department of Forestry, reported to the NSW Government in 1935, that areas suitable for commercial hardwood growing in NSW should be tightly reserved, for commercial timber growing. This would have required requests for land to be removed from forestry jurisdiction to be agreed upon by the NSW Parliament itself. The Government did not agree to the recommendation. By the 1970’s the NSWFC reported the level of hardwood harvesting could not be sustained in a much reduced area designated for harvesting, and more plantations were essential.
A major means of encouraging plantation establishment and the following rotation management to maturity can be by way of MIS. This means of attracting funds from the public stimulated strong investment by corporations set up to meet a market demand (Shiels, 1985; Australian Forest Growers 1988, 2004).

The sum total of preparedness, with Government support, identifying suitable land close to current or potential timber manufacturing facilities, can provide a stated range of volume apart from drought or flood interference. This should give comfort for low risk investment, with the offering of a capped levy grant.

**The advent of private investment representation**

In 1969 to assist with providing knowledge and dealing with management policies reported in this thesis the Australian Forest Development Institute (AFDI), known as The Australian Forest Growers (AFG) since 1991, commenced to take a policy interest in all aspects of private forestry particularly in taxation matters and market dynamics.

By 1977, AFDI had taken on the role of providing some technical and other information for potential and actual growers by means of a technical magazine for the public (Australian Forest Growers Magazine, 1977-2017) and with conferences every 2 years open to the public. Membership of AFDI grew to such an extent that branches in each State were instituted in the late 1970’s and early 1980’s. This organisation provided some comfort for investors by setting standards for PDS by regularly publishing and updating a code of practice for investment. This encouraged, in the late 1970’s and 1980’s, a large investor interest in growing softwoods privately or corporately, particularly, through MIS.

However, when the federal Government changed tax rules in 1988, disallowing future rotation maintenance and land lease costs to be claimed in the establishment year, there was a considerable decline annual planting of *Pinus radiata* which has not recovered. However there is no certainty about the size of the loss of plantation areas to date. This thesis therefore relies on the current ABARES estimate that there is currently close total of 2 million ha of plantations of all species both softwoods and hardwoods. The softwood plantation area will remain at the current total of about 1 million ha unless a plantation expansion occurs. In 2015 76% of the softwood plantation area was *Pinus radiata*. The hardwood plantation area primarily mainly
Eucalyptus globulus contributed 1 million ha or 33% of the 3 million ha estimated to be needed by 2020 aimed for establishment by the year 2020 in response to the shared vision between Government and Industry.

The interest in Eucalypt species with a short rotation caused intense competition amongst some promoters of MIS. This put pressure on determining acceptable growth. Rectification of such a problem could be by a more intense soil analysis in each PPMA to account for any unsatisfactory growth. It should be determined by Governments for areas within PPMA’s, and for proposed plantings outside PPMA’s, where any outside new plantations in which individuals could claim tax deductions for costs, but not a grant. However outside a PPMA planting area those claiming a tax deduction for plantation costs ought to sign a forestry right of entry for Government inspection to ensure standards and annual targets are reached. This has not been insisted upon up to date.

Private and small corporate, landowner investment including farmers

Chapter one observes that declining interest by Governments, landowners with suitable land for afforestation could make a strong case for producing timber in a PPMA system (Song et al., 2014). However one private owner or investor’s tax deduction might only result in less than 30 ha being planted per annum (Table 29). Hence the proposal to have a Levy grant system where suitable large areas involving MIS and Corporate investors can provide plantation areas of significance to reach targets, and service industries economically. Never the less direct assistance and long-term loans with generous repayment conditions were instituted in State Governments with budgets but these were found to be a policy which did not contribute substantially to National targets (Byron and Boutland, 1987) “Found that schemes needed to be directed to the needs of farmers instead of utilising what is convenient to Governments”.

Available finance has also consisted of joint ventures, share farming, or a stimulation with tax incentives to create a national estate capable of pursuing a target. The results have been somewhat disappointing with high administrative costs, lack of supervision in many cases. Even part consideration in the form of components such as the supply of plants fertilisers, some silvicultural advice, and sales agreements has not provided a pattern of establishment which is always wieldy.
Capped Levy Grants

To improve profitability and reduce risk to make investment attractive in Australia should be an encouragement to private landowners to invest in a PPMA. The grant’s purpose is to congregate large areas of plantation, inside a PPMA. Before a private area could be identified as part of a PPMA, individuals would need to rely on deductions for costs from individual incomes whatever their source.

<table>
<thead>
<tr>
<th>Income ranges:</th>
<th>(0-18,201)</th>
<th>(18,202-37,001)</th>
<th>(37,002-80,002)</th>
<th>(80,002-180,002)</th>
<th>180,000 +</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Income</td>
<td>9,100</td>
<td>27,601</td>
<td>58,501</td>
<td>110,000</td>
<td>180,000 +</td>
</tr>
<tr>
<td>Inc. tax rates%</td>
<td>0</td>
<td>19</td>
<td>32.5</td>
<td>37</td>
<td>45</td>
</tr>
<tr>
<td>Tax on individual incomes</td>
<td>5,244</td>
<td>19,012</td>
<td>40,700</td>
<td>81,000</td>
<td></td>
</tr>
<tr>
<td>Plantation costs deducted against individual income</td>
<td>0.0</td>
<td>22.357</td>
<td>39,489</td>
<td>69,300</td>
<td>99,000</td>
</tr>
<tr>
<td>Hectares being planted from tax deductions</td>
<td>0.0</td>
<td>2.0 ha</td>
<td>6.0 ha</td>
<td>11 ha</td>
<td>19 ha</td>
</tr>
<tr>
<td>Tax saved after discounting tax costs</td>
<td>0.0</td>
<td>$5.244</td>
<td>$19.012</td>
<td>$40.700</td>
<td>$81.00</td>
</tr>
</tbody>
</table>

Table 30. Tax deductions for private individuals with indicated plantation areas.

In the example in Table 30, a landholder with primary producer status could attain a gross income of $19,012 and costs of $9,518 per hectare with a rotation comprising two thinnings and a clearfell. Table 30 shows selected decision points faced by potential investors.

Many agricultural properties would have 5 to 20 ha of suitable land outside a PPMA to give landowners or investor lessees a gross return of the above figures or, for instance, superannuation investment at the end of a clear fell rotation, such as 30 years. However the proposal is to restrict grants to investors planting in PPMA, with a private investor having access to a levy grant approval in the PPMA, determined not by an individual income but the overall resources of an individual. Private owners outside a PPMA would need to have costs deducted against their individual income, but only after an agreed independent inspection provided by a PPMA local Committee first, to ensure good growth and good standards are intended on a proposed project.
A large amount of experience on MIS has been attained over a long period. As already stated the private sector’s first experience with MIS was stimulated in the late 1920’s when Southern Australia Perpetual Forests (SAPFOR) set up a Management Investment Scheme. At that time, investors could only identify their block as one of a capital nature and no income tax had to be paid when selling the plantation crop. The financial returns were modest depending on inflation, which in the 1930’s was very low, but clearly there was a processing facility available.

For example SAPFOR did not fail, even during the 1929-1933 depression, and it developed, in time, a well-managed cash flow, from a modest stream of investors, and it did establish a sawmill starting in 1936 (McEwen, 1936) based on converting the small logs of its own clients and other owners’ early small plantation logs. The plantation areas still exist in 2017 after more than one rotation, as do some of the sawmill facilities, but with different managers and promoters (SES SAPFOR, 1989).

In spite of regulations with legal significance concerning investing (Managed Investment Act, 1998, No 92, Austl), and the publications and membership of the AFG, investors can have referral for information with Professional Foresters and the ASIC about the details of timber plantation projects. If the concept of PPMA’s is embraced the local committee of a PPMA could provide advice. One aspect that requires consideration and is recommended in the conclusions is to allow investors’ money only to be used in a MIS Product disclosure statement (PDS) specified for a purpose in a defined PPMA. Wood sustainability is part of the security and comfort of a nation. This would continue to include a provision that at least 70% of the cost over a rotation must be assigned to actual field management and the cost of the land for a minimum 0.4 of a hectare. That minimum area was defined in the 1961 Federal Act which first described forestry activity as being one of a primary producer.

**The national balance of payments deficit**

For Timber products the financial deficit is currently around $2 billion per annum (ABARES, 2014). Whilst this can be balanced with the exports of small logs, wood chips and pellets, some reduction in the level of imports of sawn timber and other forest products including paper, is highly desirable. Australia therefore has to consider how it can stimulate again investment in
exotic softwood plantations, and in processing and value-adding capacity, to meet as much of future domestic forest product demand as possible.

The attainment of a target of 3 million plantation ha is important. The per capita consumption of timber is about one m³ RWE of a whole log conversion, and by 2045, the median population is estimated to be about 36 million (Australian Bureau of Statistics 2015). It is necessary to reiterate that it is essential to analyse the changes needed in a PDS to make the MIS more robust and acceptable to investors, by substantially raising the IRR, identifying lowering the risk by better financial management with the independent forester identifying suitable sites for PPMA’s. In addition a formal secondary market initiation would be needed to encourage investment, both for small and large areas to change ownership if investors so wished.

The thesis puts forward policy needs which should provide enough stimulation to create investment in MIS again. Funds other than corporations manufacturing wood products might be encouraged to invest. For example, Governments to invest a small annual percentage of funds in plantation projects and superannuation funds could get a potential double digit profit, including inflation, from the long rotation options, providing, fire insurance was paid annually and receipts from forest loss fire insurance payouts were used to replant promptly.

In order to cover an annual cash flow dividend to investors, a PDS could allow a splitting of their investment in two: half the funds received going to corporate plantation management requirements, which could include land purchase, and the other half to operations. This could make investors part shareholder in the land, which might well increase in value over the years, and each year provide some modest dividend flow to them (Bunnings, 1990). An annual cash flow also from part land ownership could come from intermittent grazing for instance, even on the same PPMA when tree crops are well-spaced, particularly following establishment and through to two thinnings before clear fell.

3.11 Conclusions

The subjects covered in chapter three are all important factors in making the features and drivers required to expand exotic softwood plantations. Chapter Four presents a new model for attracting investment for the expansion of plantations.
4.0 Chapter Four: A new model for attracting private investment

4.1 Contents List

4.2 Introduction
4.3 Investment Criteria for a new model
4.4 Land tenure and security (PPMAs)
4.5 Plantation configuration, rotation
4.6 Industry potential levy grants and secondary markets
4.7 The options to reach an IRR of 8%
4.8 Domestic markets and prices
4.9 Conclusions

4.2 Introduction

Unless there is instituted a policy to stimulate commercial planting, Australia will continue to have large imports of wood products. There is a need to restrain a continuing increase in volume of timber imports. Lack of planting from 2017 onwards, would prevent future expansion of manufacturing and provide some uncertainty in price or in volume of raw material.

Chapters one to three have dealt with The Foundations of Australian Forestry, Chapter 2 The Fundamentals of forestry investment, and Chapter 3 Features and drivers of private plantation investment.

These chapters form a basis for proposing a new model to reverse the current virtual cessation of exotic softwood planting. This chapter 4 examines the structure needed to produce planting success for a species with a continuing demand as a commodity timber with many uses. *Pinus radiata* has the best growth performance of any domestically grown species to produce a range of end uses.

4.3 Investment criteria

1. To establish a new model for major ongoing plantation projects, in the order of 500 ha per annum, the following features would need to be in place and all arranged and ready to be announced at the same time before execution of a project. Not only is the structure in the model in Table 31 drawn from the information in the first three chapters, but from the experience of the author as well. The FIAC report indicates tripling of an economic value of the forest industry by 2050 to Sixty Billion dollars annually This will require an expanded plantation estate (FIAC 2016), and investment in processing capacity. Unison is necessary in determining
the structures required in managing a large increase in activity via the private sector: an attractive capped IRR, a unified approach to minimum stumpage pricing of harvests within local PPMA’s and at the same time a secondary market is essential as is the use of grants and establishment of PPMA’s. This should be coupled with a selection of a chairman of an over-riding National PPMC. The person will need the range of experience to manage what would come to be, an even larger national activity than presently.

2. The concept of, if necessary, levying grants to provide a better return to investors interest and avoids disturbing some requests to the Federal government for assistance. As well, the concept should further involve the timber industry as a whole, to address the needs of a managed sustainable approach to their raw material future needs. Table 31 provides the features required:

<table>
<thead>
<tr>
<th>Table 31. A structure for a new model to attract investors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Investors</strong></td>
</tr>
<tr>
<td>1. An Internal Rate of Return at a level which can compete with equity investments, typically 8% real rate of return. If prices of stumpage remain below inflation the certainty of capped levy grants being available would be needed to achieve an attractive IRR.</td>
</tr>
<tr>
<td>2. A formal mechanism related to a stock exchange or similar Institution to allow investors to buy in or withdraw from their investment within a nominated specified time will be needed.</td>
</tr>
<tr>
<td>3. To obtain a levy capped grant the investment must occur economically close to a processor or a port in an area declared by State and Federal governments as a Perpetual Plantation Management Area (PPMA). The area having a radius of approximately of 150 kilometres in relation to a processor, or potential processor. Prior to investing the selected investment the site must be checked to be capable of growth, not less than an MAI of 15 with a minimum period 25 years rotation, for structural end use.</td>
</tr>
<tr>
<td>4. Knowledge of the features of a project must be checked before investors sign on with a Product Disclosure Statement (PDS), and the project RE must have obtained suitable agreement with the ASIC prior to the investment being accepted.</td>
</tr>
</tbody>
</table>

**Responsible Entity Project Managers (RE)**

1. Management Competency in a CV should be satisfactory for a local PPM Committee after initial application is acceptable by a National PPM Committee.

2. Employment of a Registered Professional Forester as an Independent Forester for checking the PDS and field inspections would be part of Government support, all currently readily available.

**Overall National Management Structure for a National PPMC**

1. A national PPMC would respond by setting annual Government planting targets, deal with government research priorities and consider the advice of the Federal and State Ministers and their Departments in setting standards and amending policies.
2. They would receive and respond to progress reports from local PPCM and prepare forward plans for the next planting season and maintain records of performance in local PPMA’s.

3. They would liaise with Government Departments providing ancillary services like infrastructure improvements for electricity supply, roads, fire prevention facilities such as fire towers and communications.

4. The membership of the National PPCM would consist of a full time experienced CEO with Forestry Training, representatives of local PPCMs, representatives of State Governments and the Federal Department of Agriculture and Water Resources, with an office in Canberra. In order to keep the number of members manageable, a rotation of delegates representing more than one PPCM could be envisaged.

5. Overall arrangements for a new local PPCM and setting up and maintaining formal buying and selling investment arrangements to be handled by the National PPCM.

6. Any Finance for the overall management Structure would come from Federal and State Governments, but not levy grants.

7. The Federal office of the National PPCM including equipment and office facilities, its CEO and one technical secretary would be paid for by the federal Government, including travel by the CEO

7. The National PPCM would maintain a communication arrangement with the ATO and the Federal Department of Agriculture and Water Resources regarding capped levy grants to achieve an attractive investment.

8. Finance required to lift the investment to 8%IRR return could come as a levy from the paper manufacturers and importers, and sales of processed timber regulated via an existing Federal government Forestry levy fund.

**Perpetual plantation management local committees**

1. The local PPCM would consist of the RE of each project, from which a chairman would be appointed. Representatives would consist of processors, local Government and also State Forest services.

2. A Local PPMA secretary to be housed in a Council Office with equipment and facilities to be paid for by State Government, including travel costs by the local chairman.

3. The local PPCM would be responsible in liaison with State Government officers in checking the MAI of a project area, arranging fire protection facilities in liaison with the Bush Fire Brigades and assessing project suitability.

4. Project failure in each local PPMA to be responded to, to prevent loss to the national plantation Target with the local PPCM arranging a new investor to take over to ensure a project runs its full economic life.


3. The general rule about financial investment would be to select a profitable operation which informs potential investors of all features of an appealing investment. In order to invest, one has the option to either invest in Bank securities which guarantee a return over a
fixed period, or to assess a risk and invest in some productive enterprise to receive potentially a higher return.

4. The potential use of private risk major plantation investment started with modern economic rationale being favoured in government policy, but in the case of exotic softwood plantations with a minimum rotation of 25 years to grow for the main harvest, this did not suit a policy of funds being returned in a short period, with timing of costs being returned being pre-eminent.

5. Since 1990 the private sector therefore has had to take over plantation funding for expansion from some Governments and this requires plantations to be attractive to the private sector for investment.

A new model for low risk funding has therefore to provide an appropriate profit on stumpage to attract investors instead of Government funding through using annual budgets. The research for a standard to achieve an acceptable profit indicates a minimum 8% IRR. The IRR takes no account of inflation but it represents a standard which should be acceptable to the investment industry. In brief it relates to a level of profit assessed at the start of a project by the current end selling price, discounted by estimated costs.

4.4 Land tenure and security and PPMAs

Signing off a satisfactory proposal

1. At the moment there is no regulation in place that those wanting Government financial support by way of a tax deduction or grant, have to have their project land signed off by a Consulting forester or Government official: Confirming that the chosen site has the potential to grow Pinus radiata at a particular rate. It should be the No1 priority that field checking and mapping is done before any plantation project is signed off as suitable for any investment.

This policy has been undertaken in W.A. by the establishment of regional and catchment groups. For instance the greater south west is divided into six units- Mid West, South West, South Coast, Mt Barker and Katanning, Esperance and catchment headwaters (Forest Products Commission WA (2010). There must be either sufficient local information of standing planted coupes, or soil analyses made to apply this rule successfully. The rule could be updated in due course, when a number of projects have been initiated. Current research already indicates that South Australia SQ5 would be a satisfactory a minimum level of growth to achieve. Evidence collected by the author in his field work indicates most areas vary in fertility and SQ assessment and mapping is
essential. Any land proposed for a commercial plantation should be checked for ownership and for any constraints and relief for use by local, State or Commonwealth regulation.

2. Perpetual Plantation Management Areas

The concept of a PPMA is to focus on large areas capable of growing plantations related to the timber processing industry within economic distance, as part of a national platform of one RWE per capita with continuing rotations. The Australian Forest Products Association (AFPA), has recently issued a brochure on forest policy which introduced the concept of Hubs for area concentration of forestry activity. Twenty areas that are all capable of growing commercial plantations are identified in Table 32 (AFPA 2016). These are already providing substantial areas of wood fibre of Pinus radiata.

Table 32. Strategic or potential Pinus radiata PPMA’s in Australia

<table>
<thead>
<tr>
<th>Pinus radiata PPMA’s in Australia</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bombala NSW</td>
<td>Oberon NSW</td>
</tr>
<tr>
<td>Wangaratta VIC</td>
<td>Mount Gambier S.A.</td>
</tr>
<tr>
<td>Lofty Ranges S.A.</td>
<td>Albany W.A.</td>
</tr>
<tr>
<td>Myrtleford VIC</td>
<td>Burnie TAS</td>
</tr>
<tr>
<td>Morwell VIC</td>
<td>Scottsdale TA</td>
</tr>
<tr>
<td>Geelong VIC</td>
<td>Bell Bay TAS</td>
</tr>
<tr>
<td>Colac VIC</td>
<td>Bathurst NSW</td>
</tr>
<tr>
<td>Portland VIC</td>
<td>Boyer TAS</td>
</tr>
<tr>
<td>Collie W.A.</td>
<td>Tumbarumba/Tumut NSW</td>
</tr>
<tr>
<td>Albury NSW.</td>
<td>Bunbury W.A.</td>
</tr>
</tbody>
</table>

3. The important aspect of this PPMA concept is to ensure a plantation grows to maturity with the best possible technical assistance. Each change in ownership of an area would have to be aware of any tax regulation rule. For example, the same owner should remain for at least four years after establishment otherwise a loss of a grant might occur in an annual ATO assessment.

Outside a PPMA, owners plantations growing in acceptable areas could achieve the same consideration for a tax deduction against personal income already available. Repeated poor plantation management could require, in the case of a grant or tax deduction, a local PPMC be allowed to assist in auctioning any property and find another investor.

4. The farming community have sometimes complained about a non market value increase in the price of land bought by the government wanting the land for plantation establishment. As there would be private ownership in a PPMA, the proposed concept might reduce objections that the price of land is not escalating for local properties for agriculture, because of purchase of timber plantations (Williams, 2014).
4.5 Plantation configuration, rotation, length, MAI and scale

1. Plantation configuration

Just as the quality of soil must be checked, it is important to assess the direction of planting, taking into account topography, row width, layout of access tracks and if necessary, the need to implement contour ploughing because of slope affecting run off. Where designed correctly at establishment, configuration will contribute to efficient management throughout the life of a plantation. Issues which may arise as the plantation develops include attention to firebreaks, placement of clear direction signs for safety and location and coupe numbering, control of bacterial and insect infection and harvesting thinnings and clearfell (Attiwill et al. 1994; Raymond and Underwood 2014).

2. Rotation length

By far the largest cash flow comes from clearfell at maturity, Bulletin 23 identifies rotation lengths determined by Site Quality assessment (Lewis et al. 1976.) For Pinus radiata the minimum rotation, as discussed, is aged 25. Also later, if the point at which the current annual increment exceeds the mean current increment; this could extend the plantation up to at least 36 years.

3. Mean Annual Increment (MAI)

If annual increment is less than the MAI a calculation can be made to account for this in determining the clear fall age. Measuring the average MAI in a random set of located plots will allow management to decide whether fertilising or thinning should be undertaken at a particular stage of plantation development too.

4 Plantation size

There are two profitable plantation sizes for harvests costs. One way is to ensure the harvesting can be done efficiently in conjunction with other coupe owners. A planting of an area of about 5 ha would be a minimum area for efficient harvesting (pers com., W Kerruish February 2014). The second approach could be where one or two owners are providing logs in sufficient log volume for efficient harvest for a Timber processor’s operations. The area harvested could be determined by the processors’ requirements.
4.6 Levy grants and the use of secondary markets

1. It has been demonstrated that an IRR calculated on current selling prices at clear fall between 4-6% is inadequate to attract investors (de Fegely 2011, Standing Committee 2011). References show New Zealand can achieve a return of 7.6%. This suggests a levy grant from the marketing of paper products and Timber products including imports of 2% would be necessary to stimulate expansion and achieve an IRR of 8% (pers com R. Dew March 2016). This would require as an example, a levy grant of up to $2450 per hectare over a rotation. There are five factors pre-eminent in achieving a new model for investment, apart from Governments setting standards, minimum sites and Targets.

<table>
<thead>
<tr>
<th>Table 33. Options and support for stimulating investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. An 8% capped IRR should be attractive to the investment community, requiring a levy grant from the marketing arm of the Paper making industry and Timber Industry, including imports to achieve that percentage.</td>
</tr>
<tr>
<td>2. An annual increment in market prices of sawn wood and paper and paper products reflecting inflation, would result in an achievement of a stumpage of 8%.</td>
</tr>
<tr>
<td>3. A reduction of rotational costs and further improvement in earlier suitable growth rates with increased strengths, may also reduce the amount of capped financial support necessary.</td>
</tr>
<tr>
<td>4. A secondary market using the stock exchange or a similar Institution, to enable investors to come in and out of such an investment would be essential.</td>
</tr>
<tr>
<td>5. An identification of suitable land in a PPMA, which would qualify for a levy grant to investors at establishment, rather than tax deductions for individual investors. With a proviso any change of owner, or owners would need to complete the rotation.</td>
</tr>
</tbody>
</table>

2. There is a mechanism for grants to be raised by a Levy in existence known as the Federal Forest and Wood products levy (2016). The sawn timber processor could invoice the selling agents half the amount for a levy of 3.5 cents per m3 to lift stumpage prices, as merchants are the influence in terms of determining prices in the market place. As could the Paper manufacturing industry and those importing paper products too, with a new levy of 0.87 cents per tonne collected by paper manufacture and paper imports. The combination providing equally the 2% capping to bring an IRR up to 8 %. Table 34 illustrates the current available statistics for paper production volumes and recent annual sawn timber consumption volumes.
### Table 34. Average annual consumption of Paper, Pulp and Softwood Timber

<table>
<thead>
<tr>
<th>Paper Pulp and Paper products:</th>
<th>Consumption Total average annual tonnes produced 2007/2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Printing and writing papers:</td>
<td>1,395,000</td>
</tr>
<tr>
<td>Newsprint</td>
<td>613,000</td>
</tr>
<tr>
<td>Tissue papers</td>
<td>230,000</td>
</tr>
<tr>
<td>Packaging papers and board</td>
<td>1,476,000</td>
</tr>
<tr>
<td>Total Paper and Board</td>
<td>3,712,000</td>
</tr>
<tr>
<td>Pulp</td>
<td>1,580,000</td>
</tr>
<tr>
<td>Recovered Paper</td>
<td>1,609,000</td>
</tr>
<tr>
<td><strong>Annual average total</strong></td>
<td><strong>10,615,000</strong></td>
</tr>
<tr>
<td>Sawn Timber, current annual</td>
<td>4,327,000</td>
</tr>
<tr>
<td>Levy of $1225/tonne Paper Pulp and Paper per 0.87 cents/tonne</td>
<td>To cover $10,657,500</td>
</tr>
<tr>
<td>Levy of $1225/m$^3$ on sales of sawn timber per 3.5 cents/m$^3$ from the final buyer before use.</td>
<td>To cover $4,287,500</td>
</tr>
</tbody>
</table>

The spreadsheet example requires $2450 per hectare, over a rotation of 27 years to ensure an 8% IRR is achieved on basis of selling price of stumpage and costs shown in that table.

3. This levy example would include Paper, Paperboard and Recovered paper in Australia in tonnes annual average between 2007 and 2012, and domestic sawn softwood timber sales less exports and including imports, (paid for by the local importers). for 2012/13 and recorded in (ABARES 2014).

There is likely to be an increase in timber imports, for instance of CLT cross laminated timber from overseas manufacturers. In 2017 AFPA reported that the opportunity will emerge for a new Timberlands industry bid for finances for planting from the Federal emissions reduction fund. This is envisaged to be known as a modest carbon payment, potentially offsetting a small portion of the high costs of planting.

4.7 The options to reach an IRR of 8%

**Option 1:**

By stimulating grants via the Federal Forest and Wood products levy from the Timber Marketing and Paper Industry to reach a plantation stumpage rate based on an IRR of 8% with a minimum of 6% unsupported by a levy.

**Option 2:**

By stumpage price increases at least equivalent to inflation annually, which could reduce the need for levy grants, however this might be uncertain to achieve every year and produce confusion in terms of manufacturing costs. Stumpage has declined in real terms in some
countries, for example, in Austria, where from 1976 to 2015, expressed in Figure 5 stumpage for softwoods have declined in price by 30 out of 40 units. Figure 5 shows the pattern in a. Presentation to the EcoSocial forum on forest policy, in Vienna, 10 February 2016. Information presented by Professor Martin Moog. Adjusted for inflation, stumpage had been reduced by 40% since 1976. About 1% per annum.

That example shows cost reductions may be necessary in the future but it is very unlikely that the Austrian industry reduction could be achieved in Australia and concentration of growing wood in Australian plantations to achieve one m$^3$ per capita minimum for national security would provide a domestic requirements secure industrial platform at all events.

**Option 3 in concert with Options 1 and, or 2.**

Reduce costs via federal policy instruments such as better targeting to access the Carbon Farming Initiative and funding from a contribution for infrastructure, road and communications, Establish a National farm forestry cooperative for funding of training and skills development (Federal Budget proposals AFPA 2012 and 2016). Implement more research to grow trees with more vigour to reach larger volumes with shorter rotations to reduce costs rather than rely on grants or inflation.

To assist with reducing costs in domestic plantation establishment and management, a Plantation Federal Forestry Methods technical working group was formed during 2015/2016, by the Australian Government. The object is to develop suitable methodologies to remove restrictions for commercial production plantations under the Carbon farming initiative (Table 35). Any reduction of costs related to plantation management could be an indirect contribution to a lower levy grant. This could bolster the annual areas being planted but would only be a support for large projects. The intent under such a policy is there would be no CFI restrictions on the use of agricultural land within PPMA. Currently there is emphasis on restrictions for commercial plantings in major schemes which would compete with agriculture.
Figure 5. Stumpage price trends during 40 years, 1976-2015 (Moog, 2016).

The lower line in the graph relates to Pinus logs and the top line spruce and fir logs.

This recommendation by the AFPA is one of four in a policy presentation to the Australian Government for consideration in the 2016 budget (Table 35). They present proposals for funding which are already in existence in federal budgets covering other non-forestry activity.

Table 35. Plantation support from federal policy instruments (AFPA 2016)

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Improving facilitation of private sector investment via CFI and plantation hubs. (Hubs somewhat similar to PPMA’s). This would allow companies to continue to utilise the current plantation arrangements and would address concerns that plantation projects need to be within an economic distance from a manufacturer or a port.</td>
</tr>
<tr>
<td>2</td>
<td>Growing the Regions nominated as plantation hubs with critical infrastructure. This could be achieved by directing $250 million in infrastructure funding from existing programmes to improve productivity and competitiveness.</td>
</tr>
<tr>
<td>3</td>
<td>New farm forestry co-operative for farmers. This would allocate $3 million of seed funding for the establishment of a National farm forestry co-operative for farmers.</td>
</tr>
<tr>
<td>4</td>
<td>Upskilling across the regions. This policy could direct $25 million in funding from existing programmes for skills training providers and businesses in plantation Hubs.</td>
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</table>

1. What is missing from these proposals currently, is a specific proposal designed to stimulate investor interest specifically for exotic softwood plantations.

Whilst the four CFI policies are designed to support plantation expansion by Governments and promote plantation development, the evidence is that the plantation expansion will depend very much on the level of investor interest in the IRR for a long period investment. Some Investment might well come from the Superannuation industry, and large Industries dependent on using
plantations and more tightly supervised MIS. This could be one of the main sources of investment, together with the processing industry looking to ensure continuity of supplies for their manufacturing.

2. Of the two main options identified, the proposition of a small annual levy to last for over 25 years, appears to be the best attraction to stimulate ongoing plantation establishment and management. Even if the CFI was successful there would still be a need to ensure exotic softwood plantations could compete for tax or grant funds with short rotation Eucalypt being sold after 10-12 years for pulp.

3. Policies missing in the AFPA submission are the need to stimulate investment interest to provide an attractive IRR, to create a secondary market, as part of a stock exchange function so investors may withdraw or buy into such long term plantation projects. This could help the Timber industry being more focussed on and cohesive, in policy to ensure the material they are dependent upon is domestically available in the future, particularly to meet increases in population and manufacturing.

4. The use of grants rather than Tax deductions for individual incomes for attracting investment is important. This could expand the area one investor can establish because it is not related to personal income/tax deductions (Table 30 Chapter 3).

5. In support of the need to have sufficient domestic supplies of suitable commodity species available in Australia relying on other sources of imports is not desirable. The establishment of plantations in New Zealand, Australia’s closest country wood basket for Pinus radiata plantations, has declined in establishment over the last two decades from 55,000 ha per annum to 3,000 ha in 2014. This does not auger well for future imports from New Zealand to Australia (NZ Forestry Owners Association 2010).

A recent New Zealand plantation initiative is a grant scheme, in its second round, designed to help establish 15,000 ha of new plantations between 2015 and 2020 (Ministry for Primary Industries 2016). The grants are a one off contribution of NZ$1300 per hectare. Successful applicants must have land available of 5 to 300 ha. This financial contribution would only be sufficient for field establishment. After 10 years of owners paying for maintenance costs, they would be free to use their plantation as they wish. Once the plantation is established the modest grant can be claimed. There does not appear to be any factor in the New Zealand approach which Australian plantation policy could repeat.

It is questionable whether timber volume from this initiative would be available to import to Australia as New Zealand has already exported strongly for many years, to a number of Asia-Pacific countries.
4.8 Domestic markets and prices

1. Australia has long had a deficit in its balance of trade in forest products. Enquiries made to the Timber Industry by the author and ABARES indicate that all available plantation and commercially sustainable managed native forest resources are being used. Australia’s increasing population is expected to increase the demand for wood products. If this is not responded to, the price of softwood timber could rise in keeping with supplies obtained from other countries, which have to meet a freight and insurance factor. It might be that, if Australia could maintain domestically a minimum of one cubic metre Round Wood Equivalent (RWC) per capita annually, then this might control the possibility of a need for higher stumpage increases. Historically if 2.7% average inflation had been taken into account when negotiating selling prices in past years, then stumpage prices would have been lifted (Table 16) and a levy to attract investors may not have been required.

2. Information showing an Australian Pine Log price Index (Stumpage) is available prepared by consultants KPMG in Table 49, from data provided by the Forestry Corporation of NSW, Bathurst and Tumut, HVP plantations, Ballarat, La Trobe, Victoria NE, Victoria SW and One forty one plantations Green Triangle (S.th A/Vic). It also includes a small volume from HVP Queensland with subtropical other Pinus Species. In Table 16 the effect of inflation percentages on stumpages was the actual ABS average over the period under review. If price rises had occurred an increased IRR (Real price) could have occurred

| Table 36. Effect of Inflation $m$ trends of mainly Pinus radiata 1995-2013=18 years |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|
| Type of Timber                  | Selling Price   | Inflated Price  | Selling Price   | Inflated        | Loss if not     |
|                                 | June 1995 ($)   | June 2013 ($)   | June 2013 ($)   | June 2013 (%)   |
| Pulplog                         | 11.05           | 17.56           | 13.62           | 22.43           | --1.24         |
| Small sawlog                    | 32.00           | 50.84           | 31.35           | 19.49           |               |
| Intermed. log                   | 45.38           | 72.10           | 47.70           | 38.66           | --2.14         |
| Medium log                      | 60.29           | 95.79           | 66.74           | 30.33           | --1.68         |
| Large log                       | 68.90           | 109.48          | 77.94           | 22.06           | --1.25         |

(Using KPMG Index 2015)

3. The effect of inflation depends too, of course, on the proportion of the differing value of each category of sawlog in the harvests, available in the future.

ABARES 2015 statistics show further large domestic production of paper is possible to meet even current demand, providing importers do not dump paper on the Australian market, which was the subject of a successful enquiry in 2016 for photocopy paper. Also the construction industry could take more production of domestically grown softwood timber. The latter could, in the future, also be used in high rise buildings where longitudinal strength will be in demand.
4.9 Conclusions
From the text and references in the first four Chapters there is sufficient evidence to identify a new model which could stimulate investment and allow expansion of the exotic softwood estate growing *Pinus radiata* as expressed in Table 31 and reiterated in Table 36 (Newman 1997). Tables 25, 36 and 37 show the prime factors influencing domestic wood production.

**Table 37. Inputs to a new plantation investment model**

<p>| | |</p>
<table>
<thead>
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<tr>
<td>1</td>
<td>Internal rate of return (IRR) needs to be 8% or more to attract investment.</td>
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<tr>
<td>2</td>
<td>A secondary market is essential to attract investors seeking a shorter-term investment.</td>
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<tr>
<td>3</td>
<td>A rotation must be completed to maturity but ownership could change during the rotation.</td>
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<td>4</td>
<td>Perpetual plantation management areas should encompass most plantings.</td>
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<td>5</td>
<td>Investors in a PPMA would be eligible to receive grants rather than tax deductions.</td>
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<tr>
<td>6</td>
<td>The State governments would be responsible for estimating growth rates.</td>
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<tr>
<td>7</td>
<td>Local PPMC would have access to all plantations in their PPMA's.</td>
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5.0 Chapter Five Recommendations and Conclusions

5.1 Contents List
5.2 Introduction
5.3 Recommendations
5.4 Conclusions

5.2 Introduction
Following the withdrawal of plantation loan funds provided by the Commonwealth Government (Softwood Loan Agreements 1967-1978), the expansion of softwood plantations has almost drawn to a halt, and depends mainly on funds provided by investors and land owners in a free market. These recommendations and listed conclusions are a response which the private sector will need to take up to meet the establishment targets set by the Federal Government. There will need to be low risk mechanisms to reach the 8% IRR and sound continual management for investors.

5.3 Recommendations

1. An investment must be attractive for expanding softwood plantations?
To achieve targets and to meet continuing rotations softwood plantation investors will require an IRR above the current returns reported in business and the Australian literature, of 4-6% (de Fegely 2011, Standing Committee 2011). The Excel spreadsheet accompanying this thesis show an IRR of 5.8% (Table30), as an example.

Stockbrokers (Vanguard Ltd. 2014; pers comm. R. Dew 2014) indicate that a figure of 8% IRR should be attractive. This is 2% above currently reported softwood plantation IRR of 4% - 6%, but lower than typical returns from equity shares in a stock exchange with much higher risks, as shown in Table 24.

2. If the average clear fell stumpage price rises in sympathy with inflation increases?
By lifting the long term, almost static exotic softwood stumpage selling prices, the need to support a 2% increase of the IRR% may not be necessary. However to stimulate plantation establishment, for an initial period of perhaps four years, a Timber Industry Forest products levy grant may be necessary to generate investor interest. A secondary market should also provide an attractive stimulus too. This would allow Investors to sell or buy holdings during the rotation period starting only after year 4, for taxation reasons, for those accepting grants in a perpetual plantation management area (PPMA), or for those establishing outside a PPMA by agreement with the local PPMA, tax deductions on income.
5.4 Conclusions of the hypothesis as set out in the text:

The following items are needed to stimulate plantation activity:

1. IRR to be achieved would be 8% within PPMA at planning time
2. The availability of identified Perpetual Plantation Management Areas (PPMA) identified in each State and Territory.
3. PPMA areas to suit the required amount set for Pinus radiata within a radius of 150 kilometres to provide economical sufficient feedstock to meet potential or major processors volume requirements.
4. A formal mechanism for a secondary market to be available in ASX for investing or withdrawing funds associated with establishing and managing softwood plantations.
5. The creation of a central PPM Committee and office in Canberra managing local PPMA’s.
6. The Government setting standards of sites and minimum growth and targets.

The following requirements to support six main drivers:

1. **To attract investors in such a long term investment**
   Of which they could sell or buy at establishment or after a period of four years, or up to 12, or up to maturity in a secondary market, a number of new owners could then follow up with more knowledge of the plantation known at an early stage. The drivers are Pinus radiata as a suitable species example, an IRR of stumpage, capped if necessary of 8%, with the assistance of a grant for plantings inside a PPMA. With the Government setting standards of site, growth and targets which are independently assessed.

2. **Establishment of Perpetual Plantation Management areas**
   An entitlement to a grant would be subject to the investment occurring in a proposed or existing acceptable local perpetual plantation management area, with suitable soil, rain fall and operations access within a specified area, economically close to an existing or potential timber manufacturing plant, or for export. The Government with members of a local PPM Committee could assess the cost structure of a project, assess growth potential initially, use average clear fall current harvest income per hectare to determine an IRR, and check growth again at about age 10-12 in connection with transactions desired at that age, in a formal secondary market, and to ensure National target volumes were being established. This would help the concept of investment being a low risk one.
3. National Committee for PPMAs
An overall Australian committee to represent all PPMAs would be needed. Membership should be drawn from local PPMAs including Councils, the Federal Government, Governments of each State and Territory, as well as the Australian Forest Growers. That Board would also act for setting standards. The National Board should be headed up by a very experienced professional forester as chairman, operating for appropriate periods in a Canberra located office.

4. Management of a local PPMA
A committee, with an annual elected Chairman would be needed for each local PPMA to manage the area overall (with legally declared boundary limits), give permission for suitable projects, and to resolve problems. It could also negotiate prices of plants, fertilizers, and vermin and weed destruction products, pruning and road maintenance. It could also encourage operational efficiency, effectively establish innovation and be involved in bushfire protection arrangements.

Co-operation would be very important as would be competition. The technical interaction between owners would be a help towards efficiency of getting the best growth and preventing problems, such as disease spreading and prevent any lack of bush fire protection and control.

5. The identification of suitable sites in major areas to be declared
For example, for suitable perpetual plantation management areas (PPMAs), the quality of leadership, which includes continually keeping technical knowledge up to date, is important to be exercised by the promoter and the project manager, Responsible Entity and foresters in a project management role and registered foresters in an independent role too. Laying the durable foundations of a project is absolutely essential and could assist or detract from getting enough wood volume for Investors reaching national targets and the required minimum IRR, not only for one rotation but ongoing ones.

6. Example identifying a plantation cost to clear fell
Given plantation cost amounting to $9,518 per hectare at maturity (with an initial planting of 1000 stems per hectare), a 6% IRR might be attained, assuming $55.00 per m³ for 27 years-old trees as is the current practice in the Tumut area (pers. com. P. Crowe and B. Royal, 2014). Lifting an IRR to an initial, calculated hurdle return of 8% would require an additional $2450 per hectare over the rotation, on the text example (Excel spreadsheet).
7. Arrangements for Plantation investors outside PPMAs

Investors establishing plantations outside a PPMA would seek Government certification that the site is satisfactory for plantation establishment, in order to receive a tax deduction from their income for their plantation, but no grant would not be available.

8. Grants could come from where?

The thesis recommends that the grants contribute no more than one quarter of costs of a project in a PPMA. The grant system could not only influence plantation expansion and location, but also attract investment and maintain standards (Snowdon 2003). The granting funds could be raised by levying paper and pulp sales (currently 10,161,000 tonnes per annum) and softwood sawn timber sales and sawn imports, less exports, currently of about 4,327,000m$^3$.

9. Timber marketing agency entities should pay the levy grant.

As it is the selling part of the Timber Industry which has control of pricing, they should be able to pay part of the levy grant, equally with the paper industry. The figure of both would include imports. Any separate Government financial contribution would allow projects to be sure that National targets were being reached with keeping of statistics., access to plantations being allowed, and by providing a lead on plantation efficiency, specifications, standards and supporting infrastructure.

10. Introduction of grant capping:

An IRR on an investment in plantations of *Pinus radiata* costed and capped with a grant to ensure an IRR of 8%, should be attractive to investors, even at the initial phase of plantation establishment (Table 24 Vanguard brokers for the Australian Mutual Society (AMP) Society 2014, pers.com. I. McFarlane 1999). Such a figure is above the returns on best current Trustee term market cash deposits (4%). This innovative approach could make such long-term investments attractive. Capped grant amounts might be reduced in time depending on improvements in operational efficiency.

11. Levy grant issues.

Providing a levy grant equally from the sawn timber marketeers and the processing part of the paper and pulp industry, as set out in chapter four would require a capped 2% grant. The two entities providing the grant, could be entitled, on calculation, to a return of 15% from the clear fell cash flow figure, after an eight percent IRR had been paid out to the investors at harvest time. Any balance could also be paid to the Investors. After four years from inception the principle could be reviewed, with either the levy grant continuing, or the price of average clear fell harvest stumpage rising in sympathy, because of increased selling prices sold by the marketeers.
12. Grants limited to national annual plantation area target setting in PPMA.
Entitlements should be restricted to the target setting by ongoing legislation for total area establishment annually, by the Federal Government in liaison with State Governments and Local and National PPMEs.

13. Identifying sites, setting standards and targets and carrying out inspections.
The advantage of grants over individual tax deductions for plantations is that the government could have access to the site at all times over the rotation to satisfactory maturity, and the grant entitlement could apply to all six groups of Investors, Processors, Manufacturing corporations, MIS, TIMO’s and Private owners when investing in a Government legally identified perpetual plantation management area. (PPMA). This would treat all investors equally. It would create a low risk investment with fire insurance paid when annual grant entitlements were given out for maintenance annual contribution. PPMA could ensure the plantation targets are met and further rotations possible.

14. Constraints to investment.
There is currently for investors, an initial limit of 4 years before investors can sell their investment to another party under ATO Rules. A disadvantage exists with a tax regulation that at clear fell, the whole profit should be taxed in the year of sales. Whereas all other Primary producers, apart from forestry, can pay the tax calculated in one year over a 5 year period. This is a clearly a disincentive.

In the case of a failure of annual management funds provided by an investor not being able to be met, a period of about 6 months should be given for the investor of the trees and the RE or Custodian to make satisfactory arrangements to find alternative finance, before any bankruptcy or forced sale proceedings are invoked. This would help achieve a better financial IRR.

To lower a risk Investors might feel more confident if, part of the investment encompassed the land, rather than just the trees on the land. This would be essential for projects identifying their project costs to reach a minimum of an IRR based on IRR of 6 %.

Two factors of interest for investors would need to be described in a PDS, that of confirming the investor funds would be all used in a specified project unless reasons specifically are given.

15 Insurance for projects
Projects must cover the loss from fire and public liability as large in value as the insurance market is willing to allow. Ensuring plantation National area establishment targets are met by
replanting from fire Insurance payments is vital to meet targets. The first requirement for the annual maintenance grant contribution in a PPMA must be spent on that insurance, and reported as carried out annually to the PPCMC National Administration, before receiving any annual levy money contribution towards maintenance.

16 **Action is considered urgent; Leadership is very important.**
Creating a favourable environment for attracting investment in softwood plantations requires co-operation from the Timber Industry, Federal and State Governments, and the Australian Forest Growers, to provide a cohesive approach to achieving a vigorous domestic expansion. The softwood plantation industry should assume responsibility for establishment and management of plantations. This requires closer cohesion of the overall timber industry. Governments should be involved in growth research, and the development and maintenance of standards.

17. **Too many Government committee arrangements have not produced confidence in this important need** (Table 38).
Numerous changes in staff and departmental structure at all levels of government since 1994 are indicative of the low priority and political interference afforded to plantation forestry in Australia. This turbulence eroded confidence by the private sector in plantation forestry.

18 **The final observation:**
The principle expounded in the text is of having local PPMA projects and a National perpetual plantation management structure with basically the private sector managing plantation forestry, particularly responsible for raising investment finance, for a capped 8% IRR. This should circumvent some difficulties in reaching wood supply targets. The stimulation of private sector softwood plantations can be achieved, but it will be easier to implement with the whole Australian timber industry agreeing to support the endeavour involved in plantation expansion and management, with government involvement in inspections, standards, target setting for annual achievement and infrastructure support. The population generally, investors and politicians, will then be more confident in understanding and supporting the objectives and importance of forest production and management for Australia’s future.

Robert Louis Newman.
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7.0 Appendices

7.1 Personal communication list

Much of the material presented in this thesis relied on personal contact with senior people involved in forest management and policy. The author gratefully acknowledges the advice and support of the following people and agencies.

ABARES Staff: Available PDS Data for (1916) via ASIC.
Agriwealth MIS R. Wilson (March 2014).

Economists Forest Research, Canada: Prof F. Reed Ret. UBC February (2015) and B. Peters (USFS) (February 2015).

Education: Prof J Innes (UBC February 2014).


Fire Insurance: D. Hawke of Insurance facilitators and Jardine Insurance Brokers. (June 2013)

Harvesting: W. Kerruish. (February 2014).

History: G. McKenzie Smith, (January 2013); F. O’Laiglin (March 2016); Prof. Lindsay Pryor ANU (March 1995); Adrian Wallis (CSIRO Division of Forestry and Forest Products, June 1988).


Policy: Mall June 1988).


Public MIS rejection. Retired Alan Brown CSIRO (February 2014).

Statistics: M. Gavran ABARES Staff (February 2014).


Taxation matters: A. Cummine (February 2014).

Tree Breeding: Southern Tree Breeders Association Staff (March 2014).

UK Forestry Commission: grants: J. Simpson (June 2012).
7.2 Project field operational comments

1. Suitable sites

Knowledge of the local rainfall and good soil characteristics, can help prevent tree deformity, with rows of trees aligned along cultivation lines. A minimum plantation area is needed to attract services; economic closeness to a customer or customers for selling the variety of log sizes needs to be determined. A Product Disclosure Statement (PDS) should include as much up to date product stumpage costs and price information for an investor as possible.

2. Relationships with adjacent landowners

An indication of general interest by adjacent land owners for plantation establishment is needed to build up a critical strength for bushfire protection, and to allow efficient and economical harvesting. (Leys and Vanclay 2010).

A paper on modelling a shared understanding of social-ecological systems dynamics, presented at the Centre for Sustainable Forestry SCU Lismore NSW, gives an insight to some of plantation issues, such as:

Good communication with neighbours is essential, based on a mobile telephone and, if available a radio as part of a network. It also takes time. It is often tactful to encourage removal of neighbouring fire hazards which could affect the trees in the next property, or to confirm fire suppression plans. It is important to know if adjacent owners have good or poor communication facilities even if they have no plantations. (Leys and Vanclay 2010),

3. Ease of harvesting access

Mechanised harvesters are much more efficient than chain sawing for felling, allowing removal of limbs and docking of boles to accurate length requirements. Harvesting of Pinus radiata can be profitably by either method, but the area should be large enough to attract harvesting services. Ease of access and ease of log removal would be required by the contractor for a five day uninterrupted work period at both thinning and clear fell harvest time. (W. Kerruish pers com., September 2013)

4. Size of harvest

As an example, a total sawlog harvest on five SQ4 ha over a 30 year rotation, should provide a total of 3330 tonnes, or m\(^3\), per hectare consisting of two thinnings, one at about age 15 and another at about age 22 totalling 1185 tonnes, with a clear fell then of 2150 tonnes or m\(^3\) (Table 20, chapter 2). This would require a harvester to be on site, over the rotation for some 12.5 days and to harvest 270 tonnes or m\(^3\) per day. This would require at 42 tonnes per load, two B double semi-trailers delivering up to 150 kilometres distance, 2. 5 trips each day for some 16 days in total. (W. Kerruish pers. com. September 4th 2013)
5. Site and Seedling quality and fertiliser
The suitability of the site and advice on the suitability of the seedling stock for purchase of the
trees with best vigour, can be assessed by a Registered Professional Forester. Also the forester
can advise on the need and manner of application of fertilisers, prepare a site plan to take into
account fire protection, harvesting access and log loading special requirements.
For small private owner investment it is unlikely an area of Pinus radiata plantation under 5
ha planting per annum over 10 years on a minimum rotation of 25 years would be recommended
for a project for economic reasons. However, an aggregation of small owners could result in a
substantial area being established as a PPMA, from a small beginning.

6. Ease of access for inspection and maintenance
The creation of main access tracks and formation of subsidiary tracks at plantation
establishment will reduce the risk and damage from a major fire. It would allow ease of access
for annual maintenance, checks for tree health, growth, and ease of harvesting.

7. Financial grant eligibility
Based on the financial data used in this thesis, a grant to support establishment costs and to
make capped payments for ongoing management would be a strong attraction to establish and
maintain a plantation, either for a clear fell rotation or development and management of
planting for up to 11 years before selling to another party, such as a Timber management
Organisation (TIMO). A caveat would need to be in place for the plantation to be grown until
mature clear fell. Low risk in a project is desirable to understand both the requirements and
implementation arrangements for plantation fire protection by a rural fire service. A visit to
discuss plantation establishment with a local timber processor, or potential processors would
be desirable to learn of available firefighting equipment and manpower for bushfire firefighting
support, in addition to that provided by Rural Fire Services.

8. Obtain equipment needed
In order to conform to fire insurance policies, it is essential, each late spring, to clear weeds
and rubbish from firebreaks and access tracks on a suitable width of tracks for vehicles. This
requires a machine with a blade for clearing, and an owner vehicle capable of carrying a slip
on water tank and pump for both fire season operations and spraying noxious weeds. When a
serious fire occurs, generally because of drought or lightning, it often runs away very quickly.
The use of a rubber tyred tractor with blades to clear vegetation in the face of the fire is
desirable.
9. Exercise care in forward selling offer
As the main income is derived after a long period, the owner has to assess whether a contract written say, 5 years before with a timber processor should be transacted. This is because the contracted selling price of the plantation logs may be discounted in price, depending on the state of the market and competition from small owners. There is often a better sale financially when price is arranged close to harvesting. In which case, if a processor has offered a floor price well before harvesting, one needs to be cautious about signing an early contract of sale.

10. Plantation insurance and public liability cover against fire is important
Reliable companies providing fire insurance and public liability can be contacted through the AFG, allowing the owner to conduct his plantation project with continuing and sound information, and ensuring the insurance conditions are fully followed. To ensure acceptance by the insurer, a fire or public liability understanding as expressed in the insurance cover is interpreted correctly.

13. Independent ongoing checks are worthwhile
On the basis of current Government regulations, some plantation establishment and ongoing management costs, and plantation insurance could be part of costs placed against the owner’s personal income for a tax deduction. Accountancy advice is needed. The grants proposed would only apply in PPMAs.

12. Sell harvest at stump, avoiding standing tree damage is important when thinning
Well before hand take advice about all aspects of harvesting from reputable forest products people. This includes the advantage of mechanised harvesting and its capacity to de-limb and cut logs to size. This advice could relate to row width and direction of planting in relation to roads where dumps of logs could be placed most easily for the harvester. When the time comes to harvest a thinning or clear fell, the project manager can, with professional advice, ensure a competent contractor does the work, on behalf of the investor. Which party pays for harvesting and freight to the buyer’s yard is determined by negotiation with the buyer of the wood.

13. Join an industry organisation
There is value in joining the Australian Forest Grower organisation. This is worthwhile for garnering plantation knowledge, whether the private grower has a relatively isolated plantation or is one of several plantation owners or potential owners in a district, or is a large corporation.

14. Pruning up to six metres may be a selling point
The pruning of trees up to six metres, will limit the formation of large branches at an early growth stage, to allow optimum clear wood for plywood production, and assist in fire suppression. It is often advisable to prune to enhance the possibility of a sale when unpruned
sawlogs are in over supply. A commercial advantage might be taken when selling against un-pruned logs destined for veneering or finishing timber. Of course, pruning also allows better general access in a plantation and the effect of warmer conditions for growth. Providing the pruning stubs are flush with the trunk, it may be economical to carry out pruning progressively, when agricultural workers or families on a private property, or corporate workers, have a few hours spare from other activities. However, pruning should be done before the age of 10 to restrict the size of the unpruned core of a tree. There are researched schedules available describing when to prune to get the largest amount of clear wood.

15. Work contracts needs signing

Contracts for plantation work need to be written and signed with a sound knowledge of rules. A contract arrangement might have to refer to a specific time of implementation. Always exhaust sales opportunities. If the principle of PPMAs is enacted, then some cooperation on pricing may be possible. If not, always get details of costs for arranging a sale before committing.

16. Internal Rate of Return (IRR)

The new model described in Chapter 4 of this submission should follow the Faustmann standard for value which requires knowledge of an average m³ selling price for each stumpage thinning and most importantly at clearfell. It should be discounted to take in thinning profits and costs which should be expected, giving a 4-6% IRR (de Fegely 2011; Standing Committee 2011). The calculation of the IRR should take into account costs listed in Table 18 and 28 and have a capped limit of 2% from a levy grant, to ensure that an IRR of 8% can be achieved. Research has shown that the IRRs of *Pinus radiata*, calculated for stumpage at 8% are just above those in the literature for *Pinus radiata* including New Zealand and Brazil (de Fegely 2011). The 8% value could be achieved without financial support if processing Industries were able to lift their prices modestly, listing the annual inflation rate which should be reflected in stumpage prices. But on advice from processors whose profit is, and has been low for a considerable time, the grants would have to come from the marketing part of the timber and paper industry including imports. The 8% figure is well above the general trustee offerings for safe investment and well below the better equity investment results on the stock exchange for about 30 years past (Table 24). In the 1990s New Zealand lifted their stumpage prices and obtained a strong response to plantation establishment.

17. The rotation lengths.

Until field research by organizations such as the Southern Tree Breeders Association or researchers at Universities determine that a shorter rotation can provide sufficient timber
strength, and industry can cope with smaller diameter feed stock requiring strength, plantations will have to be grown for a minimum of 25 years to main harvest time. In so far as extending past that age, Lewis (1976) indicates on the best soils plantation performance can achieve an MAI greater than 30 m$^3$ in Southern Australia. *Pinus radiata* is by far the most successful species and has over 700,000 ha in management and should be supported as much as possible. Varying soils to date of that overall estate have produced an average MAI of about 15m$^3$/ha. Better selection of sites, fertilisers and tree genetic improvement should increase that average MAI.