Forest&Wood Products Australia

Knowledge for a sustainable Australia

INVESTMENT PLAN

FOR INCREASING THE USE OF WOOD PRODUCTS IN RESIDENTIAL CONSTRUCTION

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EXECUTIVE SUMMARY

The purpose of this research was to determine drivers for increased use of timber in residential construction and to develop a market-based industry research and development (R&D) investment program with the aim of increasing the volume of wood products in residential construction by 30%. Despite the advantages of the use of timber in residential construction there has been a reduction of wood product and system use in housing in Australia in recent years. An investigation of national and international examples of timber use in housing showed that there are precedents for using greater volumes of timber as well as timber products with a greater value. Future housing scenarios thus considered 30% increases in both volume and/or value. The project included an intensive 'think-tank' session for scoping purposes followed by two one-day workshops.

The 'think-tank' team, comprised a small group of two representatives from prominent residential construction companies, an industry participant, and an architect, discussed, characterised and prioritised issues affecting the use of timber in housing. The significant issues formed a basis for developing workshop questions and research direction. The goal of the workshops was to ascertain where increases in timber could occur and where further development was required. Two workshops were conducted, one in Queensland and one in Victoria, each with about 14 participants from residential building companies, the timber industry, the Housing Industry Association (HIA), Master Builders Australia, and independent architects.

The workshops determined the areas of significance and the practical strategic initiatives were then extracted from these areas of significance. Six areas emerged as highly significant in terms of increasing timber in housing: (A) Awareness and marketing of wood products, (B) Building Construction and User Interface, (C) Education, Training and Technical Support, (D) Future Forest Resource Planning, (E) Innovation and Technology and (F) Regulations and Rating Schemes. Potential Goals and Deliverables were tabulated and a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis undertaken for each strategy. Some of the strategy areas overlap with existing FWPA activities. Priority Areas were established on the basis of (i) Potential for success, (ii) Impact, (iii) Effort, (iv) Cost and (v) FWPA budgeted.

To explore strategic actions for the investment plan, each area of significance was documented, discussed and prioritised in extensive tables in

the report. A budget for four years research addressing each of the Priority One areas was developed. The resulting Priorities One areas were:

- Quantification of savings
- Flooring R&D
- Systems R&D
- Emerging technologies support and development
- Eaves R&D
- Panel products R&D
- High performing windows R&D
- Warranties
- Maintenance schedules
- Builder allegiances
- On-road support

MISSION STATEMENT

To develop a market-based, integrated Forest and Wood Products Australia (FWPA) and industry research and development (R&D) investment program which will increase the volume of wood products in residential construction by 30%.

BACKGROUND

Changes in construction practices have resulted in a reduction of wood product and system use in residential housing despite the numerous advantages of wood. In response the FWPA has commissioned a submission for a market-based research and development investment plan to aid an increase in use of wood products in housing. The plan, as well as meeting market requirements, needs to address future housing issues, emerging sustainability requirements, national and international developments, and FWPA's strategies and priority themes.

Research to highlight strategic initiatives has been undertaken, including an investigation of national and international research and development, identification of emerging technologies, analysis of industry capabilities, and, most significantly for this plan, an investigation of housing and timber industry stakeholder requirements.

The market-based research and development investment plan is to facilitate a 30% increase in timber volume used in residential mass housing.

INCREASED USE OF TIMBER IN HOUSING

There is precedence for using a greater volume of timber in housing; composite wood products, for example, 'represent more than 40% of the total materials used in residential construction in North America making them the largest single material type used in Residential construction.' (USDA, 2011). Housing in Japan typically has many timber members: post and beam frames which are carefully integrated with sliding doors, openings, and alcoves; and, double roof systems that allow for false ceilings and slender eve rafters that do not need to carry a full roof load. Wood frame use in Japan was up by 21% and these constituted about 59% of the total housing starts in August 2010. (Global Wood, 2010)

In Australia the average volume of wood per residential construction has decreased from 24m3 to 14m3 between 1945 and 2008 (Kapambwe et al, 2008). This is despite an increase in the average size of Australian houses. Structural wood use dropped 17% and wood based panel use was down 11% in the 2008 – 2009 period. (Low & Mahendrarajah, 2010, 8) Wood products have lost valuable market share however it may be possible to recapture the market with new and innovative products and by disseminating the benefits of timber. A 30% increase of timber volume in residential construction, although significant, is considered possible based on recapturing lost market share, gaining new markets, and international precedent.

Future housing scenarios however, indicate reduced land sizes, smaller homes, increased densities, and increased multi-residential dwellings, which may have the effect of reducing the actual volume of timber in housing. Simultaneously, other issues are emerging which could affect timber volumes in each house such as:

- Increased waste disposal costs. Among the drivers are less waste on site, greater requirement for prefabricated and innovative components and systems, better use of materials, particularly wood waste, and lighter-weight products (i.e. density of timber less than concrete and bricks).
- Sustainability requirements. There is a wide range of influences, including rating schemes, increased environmental awareness, increase in material costs to reflect environmental impacts, etc.
- Future timber availability. Are Australian forests geared to handle 30% increase? What types of timbers will be available in the future i.e. durable timbers? Will increased imports be required and how will this impact the Australian Industry?

- Carbon storage potential of timber. It has been suggested that an increase of wood in housing ‘to 0.14 m3 per m2 of house area may increase the carbon uptake in Australian houses to over 4Mt CO2-e’ (7% of Australia’s 2006 greenhouse gas emissions) (Kapambwe et al, 2008). The current figures however require further understanding as some modelling tools utilise overseas data which may not reflect Australian conditions i.e. Burning-off may be considered.

It may be, in the changing market climate, that adding 30% value (or profit) to wood products (i.e. utilising wood waste, engineered wood products, smart panels, solid wood structure features, etc.) makes more sense than selling 30% more products.

METHODOLOGY AND DISCUSSION

The project had a short time frame, with the draft submission required by the FWPA within four months of project commencement. This made it pertinent to obtain market response rapidly for analysis, and immediate feedback from the market was sought using a workshop format. A select group of organisations were asked to participate in either an initial 'think-tank' or one of two subsequent workshops.

Review

A short initial scoping period allowed review of current national and international endeavours, consideration of current and future issues, and FWPA strategy and priority areas. Some of the information reviewed included, but was not limited to:

- FWPA current and completed R&D projects (i.e. Kapambwe et al, 2008; TDA, 2008; Baker, 2010)
- FWPA Annual Report (i.e. FWPA, 2010)
- FWPA Strategic Plan 2009 - 2013 (i.e. FWPA, 2008)
- CSIRO current and completed R&D projects (i.e. Tucker et al, 2009; Mitchell & McFallan, 2009)
- Other Australian research groups current and completed R&D projects (i.e. Nolan, current)
- Government Programs (i.e. DAFF, 2010)
- URS Timber Market Surveys (i.e. URS, 2009)
- International Innovations (i.e. Paevere & MacKenzie, 2006).
- HIA reports (i.e. HIA, 2007)

- Information from the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) (i.e. Low & Mahendrarajah, 2010)
- Other studies (i.e. Olesinski, 2009)

The review provided an overview to the project and understanding of many issues before market engagement. After the review a 'think-tank' team was established for an initial brainstorm session.

Think-tank

The 'think-tank' team was selected soon after project initiation and comprised a small group including two representatives from the residential building construction industry, an architect, and a forest and wood products industry representative. Dr Selwyn Tucker, was asked to participate in the project, due to his background as project leader for the LCI Timber project

(Tucker et al, 2009), and proven R&D skills. Other attendees were Dr Pene Mitchell (project leader) and Sarah Smith (assistant). The 'think-tank' team were involved in a brainstorm session and the small group format allowed each participant to contribute widely and participate freely.

The format of the brainstorm session remained flexible so as not to unduly influence discussion. The following broad questions were posed:

- Where can we put more timber?
- What types of products are required?
- What does increasing by 30% volume entail?
- How can this be done?
- What are the opportunities for Innovation?

Relevant issues were discussed, characterised and prioritised, and issues affecting timber in housing, potential R&D aiding the increased use of timber in housing, and opportunities emerged. The outcome of the 'think-tank' brainstorm was a list of areas of significance which included:

- **Increase $ Vs Volume of timber** – it is easier to add value to wood products than increase sales.
- **Perception/ Culture** – general perception of timber needs to change (i.e. old growth forest loss, durability, wood and fire, incorrect use, culture of solid houses, termites, etc.) and benefits need to be highlighted (i.e. beauty, natural, sustainable, carbon store, lightweight solution, prefabrication for ease of assembly, etc.)
- **Value** – people will value houses more in future as environmental costs are considered, solutions rather than products may make build more cost effective i.e. timber products more expensive, but quicker assembly, less site works, less labour costs, etc.
- **Understanding** – timber is not well understood and skills have been 'dumbed-down', which has led to poor building practices, loss of the art and craft of timber skills, etc.
- **Marketing/ Market** – change mentality of solid (i.e. flexibility in earthquakes, quick rebuild, etc.), timber as strong as steel, need to show builders what can be done for them to gain faith in market. It was noted that mass housing builders do not want to be guinea pigs and that 1st home buyers just want a house – 'timber does not come into the equation.'
- **Forests** – can forests handle a 30% increase? Hardwood planting, durable timbers and reforesting for the future, etc.

- **Usage** – promote systems rather than products i.e. timber systems to establish whole houses, flooring systems, wall systems, etc. There is a huge opportunity for durable cladding, panels and prefabricated systems.
- **Economics** – value add by using wood waste for products. There is opportunity to increase the value of timber with good solutions that are quick and easy to assemble.
- **Carbon** –discuss what impacts carbon tax will have on timber industry, but the tax will not make a huge difference without a 'whole-of-life' approach.

The 'think-tank' gave initial understanding to market requirements and the topics of significance were noted for a comparison with information emerging from the workshops. The initial 'think-tank' brainstorm also aided scoping for the workshop format, strategies, questions, and stakeholder involvement.

Workshops

The twenty largest residential builders were invited to participate, as well as smaller residential construction companies, representatives from the timber industry, the Housing Industry Association (HIA), Master Builders Australia and architects. It was considered that 10 to 15 participants would be optimal for each workshop; enough to generate a good and varied discussion, allow small group activities, and provide adequate opportunity for each individual to contribute.

Due to limited time and budget only two workshops were conducted. The first was held in Queensland and the second in Victoria. Timing of the workshops was not optimal, given that the end of the year is notoriously busy for the construction industry. Potential participants asked if the workshops could be moved to the beginning of 2011 so they could participate. Unfortunately, this was not possible although a fair representation was attained at each workshop (12 representatives in QLD and 14 representatives in Vic.) with a good mix of housing representatives and timber industry representatives (half and half) across the two locations.

The goal of the workshops was to determine where the residential housing market representatives considered increases could be made and where they wanted to see further development activity. In order to prompt discussion, site visits were organised immediately before each workshop to homes publicised as sustainable: Stockland's Doonella Sustainable Home, Noosa (Smart and Sustainable Homes, 2009); and, Mirvac's Harmony 9, Mt Waverley

(Mirvac, 2010). The site visits proved highly beneficial, thought provoking and inspiring, and some very good discussion was generated as a direct result of the visits.

The workshops were held at appropriate venues within five minutes' drive of the respective house sites. The workshop participants were divided into small groups of three to four people from varied organisations. The workshops were based on a series of questions which were discussed within the small groups for 10-15 minutes and then the information was fed back to the group as a whole.

The questions posed included:

- Advantages/ disadvantages: What are the advantages/disadvantages of using wood?
- Future of housing: How is housing changing? What are the impacts of change? Effect on timber use?
- Barriers: What are the barriers to increasing timber use in residential housing?
- Drivers: What are the drivers to increase the use of timber in housing?
- Where: Where is wood used in houses and where can it be used?
- Competition: What competition is there for wood products in housing?
- Innovation potential: What is the potential of wood in housing and where can we innovate?
- Industry capabilities: What capabilities are required for more wood product usage?

Important issues and priorities were characterised as an entire group after each question had been discussed within the smaller groups. When all questions had been discussed the priority topics from each were reviewed and areas of significance discussed. The following areas of significance were noted at the Queensland and Victorian workshops.

Areas of significance Queensland

Increased education and training – education and support are significant; professionals need to learn to use timber appropriately and specify the right timbers for the application, and builders require skills to handle existing and emerging products and systems.

Future planning for forests – resource planning is a priority, appropriate timbers and volume of timber need to be grown for the future, biodiversity needs to be supported, and old growth forests retained.

Innovation/technology – practical demonstrations showing innovative technology use are required, technology can be imported from overseas rather than R&D, and value adding to products and pre-fabrication will be innovations of future.

Timber recognised in Government regulations – there is a need to support proper use of wood products, Timber LCA needs further investigation, and passive house measures that support use of timber need to be understood.

Technical support – builders and design professionals need support with construction process and specifying, on-ground support & information required for the whole of industry.

Areas of significance Victoria

Flooring – flooring is a significant area for future increases, particularly flooring systems which are cost competitive and allow quick on-site assembly, floors for sloping sites, floors that do not require carpets (reducing asthma), timber slab-on-ground, etc.

Innovation – awareness of emerging innovations needs to be increased so design and construction professionals understand what solutions are available. More investigation into hybrid solutions and timber for double and triple glazed windows is required. Value (profit) adding is very important. Timber systems and solutions rather than products are required.

Brand awareness of timber – branding forest and wood products, dissemination of information responding to misconceptions, eco-labels and ratings are essential.

Site conditions – site conditions and future environmental concerns such as cut and fill process will drive lightweight solutions for sloping sites.

Windows – durability and maintenance need to be addressed, and there is a lack of good cost effective window solutions for double and triple glazed windows.

Holistic sustainability - most participants agreed that holistic environmental issues (rather than single issues) should be addressed. How LCI timber and LCA tools could be integrated in Government Regulations and environmental assessment processes should be addressed.

Of particular importance, was the participants' agreement that any investment by the FWPA must result in ***practical outcomes***.

CONSOLIDATED AREAS OF SIGNIFICANCE

Notes from the 'think-tank' meeting and the workshops were collated and six areas emerged as highly significant in terms of increasing timber in housing:

A. Awareness and marketing of wood products
B. Building Construction and User Interface
C. Education, Training and Technical Support
D. Future Forest Resource Planning
E. Innovation and Technology
F. Regulations and Rating Schemes

To explore strategic actions for the investment plan, each area of significance has been documented and discussed and is based on considerations and outcomes from the 'think-tank' and workshops.

A. Awareness and marketing of wood products

Participants suggested that there is a niche market for sustainable products and systems. It is worth noting that one of the sustainable homes visited apparently had four customers offering above market price for the home on the first public open day. Sustainable homes are becoming more mainstream as consumer awareness increases. Participants considered it important to market products in a holistic life cycle context so the whole of life performance of a house could be understood: 'Can a timber house be deconstructed, mulched and reused in a forest to grow more trees?' (See Strategic Initiative A.1).

Another of the major issues for participants was the fragmented nature of the timber industry and lack of understanding of all the players. The large number of industry organisations, manufacturers, forest owners, etc. makes it very difficult to come to terms with the industry – unlike Colourbond, which was continually referred to for comparisons. Understanding how the industry operates, technologies and skills available, methods of manufacture, facilities, and scientific and technological developments is important, but currently not practical. (See Strategic Initiative A.2).

Participants agreed that a single centralised on-line resource for consumers, suppliers, builders, architects, engineers, quantity surveyors and the industry would be extremely beneficial. It would allow an increased awareness which would result in practical outcomes. There has been a shift in the way professionals acquire knowledge away from TV, magazines, and exhibitions, to use of the internet. One participant mentioned that CSR increased their website hits by 50% one hour after 'Grand Design' aired on television when

they advertised in these slots; so consumers still respond positively to TV advertising. There is so much information about timber use in housing. However it seems that the technical transfer is not occurring; as supported by CHH's anecdote about the lack of uptake of their new panel products.

A widely used centralised resource could become a path to market for new innovations. A centralised resource could also provide an incentive for the forest and wood products industry to work together, share information, supply home systems packages, share resources and supplies, reduce waste, share advertising costs, etc. A united front would allow the timber industry to better compete with the large scale united fronts of the steel and concrete industries. A search of industry based information culminated in a proliferation of websites, from manufacturers, industry organisations, merchants, etc. Sites are often not optimised for relevant searches, information is not regularly updated (the most recent newsletters on an industry website were from 2004 (FWPA, 2007)), links are not active or available, manuals are not available on-line, etc. (See Strategic Initiative A.3).

The participants also reported that the perception of timber was an important issue, but the message about wood products was clouded by lack of understanding of various issues including fire hazard, maintenance, vulnerability to pests, old growth forest issues, etc. The ability to access correct information was seen as a significant problem and it was considered that wood products have been given bad publicity despite evidence to the contrary. Scientific proof of flexibility in earthquakes, structural strength, charring and quick rebuild potential after fire, minimised maintenance capabilities ('no such thing as maintenance free'), etc. need to be highlighted. (See Strategic Initiative A.4).

Most participants agreed that timber was a viable option but as they do not have evidence at hand, and information available is conflicting, it can often be dismissed in favour of other materials. Timber needs to be promoted as a viable construction material for residential construction and timber products must be marketed to take advantage of 'timber as a viable option.' (See Strategic Initiative A.5).

B. Building construction and user interface

Participants noted during a site visit that there was no information left on-site for potential buyers of the newly completed property on maintenance or termite protection regimes. Termites, durability, maintenance, etc. are considered significant issues by builders and end-users and it was suggested

that the timber industry need to address these concerns in a practical way. (See Strategic Initiative B.1).

Builders are hesitant to 'put their neck on the line' by introducing unproven technologies. They also need information and support in transitioning to new products and systems otherwise they may be resistant to change. Engineers and builders are formula oriented and timber 'tool-kits' are required. It is important to have strategic alliances with builders and provide incentives for them to try out new products and systems in their show homes, as these are seen as a showcase for ideas, fashions, and provide modelling for market acceptance. (See Strategic Initiative B.2).

Participants suggested that builders respond well to cost and time savings, and potential for saleability, and that these are major project drivers. Participants were all resounding in their praise for timber and the aesthetics of timber. However cost is an important factor in mass housing. 'Timber does not enter into the equation with new home buyers. They just want a house!' Cheaper materials however may be more labour intensive, and builders want construction efficiency. It was noted that natural finish, 6/7mm plywood may be a more cost effective option than plasterboard in multi-residential dwellings as there are no extra trades required, the job can be completed faster, it is stronger, low maintenance, pictures can be screwed straight to walls, etc. One of the participant architects costed equally a large structural solid timber feature compared to lower quality structural timber with more members and fixtures required. It was also discussed that builders may get to lock-up quicker if housing was sheathed in plywood, which may work out better economically, despite the increase in product. Products which are quick and easy to install (i.e. panels) have the opportunity to be more expensive. Also materials and products arriving at site with no waste (i.e. engineered and pre-fabricated components) will be more sought after with the increasing cost of waste disposal. (See Strategic Initiative B3).

Participants from building companies who built houses Australia-wide stressed that designs remained the same whether built in Queensland, Victoria or WA. They do not want to have to change the design or the way the buildings are put together but have had to in the past when standard products have not been available in all states. (See Strategic Initiative B4).

C. Education, training and technical support

Participants considered that professional education and training are critical components of using more timber. Current programs and courses are considered lacking, timber technology has been 'dumbed-down' and most

professionals do not know how to correctly specify or design with timber, and do not understand the right product or species for specific applications (i.e. hardwoods, treatments, etc.). Educators are not considered to have the right support and course content and timber technology courses in universities need to be addressed. (See Strategic Initiative C.1).

It was also noted by participants that new timber technologies were not up-taken more widely due to lack of technology training for builders. Training courses introducing new technologies would increase awareness of new innovations, development skills in the industry, re-educate in the art and craft of timber. There was discussion that engineered wood products in particular would be significant in future housing prospects if builders had more training. (See Strategic Initiative C.2).

In addition, if builders and architects have direct access to information, they are more likely to use it. Most professionals use CAD, and phone applications are quickly emerging as an at hand information source. (See Strategic Initiative C.3). Specific timber design software does exist (Timber Solutions design software, Hyne Design, Hyne Ezydraw and CHH Design IT) but it is not known to what degree these tools are utilised. (See Strategic Initiative C.4).

Technical support and trouble-shooting would also provide immediate response to problems, which would encourage use of timber. Participants agreed that industry requires more technical people who can problem solve and support building construction industry in using timber products and systems correctly and interface with architects builder, engineers and public. Timber industry participants suggested technical people who provide support to industry players are also sadly lacking and would provide a much needed resource for the industry. (See Strategic Initiative C.4).

D. Future forest resource planning

Participants were concerned whether the forest industry could handle a 30% increase in demand for residential timber. It is worth noting that during the writing up of this report major flooding claimed up to 20,000 homes Australia-wide, all of which will require a partial or complete rebuild. Already there is concern regarding availability of building materials to complete these projects in a timely manner.

There were some discussions in the workshops about forests, working with farmers and landowners, growing hardwoods, licensing for speciality timbers, and generating income for forest i.e. thinning's into innovative products. However most of these issues were not directly relevant to the scope of this investment plan. Of relation to the investment plan is the lack of

understanding about forest and the misconceptions surrounding old growth forests and plantation timbers. Having access to information about forests, forest certification, Chain of Custody, (CoC) etc. was considered important, especially for premium products. (See Strategic Initiative D.1). It may be that the increased tree planting as a result of carbon offsetting (for air-travel, etc.) may be available for use in the future. Understanding how this is modelled may be of interest. Users want to be assured that the timber they use is from a sustainable source and forest certification was considered a very important process for the forest and wood products industry. (See Strategic Initiative D.2).

E. Innovation and technology

Participants were unanimous in their support of a systems approach to housing, especially for emerging markets (higher density solutions). Rather than providing a multitude of products, systems solutions for multi-story dwellings, sloping sites, in-fill projects, small houses, and integrated, modular and pre-fabricated housing are required. Participants wanted to see systems solutions address a multitude of issues including cost, build time, maintenance, disassembly, smart design, reduced waste on-site, durability, aesthetics, energy efficiency, etc. (See Strategic Innovation E.1). The focus should be placed on housing solutions and practical technologies that can be readily adopted by home builders, industry and consumers. Systems to produce houses that are more liveable, more responsive to universal and regional environments, more frugal with available resources than those using current practices, aesthetic, functional, and disaster resistant (earthquake, bushfire, high wind, and flood).

Participants were particularly vocal about the changing housing market; for timber to retain their current 80% market share in the housing structure sector, solutions to new housing types are required. Suggestions were made that the industry looks to the European system of panels and cross-laminated beams for multi-residential and higher density housing. Imports of technologies and adaption to Australian climate, skill base, and requirements may be more cost effective than research and development: 'The Australian market is not large enough to support research.' It is worth noting that countries with smaller markets than Australia have Centres for wood research (i.e. Sweden). The timber industry participants advised that there are many new and innovative products emerging that have not had the support required to enable the products to take market share. These products require support. (See Strategic Innovation E.2).

Specific product types were discussed as having potential to impact on the amount of timber in housing. Re-introduction of eaves, for example, has the potential to add 20% to the amount of roof timber utilised. Eaves have a significant impact on passive design, house protection, window protection, and reduced maintenance. Encouraging better roof and sustainable house design will directly impact on the amount of roofing timber. It was also noted there may be potential to work with parties with vested interested i.e. Colourbond and roof sheeting companies, insulation companies, to promote better roof design. (See Strategic Innovation E.3).

Flooring was another area where a significant increase could be attained. Timber flooring has not held its market due to cost, time to lay, and the benefits of concrete slabs. With the increase in multi-storey dwellings (70% and growing), there is great potential for reintroducing timber in second and subsequent stories. If timber floors can address thermal performance, noise, time, and cost issues there is great potential to corner the market. Timber floors are lightweight, aesthetic, healthy, easy to maintain, and can be easy to install. Floors need to be considered as supporting an entire building system, and suspended floors, long span floors, slab-on-ground, panel systems, solid, pre-fabricated and insulated floors were all considered worthy of investigation. Floors which can be pre-built in the factories and assembled on-site, which are quick-build and reduce waste on-site will be significant. (See Strategic Innovation E.4).

Development of double and triple glazed durable windows was considered highly relevant in a changing market. Participants noted that cost effective, efficient, low maintenance, high quality and performing windows do not exist. With higher density living and sustainability requirements, windows will be required to provide better insulation and acoustic properties. (See Strategic Initiative E.5).

As mixed material facades become more common, the labour rate of brick construction increases, and preference for light weight upper storeys increases, there will be more scope to expand into the external cladding market. Timber cladding (rebated weatherboards), lining (VJs) and ceiling board markets have greatly declined, due in part to installation time and cost. Panel products address these and other issues, such as capacity for modular design, ease of assembly/ disassembly, part of a system solution, built in a factory for high precision and accuracy, value added product, assembled in any weather, easy design capabilities, etc. There is potential for cost to be removed from labour and put into quality materials and performance.

With smaller housing emerging as the way of the future, high performing panel products may be highly regarded. There is lots of room for innovative panel products: provision of cladding, structure, insulation, and lining in single panel; jigsaw and snap-lock potential; smart panel systems which are wired and can be 'plugged-in' to a system; low-maintenance with smart coatings, adhesives and treatments; swappable panels, with pictures, colours, recesses (for flat screen TVs, etc.); climate and location specific; end of life swap-out; refurbished/ redecorated panel capability; high performance panels (acoustic, fire, etc.); integrated solar cells or EMF shielding (conductive laminate to shield against EMF radiation); provision for integrated lighting, solar tubes and ducting; value added panels using waste wood, thinning's, etc. 'treating wood like gold'. (See Strategic Initiative E.6).

Participants pointed out other products (Colourbond for example) offered warranties, which made them more attractive options. Timber products could benefit from this type of value adding service. (See Strategic Initiative E.7).

F. Regulations and rating schemes

Participants commented on the lack of influence the timber industry has with government policy makers and organisations which could potentially influence the uptake of timber in residential construction, such as the HIA, Master Builders, the Green Building Council, rating scheme developers, etc. Customised knowledge transfer, to direct policy makers to performance of wood products is essential. Star rating schemes have swayed from timber because of focus on thermal performance, for example. Legislation allowing covenants have in the past discriminated against timber i.e. 'slab on ground,' no timber cladding, etc. The timber industry needs to determine the areas in which positive changes can be made and provide information in support of timber use. (See Strategic Initiative F.1).

In addition, the Building Codes of Australia need to better support timber construction especially regarding LCA, fire, multi-storey buildings (currently Class One Buildings are restricted to three storeys in timber) and Carbon Pollution Rating Scheme (CPRS). Participants thought that providing the science supporting timber use and spending money to change the codes (legal pressure) could be a good opportunity to increase timber utilisation. (See Strategic Initiative F.2).

STRATEGIC INITIATIVES

Practical strategic initiatives have been determined from the workshop discussions and within each area of significance there are between two and seven strategic initiatives. Twenty seven strategies in total are detailed in Table 1: Strategies.

Table 1 Strategies

A. AWARENESS AND MARKETING OF WOOD PRODUCTS	
A.1	Promote to consumers and specifiers the holistic sustainability aspects of wood products.
A.2	Map industry and investigate a co-ordinated industry approach to wood product supply and information dissemination.
A.3	Provide centralised, regularly up-dated internet resource.
A.4	Address the negative perceptions and misconceptions of timber including durability and maintenance issues to educate the end user of wood products.
A.5	Promote wood as a viable option to steel, concrete, bricks, plastics, and other competitive materials.
B. BUILDING CONSTRUCTION AND INTERFACE	
B.1	Develop smart maintenance and termite protection schedule and reminders.
B.1	Establish allegiances with builders and provide support and information.
B.3	Quantify cost savings, time savings, and saleability of new and existing products.
B.4	Promote standardisation of engineered wood products.
C. EDUCATION, TRAINING AND TECHNICAL SUPPORT	
C.1	Overhaul and expand University Courses for professional education and training.
C.2	Provide training courses for new and existing technology installation including engineered wood products, panel products, etc.
C.3	Develop proprietary CAD and phone applications for building construction and timber industries.
C.4	Provide continuing professional development (CPD) training courses to use available and new software.
C.5	Establish technical support for timber industry and building construction industry.
D. FUTURE FOREST RESOURCE PLANNING	
D.1	Disseminate information on sustainable forest management, future growth planning, harvest capabilities, niche market timber, logging practices, etc.
D.2	Aid adoption of Forest Certification schemes and Chain of Custody by all industry players supplying to the Australian market.
E. INNOVATION AND TECHNOLOGY	
E.1	Develop systems approach to residential housing construction.
E.2	Highlight and support emerging technologies and communicate R&D.
E.3	Campaign to reintroduce eaves for better building protection and passive design.
E.4	Develop flooring systems which address thermal performance, acoustic and fire performance and are easy to install.
E.5	Develop high performing double and triple glazed timber windows with high durability.
E.6	Investigate and further develop panel products.
E.7	Investigate potential to offer warranty for a range of applications.
F. REGULATIONS AND RATING SCHEMES	
F.1	Develop a communication plan to inform government policy makers, ratings scheme developers, HIA, Master Builders, GBC, etc.
F.2	Supply scientific data to change building codes to favour timber products.

GOALS AND DELIVERABLES

For each strategic initiative the Goals and predicted outcomes of the research and development strategy have been broadly outlined in the following Tables 2A to 2F. The potential increase in timber is also provided as an estimated impact which that strategy will have on the increase of timber uptake in residential housing (as a %). This percentage was determined based on understanding of construction practices and current timber use.

Table 2A Awareness and Marketing of Wood Products Goals and Deliverables

	Strategies	Goals	Deliverables	Potential Increase of timber
A. AWARENESS AND MARKETING OF WOOD PRODUCTS				
A.1	Promote holistic aspects	To promote to consumers and specifiers holistic sustainability aspects of wood products by collating science-based research and positive aspects of wood, including product range, structural capabilities, ease of assembly, quick-build and disassembly potential, modularity, low emissions and embodied energy, longevity, pre-fabricated and engineered products, versatility, aesthetics, local resource, strength-to-weight ratio, reusable, recyclable, energy source, moisture control, etc.	Fact sheets and holistic marketing strategy incorporated in 'Wood. Naturally Better' brand, which allows wooden houses to be recaptured, reimagined and re-valued as sustainable homes. This information should also aid future development of eco-labels for forest and wood products and systems which could be certified within the Type I labels (ISO 140024).	10% - Potential to increase the purchase of premium products and influence a culture of sustainable timber use.
A.2	Map industry	To map industry and investigate a co-ordinated industry approach to wood product supply and information dissemination.	Web-based overview of the timber industry including forests and forest owners, manufacturers, millers, merchants, industry organisations, Government Departments, affiliated industries (treatments, laminates, paints, etc.), forest certification, University partners etc. The website will be accessible to a wide range of users and industry will benefit from a whole-of-industry approach which can be co-ordinated in order to provide awareness within industry as well as communication outside industry.	<5% - This resource would allow a better understanding of the industry, product availability, and where to access it. It may not directly influence further timber uptake in residential construction.
A.3	Provide centralised resource	To provide a centralised and regularly updated internet resource for communication within and outside industry.	Consolidated timber industry website, containing case-studies of buildings, components, assembly instructions, installation resources, technical notes, demonstrations, CAD ready details, span tables, online Wood Solutions manuals, technical helpdesk, links to industry players, collaborations, advertising, etc. The resources would need to be regularly up-dated and be optimised for relevant search engines.	10% - Desire to utilise more timber but little access to information required. A single resource would make it easier to source products, specify products, establish tool kit, collect CAD details, understand location variability and standard product availability, etc.
A.4	Address misconceptions	To address the negative perceptions and misconceptions of timber including durability and maintenance issues in an endeavour to educate the end user of wood products.	Fact sheets and marketing strategy incorporated in the 'Wood. Naturally Better' brand and discussions with major profile environmental groups to improve their perception of the Australian forest and wood products industry.	10% - Potential to influence purchasing decisions in favour of wood products.
A.5	Promote wood viability	To promote wood as a viable option to steel, concrete, bricks, plastics, and other competitive materials.	Promotion and marketing strategy incorporated in 'Wood. Naturally Better' brand.	5% - Influence during decision making process and in developing solutions for new construction types.

Table 2BBuilding Construction and Interface Goals and Deliverables

	Strategies	Goals	Deliverables	Potential Increase of timber
B. BUILDING CONSTRUCTION AND INTERFACE				
B.1	Develop maintenance schedule	To develop maintenance and termite protection software or applications that can provide homeowners with reminders and schedules on an ongoing basis.	Software or phone application which detail all the timber in the customer's house with the ability to remind the homeowner about termite protection, maintenance regimes and to also provide schedules, information, local distributors, new products available, latest news and information, advertising, etc.	5% - End users, as well as architects and builders, are the dominant decision makers for many visual housing components (HIA, 2007), and this type of development would manage the expectations of the end user.
B.2	Form builder allegiances	To form allegiances with builders to encourage the use of more timber in residential construction and reduce resistance to change.	Information packages for builders detailing support, loyalty discounts and incentives, continuity and quality assurance, long-term plans, training, packages for show homes and 'tool-kit' with all technical information.	15% - Allegiances would directly influence the increase of timber in housing.
B.3	Quantify savings	To develop economic costing model for residential building systems to identify cost drivers and opportunities for substitution of building systems, including: • Low cost materials/ high cost labour versus prefabricated materials/ reduced labour. • Construction efficiency and costing. • Energy saving and reduced energy demands. • Low environmental footprint. • Economic Replacement costs. • Conflict between low value/high volume and high value/low volume.	Economic costing model with comparisons of timber versus competitor systems and products for a range of applications with quantifiable evidence of cost savings taking into account product cost, installation, quick build, waste minimisation, labour, etc.	20% - If cost savings can be proven over other materials when considering more than just cost of materials, there is potential for a significant increase of timber in residential construction.
B.4	Promote standardisation	To work with manufacturers to promote standardisation of engineered wood products.	Consolidation of available information into fact sheets or tables which detail product standardisation and widely available products.	10% - this will be particularly significant for new higher density housing types.

Table 2C Education, Training and Technical Support Goals and Deliverables

	Strategies	Goals	Deliverables	Potential Increase of timber
C. EDUCATION, TRAINING AND TECHNICAL SUPPORT				
C.1	Expand wood technology courses	To overhaul and expand existing University Courses for professional education and provide sponsorship and support.	New professional education timber technology courses including course content, course notes, guest lecturers.	15% - Professionals will better understand the use of timber and will use timber as part of a tool-kit.
C.2	Provide training courses	To provide training courses for new and existing technologies including engineered wood products, panels, etc.	New TAFE based or independent training courses for builders and trades people to develop skills required for utilising wood products and systems.	15% - If trades people have skills to utilise emerging wood technologies, the uptake will be quicker and more effective.
C.3	Develop CAD and phone apps	To develop proprietary CAD and phone applications for costing and quantifying which will support the building construction and timber industries.	Software and phone applications linking to existing programs with drag and drop capabilities, designed components, in-built 'live' costing tools, stock availability, building construction calculators, estimator and planning tools, full plans and member dimensions for components, sizes, cutting schedule, layouts volumes, diagrams, latest news, construction information, design information, span tables, performance measures, bill of materials, cut lists specifications, fire ratings, performance critique, daily updates including tip of the day, advertising, etc. which will benefit builders, architects, timber industry, quantity surveyors, engineers, etc.	5% - Will aid industry and will keep timber in their minds on a daily basis and will move the industry into the 'technology-age' both of which have been proven to be beneficial in influencing uptake and increased use.
C.4	Provide software training	To provide continuing professional development (CPD) training courses to use available and new software.	New independent training courses to aid professionals to understand timber software available (i.e. Timber Solutions Design Software, Hyne Design, Design IT, etc.) and how to utilise it which can be run through professional institutes (architects, engineers, quantity surveyors, HIA, Master Builders, etc.) as continued professional development (CPD) courses.	5% - Providing professionals with tools and how to use them will influence the uptake of technology and influence increase of timber in housing.
C.5	Provide on-road support	To provide on-road technical support and troubleshooting which supports the whole building construction and timber industries.	State and territory-based, nationally co-ordinated, on-ground technical support team.	10% - Costly but potentially effective.

Table 2D Future Forest Resource Planning Goals and Deliverables

	Strategies	Goals	Deliverables	Potential Increase of timber
D. FUTURE FOREST RESOURCE PLANNING				
D.1	Disseminate forest facts	To disseminate information and facts on forests, sustainable forest management, R&D initiatives, planning for future growth and harvest capabilities, niche market timber availability, lawful logging practices, carbon offsetting by third parties, forest fires, etc.	Forest and wood product fact sheets which can be read in conjunction with eco-labels and part of the 'Wood. Naturally Better' brand.	5% - Negative connotations regarding forestry practices are still common place. If more details about the forest practices were known, there would be better support for products from sustainable sources and choice over cheap imports.
D.2	Aid Certification	To aid adoption of Forest Certification schemes and Chain of Custody certification by all industry players supplying forest and wood products to the Australian market	Support of Forest Certification and Chain of Custody schemes by providing information, systems and processes to industry, knowledge along the supply chain, and lobbying to regulation bodies and rating tool developers.	10% - Certified wood products would replace cheap imports from old growth forests.

Table 2E Innovation and Technology Goals and Deliverables

	Strategies	Goals	Deliverables	Potential Increase of timber
E. INNOVATION AND TECHNOLOGY				
E.1	Develop systems approach	To develop a systems approach to residential housing construction.	Analysis of systems available and development of systems solutions using new and existing products and technologies, determining missing links and new construction opportunities.	20% - If the industry can provide a system approach to construction addressing issues discussed, there is potential for a significant increase in timber in housing.
E.2	Support emerging technologies	To highlight and support emerging technologies and communicate R&D.	A communication plan for marketing new and emerging technologies and research being undertaken, including web-based fact sheets, combined advertising, training courses (see Strategic Initiative C.2).	10% - If emerging technologies are well marketed and supported by the industry there will be a potential increase of timber use in housing.
E.3	Support reintroduction of eaves	To encourage better roof design and campaign to reintroduce eaves for better building protection and passive design, better internal climate (cool in summer/ warm in winter), shade and protect windows, less maintenance, greater water collection capacity, etc.	A manual to detail better roof design with associated eaves which will allow better passive design with associated courses.	10% - Immediate increase in roofing timber members such as trusses, but also ability to increase timber in eaves lining. Currently Hardiflex dominates market and offer a 10 year warranty. Timber and panel products could be pre-primed for eaves lining.
E.4	Develop flooring systems	To develop flooring systems which address thermal performance, acoustic and fire performance, are easy to install and structurally integrated.	Practical solutions for flooring systems supported, developed or overseas technology purchased after analysis of available technology.	20% - Huge potential to expand into market.
E.5	Develop high performance windows	To develop high performing double and triple glazed timber windows with high durability.	New innovative and practical high performing window solutions developed or technology purchased from overseas after analysis of technologies available.	10% - Potential to significantly increase market share with high performance product satisfying requirements of emerging home trends.
E.6	Develop panel products	To Investigate and further develop panel products.	New and innovative panel products which can form part of systems solutions and communication of panel technology available.	20% - Significant ability to increase the use of timber with panel technologies – structural, aesthetic, cladding, lining, etc.
E.7	Investigate warranties	To investigate potential to offer warranty for a range of applications.	Report detailing potential products and applications in which warranty could be viable.	5% – Value added service could have impact on amount of timber especially on products which homeowners choose (i.e. timber in visual applications), and products in structural applications.

Table 2F Regulations and Rating Schemes Goals and Deliverables

	Strategies	Goals	Deliverables	Potential Increase of timber
F. REGULATIONS AND RATING SCHEMES				
F.1	Develop a communication plan - policy	To develop a communication plan to inform government policy makers, ratings scheme developers, HIA, Master Builders, GBC, etc.	A communication and action plan which includes employment of skilled policy developers and establishment of a representative wood products group.	10% - If appropriate changes reflecting the beneficial use of timber in housing are made, however there will be a time lag.
F.2	Provide scientific data for BCA	To supply the scientific data to change building codes to favour timber products.	Report which challenges all restrictive components in the Building Codes with supporting scientific data.	5% - Will not directly affect increase until codes updated.

SWOT ANALYSIS

A SWOT analysis has been undertaken for each initiative in order to highlight the Strengths, Weaknesses, Opportunities and Threats of the strategies. These have been documented in the following Tables 3A to 3F each within one of the areas of significance (A to F). The areas of significance arose from workshop discussions whereas the SWOT table is based on understanding of the issues. The SWOT analysis provides information to determine whether the strategic initiative is attainable. It is used in ascertaining the priority areas (see Priority Areas).

Table 3A Awareness And Marketing Of Wood Products SWOT Analysis

Opportunities (External)	Strengths (Internal)	Strategic Initiatives	Threats (External)	Weaknesses (Internal)
A. AWARENESS AND MARKETING OF WOOD PRODUCTS				
• Increasing interest in holistic aspects rather than short term cost. • Increased use of internet for information by architects, builders, Quantity Surveyors. • Awareness of health, environment etc. which can be capitalised on.	• Wood products benefits have been determined and documented. • Wood. Naturally Better brand can encompass holistic aspects.	**A.1 Promote to consumers and specifiers the holistic benefits of wood products i.e. environmental, long term performance, health, aesthetics, structure, disassembly, ease of build, modularity, etc.**	• Many initiatives in Australia focus on single factor issues i.e. thermal performance, embodied energy, carbon storage, and operational energy. • Eco-product confusion and 'green-washing'.	• Industry has focus on carbon and single aspects.
• External understanding of timber industry and operations.	• Physical map of Australia with forest areas and industries available.	**A.2 Map industry and investigate a co-ordinated industry approach to wood product supply and information dissemination.**	• Large number of players so may be complex. • Where would each sit in map? • How would imports be displayed?	• Industry fragmented. • Competitive and conflicting interests within the industry. • Need to constantly be updated.
• Increased use of internet for information by architects, etc. • Opportunities to use resource to sign up more affiliations. • Creating a data base quickly and cost-effectively for e-mail up-dates, newsletters, new-product information, etc.	• FWPA is currently developing new website.	**A.3 Provide centralised, regularly updated internet resource for awareness within industry and communication outside industry.**	• Generic resource and may not benefit all industry players. • May lead to support of non-affiliated companies.	• Many competitive industry websites.
• Many products available for protection and opportunities for affiliations.	• Many durable wood products existing and research conducted.	**A.4 Address the negative perceptions and misconceptions and educate end user.**	• Many public misconceptions about maintenance (nothing maintenance free). • Health implications of treatments.	• Expertise may not be available and limited budget.
• Changes to multi-residential requires new thinking. • Sloping sites, smaller sites, greater densities all opportunities for new products and systems.	• Have competitive products for many applications.	**A.5 Promote wood as a viable option to steel, concrete, bricks, plastics, and other competitor materials.**	• Other materials industries have good representation and budget.	• Competition within industry and imported products. • No holistic sales approach i.e. systems solutions.

Table 3BBuilding Construction Interface SWOT Analysis

Opportunities (External)	Strengths (Internal)	Strategic Initiatives	Threats (External)	Weaknesses (Internal)
B. BUILDING CONSTRUCTION INTERFACE				
• Most people have access to internet/ e-mail/ texts and are familiar with receiving reminders and advice. • People willing to pay for extra services. • Database of customers • Revenue raiser with termite protection companies, paint companies, etc.	• Industry has all information on maintenance and termite protection requirements.	**B.1 Provide maintenance and termite protection details, schedule and reminders to manage expectations of end user.**	• Builders not supporting process and information not being passed on to end user. • People selling homes not handing over maintenance information.	• Maintaining and updating database may be costly. • Database may be complex.
• Builders loyalty once systems and products proven. • Builders train apprentices who will continue practices. • Ability to pass on information direct to builders which can be passed on to end user. • Data gathering from building industry.	• Wood products industry has most information required.	**B.2 Establish allegiances with builders to provide timber toolkit, support, long-term plans, bulk buying potential, bespoke components/ systems, awards and training.**	• Lack of uptake. • Undervalued. • Idea adopted by competitors and replicated.	• Information not well communicated. • Could be costly.
• Expand understanding of costs and time. • Change preferred construction technique.	• Have case studies to support information. • May learn more about cost competitiveness of timber.	**B.3 Provide builders with evidence and quantify cost savings, time savings, and saleability for new and existing products.**	• May not be cost or time competitive or marginal. • Instigate negative attention from competitors.	• Lack of knowledge of concrete, steel, plastics and other competitor materials.
• Building construction companies able to utilise same products and systems Australia-wide. • Increase confidence in timber products and availability.	• Reduce production costs with standardisation. • Reduce manufacturing waste.	**B.4 Promote standardisation of engineered wood products.**	• Promotion flawed if products not widely available.	• Timber merchants not able or inclined to stock all standard products.

Table 3C Education, Training and Technical Support SWOT Analysis

Opportunities (External)	Strengths (Internal)	Strategic Initiatives	Threats (External)	Weaknesses (Internal)
C. EDUCATION, TRAINING AND TECHNICAL SUPPORT				
• Influence future designers, builders, quantity surveyors. • Greater understanding of wood use by professional and wood products industry. • More likelihood of educators conducting wood courses. • Educators with high level of fluency will promote wood.	• Information already available. • Greater number of students exposed to timber so larger pool of people to employ in future.	**C.1 Overhaul and expand existing wood technology courses for professional education and training, and provision of course content, notes, etc.**	• Lack of understanding of wood technology by educators.	• Time and costs to develop courses.
• Builders more likely to utilise technology if they understand it.	• Revenue raising. • Database creation. • Accreditation potential.	**C.2 Provide training courses and fact sheets for new and existing technology installation including engineered wood products, etc.**	• Builders may use competitive products from overseas.	• Time and costs to develop courses.
• People using new CAD and phone technologies. • Ability for pre-ordering. • Ability to see what is in stock • Information at fingertips. • Saleable IP/ revenue from Apps, support, updates, etc. • Makes designing, QS, easier. • Instant quoting.	• Ease of supply and ordering. • More information about what builders are using, quantities, trends, cycles, where used. • Opportunity to disseminate information and advertise. • Some industry members already have own software - convert to phone Apps.	**C.3 Investigate and develop CAD and phone applications for builders, architects, quantity surveyors, industry.**	• Software glitches, bugs, patches and phone communication problems. • Lack of uptake. • New technology fad. • Phones, computers and software constantly require updating. • May be difficult to use.	• Cost and expertise to develop and support system.
• Understanding timber design software and application. • Links with CAD packages. • Add-ins and tool-boxes for existing arch. packages.	• More likelihood of using members' products. • More members will want products represented.	**C. 4 Provide and coordinate CPD training to use available and new software i.e. Timber Solutions/ Hyne Design/ CHHs Design IT.**	• Overseas substitutions.	• Not all products represented. • Training provided for specific company software.
• Membership opportunities (Gold, Platinum etc.) like automobile companies.	• Help and support for industry on-ground.	**C.5 Provide on-road/ on-phone technical support and interface for industry, architects, builders, engineers, public, etc.**	• People using non-member timbers.	• Not enough personnel and people with experience. • Large territories to cover. • Ensuring correct information. • Indemnity insurance.

Table 3D Future Forest Resource Planning SWOT Analysis

Opportunities (External)	Strengths (Internal)	Strategic Initiatives	Threats (External)	Weaknesses (Internal)
D. FUTURE FOREST RESOURCE PLANNING				
• Support for good forestry practices	• Forestry has addressed many forestry issues they just need to be communicated • Ability for new products from forestry to be developed i.e. from thinning's	**D.1 Disseminate information on forests and facts on sustainable management**	• Threats from imports not subscribing to similar practices • Lack of understanding about certification • Impact of monocultures on the environment and biodiversity may not be known	• Lack of knowledge • Resistance from importers • Inaccuracies in information and changes • Lack of understanding of certification process
• Premium product requirements • Greater awareness of certification schemes	• Ability to provide eco-labels and certification labels	**D.2 Implement Forest Certification and Chain of Custody and become active in marketing certified timber.**	• Lack of uptake • International Certification versus Australian Certification	• Cost of initiating programs and auditing programs

Table 3E Innovation and Technology SWOT Analysis

Opportunities (External)	Strengths (Internal)	Strategic Initiatives	Threats (External)	Weaknesses (Internal)
E. INNOVATION AND TECHNOLOGY				
• Changing in housing (higher density, multi res.) provide opportunities for changes in building practices. • More sloping land available; cut/ fill alternatives required. • Fast build systems solutions easier for builders to work. • Form strategic alliances with other product manufacturers.	• Generating new systems solutions and innovations.	**E.1 Develop systems approach to housing construction.**	• Other industries may develop own systems approach not utilising timber.	• Fragmented wood products industry may mean industry will not work together to develop systems. • IP protection costs.
• Builders may be open to new technologies and systems with changes in housing. • Organisations outside industry have opportunity to become partners in funded grant.	• Much R&D undertaken and new technologies developed. • Government and other support available for developing new technologies.	**E.2 Highlight and support emerging technologies and communicate R&D initiatives.**	• Other industries may develop own competitive product. • Industry and technology may end up offshore and becoming competitive to Australian industry.	• Problems with communication. • Fragmented industry which means human resources stretch across many diverse organisations.
• Passive design measures gaining attention and understanding. • Potential for Government rebates for passive design measures. • Building codes could address appropriate mandatory eaves. • Green rating tools can address passive design measures and rate buildings with appropriate eaves more highly. • Opportunity to campaign with sheet roofing manufacturers and form alliances.	• Timber roof frames comprise 80% of the number of residential housing roofs.	**E.3 Campaign to reintroduce eaves for better building protection, better passive design, less maintenance etc.**	• Resistance by builders to campaign. • Resistance by homeowners who want larger building footprint. • Resistance to changes in Building Codes. • Time lag of changes to Codes.	• Campaign may be costly.

• Higher density, multi-storey and multi- residential dwellings increasing. • High performance flooring systems required in multi-storey residences. • Potential cost savings • Alliances with other manufacturers i.e. insulation.	• Lightweight, ease of assembly and cost effective shipping and installation. • May be in development or existence overseas.	**E.4 Develop timber flooring systems for 2nd and 3rd stories addressing noise barrier, thermal performance, fire performance, structure, etc.**	• Require structure system to support high performance flooring. • Building Codes may not accommodate non-established technologies.	• Cost of developing new systems. • Cost of purchasing technology from overseas. • Factory capabilities to manufacture products • IP protection costs.
• No good competitor products • Requirements for high performing thermal efficiency. • Good for high density living • Working with new technologies i.e. solar glazing • Cost of aluminium may rise as it becomes increasingly used in transport, increasingly scarce and more expensive to make (carbon tax). • Timber windows seen as premium product.	• Research may be underway.	**E.5 Develop high performing double and triple glazed timber windows with high durability.**	• Aluminium window manufacturers currently corner window market. • May be expensive or uncompetitive. • Ease of maintaining and timber double glazed window.	• Cost of developing new systems. • Factory and personnel capabilities. • IP protection costs.
• Disassembly & environmental concerns becoming more widely understood. • Building construction efficiency more widely understood. • Ability to incorporate and integrate emerging technologies and systems i.e. EMF shielding, intelligence sensors, monitoring sensors, heating and cooling elements.	• Engineered wood products available and existing factory capabilities. • Overseas examples emerging. • Current panel R&D. • Cost effective due to fast construction. • Engineered panels can have a high tolerance. • Ability to specify cut-outs, recesses, fixtures and fittings.	**E.6 Investigate and further develop panel products which address cladding, structure, insulation, lining, quick assembly, smart technology, etc.**	• Fibre-cement sheeting, brick and plasterboard cheap and widely used. • Need to change way buildings are assembled. • Potential for it to be quickly replicated and be imported from overseas.	• High degree of factory skill required. • New technology and retooling • IP protection costs.
• Customer reassurance • Increasing value.	• Understanding performance and lifetime of products. • Easier on prefabricated factory components.	**E.7 Investigate potential to offer warranty for a range of applications i.e. roof truss should last 25years.**	• Counterfeit and proving product authenticity. • Proving correct use and maintenance schedule.	• Warranty costs. • Provision of details for assembly, maintenance, etc. • Limited to materials/products.

Table 3F Regulations and Rating Schemes SWOT Analysis

Opportunities (External)	Strengths (Internal)	Strategic Initiatives	Threats (External)	Weaknesses (Internal)
F. REGULATIONS AND RATING SCHEMES				
• Overseas affiliations for sourcing up-to-date information	• Opening channels of communication	**F.1 Develop communication plan to inform government policy makers, ratings scheme developers, HIA, Master Builders, GBC, etc.**	• Finding appropriate people to deal with • Issues with State and Federal Governments • Change of Government • Other lobbying groups	• What does industry want to communicate? • Finding staff with policy background • Restrictions on Government lobbying
• Overseas examples of good practices emerging i.e. 9 storey timber residential building	• Build body of knowledge	**F.2 Supply scientific data to change building codes to favour timber products**	• Strong involvement of competitive industries in Building Code development	• Is science available?

OVERLAPS WITH EXISTING FWPA ACTIVITIES AND ASSOCIATED INFORMATION

In numerous cases the strategies overlap with existing FWPA programs and resources including 'Wood. Naturally Better' and 'Wood Solutions'. Overlap is inevitable given the market and these areas need to be highlighted so that funding can be prioritised to strategies within areas which have little or no allocated funding. It is also pertinent to understand other activities which are happening in Australia and overseas to determine available information, research underway, supporting and potential collaborators. A short discussion follows for each area with a summary in Table 4. However for a more comprehensive list of FWPA activities and associated information please see Appendix 1 which details current and completed research and development activities, existing platforms, databases, information, science, international and national developments, and any information which may support achievement of the strategic goals.

Areas funded by the FWPA have been determined by an investigation of current research and development activities and recent investment plans as well as discussions with FWPA staff. Areas well-funded by the FWPA or highlighted within other programs are not prioritised in this investment plan. It is worth noting however that the specific strategies may need to be reviewed within the separate budget areas to determine whether these initiatives need further investigation. Strategy A.2 Mapping Industry for example is considered extremely important and of great benefit to market. However marketing is budgeted separately.

A. Awareness and marketing of wood products

FWPA has a number of platforms for promoting forest and wood product information, including the 'Wood. Naturally Better' website targeting the consumer market (FWPA, 2011), and the Wood Solutions website (FWPA, 2011a) which will replace Timber.org (FWPA, 2007). FWPA has also produce many manuals including five recent technical manuals (TDA, 2010; TDA, 2010a; Iskra & Muir, 2010, MacKenzie, 2010). There are many funded research projects underway (Francis, 2008; Przewloka, Current Project; University of Melbourne, current research; Brown, Current Research; Langenberg et al, 2010). In addition there is a vast amount of associated information which has been document and is available. This area is well funded and covered within other FWPA budgets.

B. Building construction and user interface

FWPA's Specifier Marketing Program covers the standardisation of products and systems and manufacturers and suppliers have a vested interest in providing coherent information to users and specifiers. Most of the other strategies however are not included in existing programs or research and development funding. Some builders including Henley homes (Henley Property Group, 2010) do have allegiances with wood products research and development but relationships need to be reinforced. Quantifying savings will have the most market impact and needs to be prioritised.

C. Education, training and technical support

Education, training and technical support are budgeted by the FWPA separately and there are associated initiatives underway in Australia (UTAS, 2011; Jones, 2010; TPC Solutions, commenced March 2008; FWPA, 2007) It is important that specific strategies from this report by aligned with existing funding priorities. On-road user and industry support is considered a significant priority which should be scoped and trialled within this investment plan. There is industry support for an initiative which can provide on-ground immediate feedback to users as well as industry.

D. Future forest resource planning

The FWPA Sustainable Building Investment Plan and the 'Wood. Naturally Better' program include budgeting for forest certification, planning and information dissemination. The FWPA also have several R&D project in process (Forestry Plantations Queensland, commenced 2008; University of Tasmania, 2009) The CRC for Forestry (CRC Forestry, 2009) and CSIRO Forestry research (CSIRO, 2008) also play a major role in this area, and there are numerous other organisations, nationally and internationally, undertaking significant work in this area (Southern Tree Breeding Association, 2010; Australian Forestry Standard, 2010; Wood Council Australia, 2011; CSAW, 2010). As this area is already budgeted it does not need to be funded in this investment plan.

E. Innovation and technology

This is a strong area for investment as there is a great requirement for innovation and technology as well as support for existing and emerging technologies. FWPA has funded a background investigation of international emerging technologies, so research in this area will grow on this research. (Paevere and MacKenzie, 2006). There has also been research and development of flooring systems supported by the FWPA (Farrel and Gadient, 2009; Farrel and Gadient, 2009a). Some building companies are investigating complete building systems (Henley Homes for example) and there is

collaboration potential. Innovation and technology are high priority for funding.

F. Regulations and rating schemes

FWPA is currently investing in this area under the Sustainable Building Investment Plan and the 'Wood. Naturally Better' program. FWPA funded a report on policy and regulations which resulted in many recommendations, one of which was development of a communication strategy to inform and improve organisation and government policy makers. (Nolan et al, 2006) This area is well funded and covered within other FWPA budgets.

Table 4 Strategies budgeted in Existing FWPA Programs

STRATEGIES		FWPA BUDGETED	COMMENTS
A. AWARENESS AND MARKETING OF WOOD PRODUCTS			
A.1	Promote holistic aspects		Covered with 'Wood. Naturally better' marketing and Wood Solutions web development. Investigate what is being included and focus on those things absent. Mapping of industry is very important and needs to be investigated further.
A.2	Map industry		
A.3	Provide centralised resource		
A.4	Address misconceptions		
A.5	Promote wood viability		
B. BUILDING CONSTRUCTION AND INTERFACE			
B.1	Develop maintenance schedule		Design user-friendly maintenance schedule and implement.
B.2	Form builder allegiances		Promote benefits of allegiances to industry.
B.3	Quantify savings		Quantify cost comparison of building systems.
B.4	Promote standardisation		Covered in FWPA Specifer Marketing Plan.
C. EDUCATION, TRAINING AND TECHNICAL SUPPORT			
C.1	Expand wood technology courses		FWPA budgeted in education.
C.2	Provide training courses		
C.3	Develop CAD and phone Apps		
C.4	Provide software training		
C.5	Provide on-road support		Scoping support for users of new technology and trial.
D. FUTURE FOREST RESOURCE PLANNING			
D.1	Disseminate forest facts		Covered in FWPA Sustainable Building Investment Plan and 'Wood: Naturally Better'.
D.2	Aid Certification		
E. INNOVATION AND TECHNOLOGY			
E.1	Develop systems approach		Analysis and development of systems solutions.
E.2	Support emerging technologies		Factsheets on new technologies & support industry promotion.
E.3	Support reintroduction of eaves		Better roof design manual.
E.4	Develop flooring systems		Analysis of existing and development of practical solutions.
E.5	Develop high performing windows		High performing window analysis and solutions.
E.6	Develop panel products		Smart panel technology analysis and development.
E.7	Investigate warranties		Investigate and promote benefits to members.
F. REGULATIONS AND RATING SCHEMES			
F.1	Develop a communication plan - policy		Covered in FWPA Sustainable Building Investment Plan.
F.2	Provide scientific data to BCA		

PRIORITY AREAS

The strategies have been prioritised in order to determine those strategies which have the greatest potential to achieve the outcome in the mission statement: to increase the market share for wood products in residential construction by 30%.

The priority areas have been rated in several ways, each with 1 being low priority and 5 high priority:

- **Potential for success (based on SWOT)** – Low =1, High = 5
  How likely is this strategy to be completed to a high level of satisfaction in meeting the goals of the FWPA?
  - The potential for success has been determined based on the work already completed in the area and current activities. If there is a lot of activity and some research has already been undertaken, the potential is for a greater level of success.
- **Impact (based on % increase)** – Low = 1, High = 5
  How likely is this strategy to increase timber in residential construction?
  - The impact has been determined based on estimated increase in timber products and systems in houses, if the strategy is completed with a high level of success.
- **Effort (based on understanding)** – Large = 1, Small = 5
  How much effort – time and resources – will this strategy require in order to complete to a high level of satisfaction?
  - The effort has been determined base on knowledge of project commitments and is a broad estimate.
- **Cost (estimate)** – Large = 1, Small = 5
  How much is this strategy likely to cost compared to all other strategies?
  - The cost has been determined by comparison of all the strategies, roughly estimating which will be the most through to least costly.
- **FWPA Budgeted (based on overlaps)** – Yes = 0, No = 5
  If the strategy has been budgeted by FWPA in other programs or if it lies outside the current FWPA remit it is not a high priority in this investment plan.

Table 5 shows details of the priority areas and the results have been totalled for each strategy.

The results of prioritisation have been documented in rank order in Table 6 with the results prioritised in two groups as follows:

- Priority One: scores of 17 +
- Priority Two: scores of <17

Table 5 Strategy Area Rating

	STRATEGIES	Potential for success	Impact	Effort	Cost	FWPA Budgeted	Total
		Low = 1, High = 5	Low = 1, High = 5	Large = 1, Small = 5	Large = 1, Small = 5	Yes = 0, No = 5	
A.1	Promote holistic aspects	5	3	4	2	0	**14**
A.2	Map industry	5	1	4	4	0	**14**
A.3	Provide centralised resource	5	3	2	3	0	**13**
A.4	Address misconceptions	4	3	4	4	0	**15**
A.5	Promote wood as viable	2	2	4	4	0	**12**
B. BUILDING CONSTRUCTION AND INTERFACE							
B.1	Maintenance schedule	3	3	5	2	5	**18**
B.2	Builder Allegiances	3	3	3	4	0	**13**
B.3	Quantify savings	3	5	5	4	5	**22**
B.4	Promote standardisation	3	3	5	5	0	**16**
C. EDUCATION, TRAINING AND TECHNICAL SUPPORT							
C.1	Wood technology courses	4	4	4	4	0	**16**
C.2	Training courses	4	4	4	4	0	**16**
C.3	CAD and phone Apps	4	2	2	1	0	**9**
C.4	Software training	4	2	4	5	0	**15**
C.5	On-road support	5	4	1	2	5	**17**
D. FUTURE FOREST RESOURCE PLANNING							
D.1	Disseminate forest facts	2	3	4	3	0	**12**
D.2	Certification	4	5	3	4	0	**16**
E. INNOVATION AND TECHNOLOGY							
E.1	Systems approach	5	5	2	3	5	**20**
E.2	Emerging technologies	4	3	5	3	5	**20**
E.3	Eaves	5	3	3	4	5	**20**
E.4	Flooring	5	5	3	3	5	**21**
E.5	High performing windows	5	4	2	3	5	**19**
E.6	Panel Products	5	5	2	3	5	**20**
E.7	Warranty	3	2	4	5	5	**19**
F. REGULATIONS AND RATING SCHEMES							
F.1	Communication plan – policy	3	3	3	2	0	**11**
F.2	Scientific data to BCA	3	2	3	3	0	**11**

Table 6 Priority Areas

STRATEGIES		Total	Strategy Area
Priority One Areas			
B.3	Quantify savings	**22**	B. BUILDING CONSTRUCTION AND INTERFACE
E.4	Flooring	**21**	E. INNOVATION AND TECHNOLOGY
E.1	Systems approach	**20**	E. INNOVATION AND TECHNOLOGY
E.2	Emerging technologies	**20**	E. INNOVATION AND TECHNOLOGY
E.3	Eaves	**20**	E. INNOVATION AND TECHNOLOGY
E.6	Panel Products	**20**	E. INNOVATION AND TECHNOLOGY
E.5	High performing windows	**19**	E. INNOVATION AND TECHNOLOGY
E.7	Warranty	**19**	E. INNOVATION AND TECHNOLOGY
B.1	Maintenance schedule	**18**	B. BUILDING CONSTRUCTION AND INTERFACE
C.5	On-road support	**17**	C. EDUCATION, TRAINING AND TECHNICAL SUPPORT
Priority Two Areas			
B.4	Promote standardisation	**16**	B. BUILDING CONSTRUCTION AND INTERFACE
C.1	Wood technology courses	**16**	C. EDUCATION, TRAINING AND TECHNICAL SUPPORT
C.2	Training courses	**16**	C. EDUCATION, TRAINING AND TECHNICAL SUPPORT
D.2	Certification	**16**	D. FUTURE FOREST RESOURCE PLANNING
A.4	Address misconceptions	**15**	A. AWARENESS AND MARKETING OF WOOD PRODUCTS
C.4	Software training	**15**	C. EDUCATION, TRAINING AND TECHNICAL SUPPORT
A.1	Promote holistic aspects	**14**	A. AWARENESS AND MARKETING OF WOOD PRODUCTS
A.2	Map industry	**14**	A. AWARENESS AND MARKETING OF WOOD PRODUCTS
B.2	Builder Allegiances	**18**	B. BUILDING CONSTRUCTION AND INTERFACE
A.3	Provide centralised resource	**13**	A. AWARENESS AND MARKETING OF WOOD PRODUCTS
A.5	Promote wood as viable	**12**	A. AWARENESS AND MARKETING OF WOOD PRODUCTS
D.1	Disseminate forest facts	**12**	D. FUTURE FOREST RESOURCE PLANNING
F.1	Communication plan - policy	**11**	F. REGULATIONS AND RATING SCHEMES
F.2	Scientific data to BCA	**11**	F. REGULATIONS AND RATING SCHEMES
C.3	CAD and phone Apps	**9**	C. EDUCATION, TRAINING AND TECHNICAL SUPPORT

PRIORITY SUMMARY AND BUDGET

The Priority Strategies have been reviewed in conjunction with the FWPA budget for the next five years. A possible funding schedule is shown in Table 7. The funding allocation process was based on knowledge of research budget allowances and discussions with FWPA staff. The amount for each priority areas does not necessarily reflect the placing on the priority table i.e. the top priority does not have the largest budget. The budgets have been determined according to estimated amounts required to adequately complete the project objective and the proposed FWPA budget for the next four years. The Outcomes have been adjusted to align with the budget restrictions and FWPA priorities (see Table 7). For example, a scoping study for an 'on-road' helpline needs to be conducted initially and builder's allegiances need to be promoted to industry.

The suggested total funding allocation for each strategy in Priority One is as follows.

B.3	Quantify savings	$160,000
E.4	Flooring	$150,000
E.1	Systems approach	$210,000
E.2	Emerging technologies	$90,000
E.3	Eaves	$100,000
E.6	Panel Products	$160,000
E.5	High performing windows	$160,000
E.7	Warranty	$50,000
B.1	Maintenance schedule	$80,000
C.5	On-road support	$90,000

It is recommended that the top five priority areas are started in the first year, and the following priorities commenced in the subsequent years.

It is recommended that all Priority One Areas be funded within this program in order to ensure there is greatest opportunity for a positive outcome in terms of increased forest and wood products in residential housing. These strategies should build upon work already undertaken within the industry in order to continue to strengthen the timber industry's presence in the residential housing market.

It is recommended that Priority Two strategies be investigated within other program funding to ensure these strategies are accounted for. The industry as a whole should make particular note that ***practical outcomes*** and consolidation of the whole forest and wood products industry will be

extremely beneficial to increase use of forest and wood products in residential housing, and potentially the entire construction market.

It also needs to be noted that during the writing of this report there were several natural disasters occurring in Australia and overseas, including flooding, earthquakes, and tsunamis. These have had major impact on housing and infrastructure and discussions have abounded about how buildings, in particular housing, can weather these types of disasters. The FWPA's investment plan needs to be flexible and be able to adapt to issues arising during the budget period.

Table 7 Priorities Summary and Budget

	STRATEGIES	Priority	2011/2012	2012/2013	2013/2014	2014/2015	Area	Outcomes and Comments
A. AWARENESS AND MARKETING OF WOOD PRODUCTS								
A.1	Promote holistic aspects	Priority 2						
A.2	Map industry	Priority 2						Covered with 'Wood. Naturally better' marketing and Wood Solutions web development. Investigate what is being included and focus on those things absent.
A.3	Centralised resource	Priority 2						
A.4	Address misconceptions	Priority 2						
A.5	Promote wood as viable	Priority 2						
B. BUILDING CONSTRUCTION AND INTERFACE								
B.1	Maintenance schedule	Priority 1			**40000**	**40000**	**User support**	Design user-friendly maintenance schedule and implement
B.2	Builder Allegiances	Priority 1						Not within FWPA Remit
B.3	Quantify savings	Priority 1	**60000**	**40000**	**40000**	**20000**	**R&D**	Quantify cost comparison of building systems
B.4	Promote standardistion	Priority 2						Covered in FWPA Specifer Marketing Plan
C. EDUCATION, TRAINING AND TECHNICAL SUPPORT								
C.1	Wood technology courses	Priority 2						
C.2	Training courses	Priority 2						FWPA budgeted elsewhere.
C.3	CAD and phone Apps	Priority 2						
C.4	Software training	Priority 2						
C.5	On-road support	Priority 1				**90000**	**User support**	Scoping support for users of new technology and trial
D. FUTURE FOREST RESOURCE PLANNING								
D.1	Disseminate forest facts	Priority 2						Covered in FWPA Sustainable Building Investment Plan and wood Naturally Better.
D.2	Certification	Priority 2						
E. INNOVATION AND TECHNOLOGY								
E.1	Systems approach	Priority 1	**90000**	**40000**	**40000**	**40000**	**R&D**	Analysis and development of systems solutions
E.2	Emerging technologies	Priority 1	**30000**	**30000**	**30000**		**Ind. Support**	Factsheets on new technologies/ support ind. promotion
E.3	Eaves	Priority 1	**60000**	**40000**			**R&D**	Better roof design manual
E.4	Flooring	Priority 1	**70000**	**50000**	**30000**		**R&D**	Analysis of existing and development of practical solutions
E.5	High performing windows	Priority 1			**70000**	**90000**	**R&D**	High performing window analysis and solutions
E.6	Panel Products	Priority 1			**70000**	**90000**	**R&D**	Smart panel technology analysis and development
E.7	Warranty	Priority 1			**30000**	**20000**	**Ind. Support**	Investigate and promote benefits to members
F. REGULATIONS AND RATING SCHEMES								
F.1	Communication plan	Priority 2						Covered in FWPA Sustainable Building Investment Plan
F.2	Scientific data to BCA	Priority 2						
	Budget costs ($)		310000	190000	350000	390000		
	Management and Contingencies		90000	50000	100000	110000		
	Total Budget Costs ($)		**400000**	**250000**	**450000**	**500000**		

APPENDIX 1: FWPA ACTIVITIES AND ASSOCIATED INFORMATION

A. Awareness and Marketing

FWPA

- A platform for promoting holistic information exists with 'Wood. Naturally Better'. The 'Wood. Naturally Better' website will target the consumer market (FWPA, 2011).
- FWPA is developing a Wood Solutions website (FWPA, 2011a) for the specifier market replacing Timber.org (FWPA, 2007).
- Wood Solutions Manuals (TDA, 2010; TDA, 2010a; Iskra & Muir, 2010, MacKenzie, 2010)
- TimberLife Educational Software (Timber.org.au, 2010)
- Web-sites linked to create a centralised resource for specifiers, consumers, builders, students, industry, etc. Resources and communication tools exist but not in a single resource.
- FWPA tracking perception of timber with architects and specifiers to understand implications of marketing i.e. Wood solutions (FWPA, 2011a)
- Ezard suggests carbon initiatives including carbon calculator for housing, carbon storage understanding and marketing, guidance on energy efficiency measures, national recognition of LCA of materials, comparison of performance of wood products by LCA techniques in residential housing construction, identification of gaps in LCA assessment for wood products, equitable measure of biodiversity, understanding of environmental check lists and verification of environmental claims, assistance in developing nationally agreed eco-labelling program and eco-marketing promotion (Ezard, 2009)
- FWPA Funded Research –
  - Causes of natural durability in Australian hardwoods (Francis, 2008)
  - Design durability of biocomposites, (Przewloka, Current Project)
  - Building with termites (University of Melbourne, current research)
  - Living with Bushfires (Brown, Current Research)
  - Green Adhesives: Options for the Australian industry (Langenberg et al, 2010)

ASSOCIATED INFORMATION

- Timber LCI database – developed by CSIRO (Tucker et al, 2009) and public release documentation in production (Dunn, commenced 2010).

- Centre for Sub-tropical Design has undertaken research (with the Brisbane City Council and Timber QLD) to rethink wooden housing – 'New Queenslander'. (Kennedy et al, 2005).
- Carbon reporting and research conducted (CRC Forestry, commenced 2009).
- Australian Timber Design Awards promotes many aspects of timber (TDA, 2011)
- Promotions campaign by industry in 1990s generated more than 66% support for industry. Three months after campaign ended support dropped to around 30%. 'This would be seemingly clear evidence of the need to keep industry's message in the eye of the community.' (Seigers, 2002)
- Greenhouse gas emissions associated with embodied energy of construction materials are lower if timber content is increased. It is possible to achieve 86% reduction in greenhouse gases by increasing the amount of timber specified (Burnett, 2006)
- Biodiversity impacts of timber and other building materials (Nolan, current)
- Sweden's EcoBuild Centre with research areas such as Biobased Binders (Low emission and durable resins), Biobased Coatings (Eco-efficient coating systems), Durability and Eco-Efficiency (develop eco-efficient materials and products addressing resistance to microbes, insects, fire, weathering, etc.) Modified Wood and Fibre (using microwave technology) (EcoBuild, 2007)
- Timber industry's continuing hard press with environmental groups focussed on old growth logging and attacks on carbon stance (i.e. Morton, 2009)
- Report on underlying sustainability of timber and how it performs against other materials. (Blundell, 2010)
- Most organisations have websites which can be easily accessed for information and industry may be open to short survey.
- The forest and wood product industry organisations all have member lists which may be able to be accessed.
- University and CRC collaborations can be investigated.
- Timber industry organisations (TDA, 2011; Timber QLD, 2011; Tas. Timber, 2010; Wood Products Victoria, 2010; Wood Council Australia, 2011 ; Engineered Wood Products Association of Australia, 2011 ; NAFI, 2011, etc.)
- Forests Australia contains the most up-to-date information available on Australia's forests - from links to forest management organisations and institutions to the latest forest-related publications, maps and tools. (DAFF, 2011a)

- Timber in Internal Applications: set of resources on timber used in internal applications for Australia's building design and construction professionals and undergraduates (Nolan, 2010; Tasmanian Timber Promotions Board, 2011).
- TRADA UK has case studies on their website of both buildings and products i.e. louvers, cross-laminated beams, etc. (TRADA, 2008)
- CSIRO: Timber Protection & Paper Products Material Knowledge has a wealth of information available for growers, processors, saw millers, engineers, architects, industry, etc. on forests, use, properties, systems, drying, protection, modification, coatings, etc. (CSIRO, 2009)
- CSIRO: Designing and Testing Wood Composites such as plywood, LVL, MDF, OSB, particleboard. CSIRO is developing and testing new and improved wood adhesives, new composites, and composite additives and preservatives, assessing new raw materials for composite production and the quality of fibres, recycling of residues and wastes into composites, etc. (CSIRO, 2009a)
- CHH has produced information on using timber in bushfire zones. (CHH, 2010)
- NGOs have produced negative information on timber (i.e. The Wilderness Society, 2011)
- It is worth noting that during the completion of this draft, QLD had severe flooding causing damage to over 17,000 houses. Determining damage to wood products during flood events and other natural disasters and comparing them to other materials may be significant.
- Timber Building in Australia website (Tasmanian Timber Promotion Board, 2011)
- Housing is changing and needs new thinking and solutions.

B. Building construction and user interface

FWPA

- Specifier Marketing Program

ASSOCIATED INFORMATION

- Programs easy to develop and common place.
- People familiar with to e-mail and phone reminders and support.
- Allow industry to expand understanding of maintenance and protection.
- Builders and in particular mass home builders specify standard features of their homes (i.e. Colourbond roof) so there is precedence for allegiances.
- Henley Properties (5th largest home builders in Australia) has strong affiliation with wood products and research and development organisations i.e. FWPA and CSIRO (Henley Properties Group, 2010).

- Case studies supporting costing exist – may need documenting.
- Building construction companies, particularly in mass housing, want ability to utilise standard products with known performance indicators.

C. Education, training and technical support

FWPA

- FWPA funded research to develop technical educational resources, support Continuing Professional Development (CPD), tertiary and trade level education, and training to support and educate existing and futures users/ specifiers of timber (TPC Solutions, commenced March 2008).
- FWPA has existing TAFE program.
- FWPA holds seminars: CPD development points, Wood Solutions 2010 (FWPA, 2011a).

ASSOCIATED INFORMATION

- Graduate certificate in timber (processing and building)(UTAS, 2011; Jones, 2010)
- University of Melbourne submission to Victorian Government suggests education investment strategies including: Government support for professional education and training in the forest sector to meet their future requirements for skilled land and fire management professionals; Encouragement of industry support to key educational programs to meet future needs; Investment to encourage collaboration across Victorian tertiary education institutions to ensure training needs of government and industry at technical and professional levels. (University of Melbourne, 2008).
- Training factory at Creswick, Vic.
- Software packages are used by industry.
- Timber design software packages exist.
- All information is available.
- Timber Solutions is a design software package developed initially to provide tables for AS1684, Residential timber framed construction. It is now available as a stand-alone package which complements the standard. (FWPA, 2007)
- Hyne - Design v6 software (release Oct 2010) delivers 'powerful design capabilities for domestic construction, unparalleled ease of use, and a host of new productivity features and formats.' (Hyne, 2010)
- DesignIT is a software tool for all building practitioners for the design of Carter Holt Harvey's Engineered Wood Products range and other selected materials for houses and similar structures. 'Quick and simple to use yet deceptively powerful software, DesignIT is useful for the selection of beam

sizes without the need for engineering knowledge or the exercise of professional engineering judgement.' (CHH, 2011)
- Nelson Pine has specific Nelson Pine Design Software for their LVL (Nelson Pine Industries Limited, 2011, State-based timber organisations i.e. Timber QLD, TDA, etc.
- Ezard suggests establishing communication with wood products industry to generate awareness (Ezard, 2009).

D. Future forest resource planning

FWPA

- FWPA Funded Research - Managing subtropical pines for improved wood production based on a better understanding of genetics, silviculture, environment and their interactions. To explore ways of increasing plantation profitability while maintaining or enhancing future volume production and wood quality. (Forestry Plantations Queensland, commenced 2008)
- FWPA Funded Research - The potential to recover higher value veneer products from Fibre Managed Plantation Eucalyptus and broaden product and market opportunities for this resource. To define the likely plywood/LVL quality obtained from the E nitens and E. globulus grown in Tasmania; identify the genetic parameters that affect quality of rotary-peeled veneer, plywood and LVL, and develop niche markets for the resultant products (University of Tasmania, 2009).
- Ezard suggests managing the introduction of chain of custody certification, assisting with the national adoption of agreed methods to identify lawfully procured local and imported forest and wood products, national adoption by all producers and markets of acceptable forest certification scheme, chain of custody and distribution chain development. (Ezard, 2009).

ASSOCIATED INFORMATION

- CRC Forestry undertaking research such as: land for the planting of forest carbon offset sinks; managing and monitoring for growth and health; high value wood resource - high yields of wood; Improving efficiency of harvesting and transport; Trees in the landscape - production, biophysical and social environment encompassing biodiversity, communities, water, etc. (CRC Forestry, 2009)
- CSIRO: Forestry Research including: breeding better forests; developing management systems for productive and sustainable forests; protecting forests from pest, pathogens, weeds, fire, wind; extracting value from wood and fibre resources; wood processing and wood products to ensure

the place of wood in a modern market; optimising pulp, paper and packaging processes and products. (CSIRO, 2008)

- TRADA UK Forestry Commission Wood Footprinter (Forestry Commission, 2010)
- Gunns protection of old growth forests (Denholm, 2010)
- Treeplan which can estimate breeding and genetic values for tree species (Southern Tree Breeding Association, 2010)
- European Indisputable Key Project: An automatic traceability system which will provide information at different stages along the forestry-wood production chain. In will enable a significant increase in raw material yield and in utilisation of production resources, decreasing the environmental impact. (SP Technical Research Institute of Sweden, 2010)
- Australian Forest Certification Scheme (AFCS) includes Chain of Custody (CoC) and Forestry Standard (Australian Forestry Standard, 2010)
- Forest Stewardship Council (FSC) Australia (FSCA, 2010)
- Forest Stewardship Council (FSC) International (FSCI, 2010)
- Eco-Select brand was decommissioned after strong anti- 'green wash' campaigns (Eco Neglect) by the Wilderness Society (The Wilderness Society, 2011) and The Australian Conservation Foundation (The Australian Conservation Foundation, 2011)
- Wood Council of Australia is the umbrella group for Australia's timber industry technical bodies and has Centres for Excellence with QLD focusing on Codes, Standards and Regulations, NSW (Fire, Acoustics, post-consumer wood), SA (advisory service). Tas. (Design Innovation), and Vic. (Sustainability & Education) (Wood Council Australia, 2011)
- Greg Nolan, CSAW suggests encouraging the Australian Forestry Standard Ltd to become active in marketing AFS certification and establish chain of custody and other procedures to support explicit sustainability indicators (CSAW, 2010)
- Sumitomo forestry promotes the use of certified wood (Sumitomo Forestry C. Ltd, 2010)

E. Innovation and technology

FWPA

- Emerging Technologies and Timber Products in Construction (Paevere and MacKenzie, 2006).
- FWPA's new website may support new technologies and become a platform to communicate R&D activities
- Advanced research into floor performance issues (Farrel and Gadient, 2009; Farrel and Gadient, 2009a).

- Five Star Thermal Performance of Timber Houses Project (Nolan, 2009; Dewsbury et al, 2009; Five Star Thermal Performance Project, 2009).
- Ezard suggests suspended timber floors on constrained building sites have environmental benefits which need to be recognised in BCA energy Efficiency regulations and energy rating tools (Ezard, 2009)
- Australian Timber Windows Specification Guide Project (Nolan, current).
- Ezard suggests analysing thermal mass of timber frames and compared to mass structures (Ezard, 2009).

ASSOCIATED INFORMATION

- CSIRO: Forest Products – improved and new products and performance and efficient manufacturing processes and value recovery, leading to cost-effective products (CSIRO, 2008).
- Centre for Subtropical Design 'New Queenslander' (Kennedy et al, 2005).
- Forest Products Laboratory, US Dept. Agriculture, Forest Service - Advanced structures research and development at FPL is focused on developing next generation residential and non-residential structures (USDA, 2010).
- Henley homes are investigating complete systems (including engineered wood products) for fast build and prefabricated walling systems.
- Timber industry participant were particularly keen to see practical outcomes and support of existing technologies.
- Your Home Technical Manual, see for example section 4.4 Shading (Your Home, 2008).
- Eaves a key feature of sustainable design.
- Sun Shading Guides.
- Advantages of suspended timber floor light-weight construction (Wood Products Victoria, 2007).
- Adair & McKeever suggest largest potential gain for wood products is in converting concrete slab floors to raised wood floors (Adair & McKeever, 2009).
- CSIRO: Forest Products - durable products that are environmentally friendly and wood protection - including developing chemical and non-chemical treatments for protecting wood from termites and decay (CSIRO, 2008).
- Sustainable Home fact sheets and information about thermal performance criteria of windows (i.e. Smart and Sustainable Homes, 2008).
- CHH has spent a considerable amount on developing new technology over last few years – particularly in the area of panel technology. (CHH, 2010a).
- Henley Homes looking at structurally insulated panel products with good thermal performance and prefabricated walling systems.

- Adair & McKeever suggest second largest gain in timber is in walls and structural panels (Adair & McKeever, 2009).
- Colourbond warranty covers up to 30 years against corrosion to perforation, and up to 20 years against paint flake & peel (i.e. delamination).
- Ezyclad, an EPS (Expanded Polystyrene) substrate panel, has a seven year manufacturer's warranty.
- Carter Holt Harvey has a 25 year warranty on some of their floors i.e. Termi Floor (CHH, undated).
- Noted benefits for offering home warrantees.

F. Regulations and rating schemes

FWPA

- Report on Policy, regulations and guidelines affecting wood product markets in Australia's built environment (Complete). The study recommends that the timber industry adopts the following approaches to tackle these concerns:
  - development of a communication strategy to inform and improve organisation and government policy makers;
  - Encouraging the Australian Forestry Standard Ltd to become active in marketing AFS certification and establish chain of custody and other procedures to support explicit sustainability indicators; and,
  - Revision of general use marketing terminology to ensure the source and production processes are clear. (Nolan et al, 2006).
- Ezard suggests influencing Building Regulations with LCA and assisting in development of an embodied energy rating tool and forming a lead industry group to represent the wood products industry to drive changes to regulations (Ezard, 2009).
- There is scientific data available for most of the issues that need addressing i.e. fire regulations, number of stories etc.

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