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**BUILDING CONSTRUCTION  
TECHNOLOGY ROADMAP**

**APPENDIX B**

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**Desktop Study Report**

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# APPENDIX B:

## Desktop Study Report

### EXECUTIVE SUMMARY

The executive summary presents an overview of the sourced literature and the important findings in relation to the Building Construction Technology Roadmap. The findings are discussed by theme as follows:

- Metals
- Electricity/Transport/Infrastructure
- Buildings
- Demographics/Other trends.

No technology roadmaps were found which relate directly to the future use of metals in the building industry in Australia, making the Building Construction Technology Roadmap unique.

#### Metals

The literature in this section contains information regarding production, consumption and end-of-use trends for copper, as well as roadmaps for other metals (aluminium, steel).

In general, there is more information regarding the production of copper than consumption. Forecasts which are freely available for production and consumption trends extend to only the short term. Longer term analyses may be purchased at significant cost. Information specific to Australia is available. Little information was found regarding copper and health applications.

Macro drivers for the consumption of copper relate to population, general economic activity and investment in power and telephone networks, while as copper is a mature metal, micro drivers mean its use is determined by its unique properties. Currently the main important competition for copper consists of:

- aluminium for electrical transmission and heat transfer (e.g. car radiators)
- plastic for plumbing
- wireless and optical fibres for telecommunications.

Predictions for growth are greatest for wiring and in areas where copper will be part of a drive to increase energy efficiency. Intensity of use is increasing in developing countries and decreasing in developed countries.

As an industry, it was noted that copper is less integrated than aluminium, making marketing and research/development for new applications more difficult to implement. Also copper must defend its environmental credentials and in future may need to demonstrate its usefulness in particular applications based on having the best life cycle environmental performance.

Considering roadmaps of other metals, that of aluminium had its focus on mining and refining rather than consumption and is thus of less direct relevance for comparison with copper. It noted the growing impact of environmental and social issues on business practice. It also used a helpful format for presenting information. The steel roadmap considered end uses and may be of limited interest to copper where trends related to end uses overlap (e.g. automobiles).

#### Electricity/Transport/Infrastructure

This section considered roadmaps and general trends relating to electricity, transport and infrastructure both in Australia and overseas.

A very thorough roadmap has been undertaken in the USA for the electricity industry. Goals include the decarbonisation of global energy through electrification (using nuclear and renewables), more electricity for transport, potential for distributed generation. It also depicts a range of future world scenarios such as 'high prosperity', 'ecologically driven' which could be useful in the context of copper roadmapping.

A European study regarding electrical energy losses, found that significant savings could be made by increasing the efficiency of distribution transformers. This may also apply in Australia and could involve the increased use of copper.

In Australia, a thorough renewable energy technology roadmap was completed in 2002 comprising eight workshops in each state and territory. It highlights the key question of whether to develop new technology here in Australia or to import it, and the need to develop an innovation network to successfully implement developed strategies. Priority technologies listed included biomass, cogeneration, fuel cells, photovoltaics, solar thermal and wind energy. The roadmap process itself is useful as a guide.

An investigation into transport infrastructure in Australia found a direct link between transport infrastructure investment and Australia's economic growth based on the need to export and the emergence of the knowledge economy, both requiring good transport links. Evaluating nearly 50 large infrastructure projects, greater integrated long term planning with increased cooperation between governments and industry will be needed to realise effective results. Transport planning must also be better integrated with land use planning and other infrastructure. This will have implications if baby boomers retire to the coast.

The deregulation of gas in Australia has increased connection between states meaning current capacity should meet demand until 2008. There is a low opportunity for new gas power stations to provide base load electricity, so the outlook for major gas infrastructure development is somewhat limited.

Limited information was found relating to trends in water infrastructure in Australia.

The importance of sustainability was emphasised by the creation of a handbook called "Sustainability framework for the future of Australia's infrastructure". If this significantly influences the way infrastructure projects are managed in Australia, this could mean that to be a project partner, a commitment to sustainability must be demonstrated. This may influence the way copper approaches being involved in future infrastructure projects.

### Buildings

This section contains building industry roadmaps from overseas and projections relating to the housing industry in Australia, however, no building industry roadmaps were found for Australia.

Forecasts for the building industry in Australia until 2018 may be purchased for \$2,500. Literature on current trends is available in reports from the Commonwealth Treasury. They suggest that participation of first home buyers in the market is consistent with demographic trends.

An extensive series of technology roadmaps ranging from manufactured housing, to energy efficiency in the home, to intelligent buildings, to the future of lighting and air conditioning have been undertaken recently in the USA and Canada. These reports are an excellent resource for the way they present information and the ideas they contain regarding the future of building trends, some of which may be applicable in Australia.

Energy efficiency initiatives include advanced control systems to minimise standby electricity and turn off lights when rooms are vacant, recovering waste heat from the dishwasher and clothes dryer, using distributed generation via fuel cells and solar cells. To achieve these outcomes will require the value of energy efficiency to be clearly demonstrated to customers, as well as motivating and enabling builders to deliver energy efficient solutions. An interesting web-based tool was used as part of the roadmapping exercise to get different stakeholders to evaluate strategies based on: the likely

improvement; probability of it happening given \$2 million per year directed to the particular strategy; and the years required to achieve the results.

A trend toward flexible housing was highlighted to allow people to "age-in-place", changing room structures as people get older. The likelihood of a similar trend in Australia could be tested at the roundtables.

Regarding intelligent buildings, to enable them to become a reality, reliable communication infrastructure is needed. Intelligent buildings are set to span the integration of lighting, voice/data communications, heating/cooling, energy management, security, elevators. The need for education and promotion is also raised, given the reluctance of the industry to embrace change.

### Demographics

Information on broad demographic trends relating to the effect of aging on transport, housing and economic growth was sourced primarily from three papers from the proceedings of a 1999 conference "Policy Implications of the Aging of Australia's Population". The first suggests a limited change in water, power, communications, sewage and waste disposal requirements for an aging population. In relation to transport, the fact that corner stores are fewer and shops have been concentrated in shopping centres, means that the elderly will find it difficult to walk to local amenities. This is likely to create a need for flexible minibus services.

In relation to the paper on housing and aging, the focus is on understanding demand rather than the need for new technologies in housing that may be generated by the aging population. The baby boomers will have more resources and higher expectations than their parents in old age. Generation X have less secure jobs and over the coming decades may be excluded from basic housing ownership that would have equipped them with adequate economic resources going in to old age. The desirability of home ownership may be declining for younger people. In relation to the copper roadmap, this may prompt consideration of how easily renters will be able to demand smart wiring in their home if they do not own it.

## Other considerations

Additional information has been sourced on general future forecasts, the process of roadmapping itself and also the particular issue of extended producer responsibility.

Regarding future scenarios, a report from the conference Copper 99 suggests groupings of actors in future global scenarios may be more aligned with identity than geography or nation states. These identity-based actors are elites (power brokers), pragmatists (middle class), believers (single issue devotees) and marginals (poor). Four future scenarios are developed in which different actors hold more or less power. In an accelerated world the elites benefit. In a continuation of the status quo, pragmatists benefit. Believers benefit with a revolt against an accelerated world. Finally, crisis could lead to conflict, potentially precipitated by marginals.

Journal articles relating to roadmapping were obtained and provide an overview of the different approaches to roadmapping that may be used. Furthermore, the use of roadmapping to drive innovation is also explored.

Extended producer responsibility is likely to impact the products of the future which contain copper. This will require the consideration of the market for copper in the context of the overall supply chain and necessitate planning from cradle to grave. Information regarding the state of the debate in Australia is included.

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