



Cooperative Research Centre for Advanced Automotive Technology

Sustainable Vehicle Technologies - Outcomes from Automotive Australia 2020 Technology Roadmap

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What is Technology Roadmapping?

- ❖ Tool to support strategic and long range planning
- ❖ Demonstrates the dynamic interaction between markets, products/technologies and associated requirements on industry as these change over time
- ❖ Based on the premise that the future can be constructed and is not simply ‘happening’
- ❖ Is not a “desk exercise” but a series of collective processes involving all stakeholders leading to collective decisions and an agreed way forward

Automotive Australia 2020

Goal: Define a technology roadmap for Australian automotive industry

- ◆ Initiated June 2009 by Auto Industry Innovation Council
- ◆ Funding from AutoCRC, Australian (DIISR) and Victorian Governments
- ◆ Delivered by
 - ◆ ANU
 - ◆ AutoCRC
 - ◆ University of Cambridge
 - ◆ CSIRO
- ◆ Reference group to provide oversight and policy direction



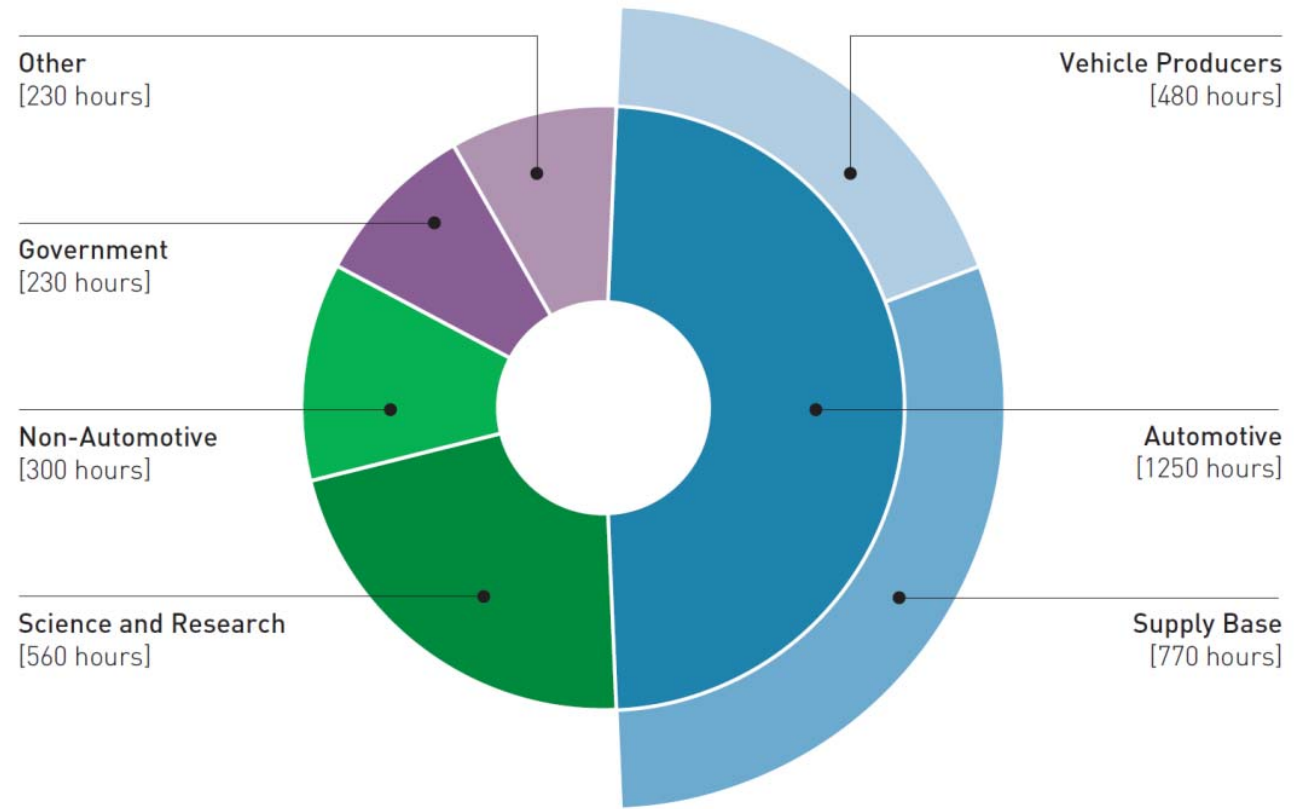
Automotive Australia 2020

Scope

- ❖ Engage industry, technology providers and government
- ❖ Understand short term needs
- ❖ Identify long term trends
- ❖ Match Australian capability with industry needs
- ❖ Identify gaps
- ❖ Provide a roadmap for the auto industry to 2020+

Broad Participation

- ◆ 160 Organisations
 - Vehicle Producers
 - Suppliers
 - Researchers
 - Industry Bodies
 - Governments
 - Aligned External Organisations (Defence, Aerospace, Resources etc)
- ◆ 220 Individuals
- ◆ 2,500 hours of direct industry engagement



The Roadmapping Process

The beginning - Sep 2009

- ❖ Stage 1 - Define the Vision

Sep - Dec 2009

- ❖ Stage 2 - Understand Market Need (Dec 2009)
- ❖ Stage 3 - Define National Capability (Dec 2009)
- ❖ Stage 4 - Portfolio of Opportunities (Dec 22nd 2009)

Jan - Mar 2010

- ❖ Stage 5 - Develop Opportunity Roadmaps

Apr 2010

- ❖ Stage 6 - Prioritize Opportunities
- ❖ Delivery of Draft Final Report

Jun 2010

- ❖ Post-roadmap “sanity check” workshop (convened by DIISR)

Aug 2010

- ❖ Public release of roadmap reports

Automotive Australia 2020 - Vision

“As concerns over **environmental** challenges and **energy security** drive increased public awareness of emissions and efficiency, a paradigm shift is looming in the automotive market”

“Through **advanced green car initiatives** ... Australia can become one of the world’s leading designers and producers of ... zero emission passenger vehicles”



Capabilities and Opportunities

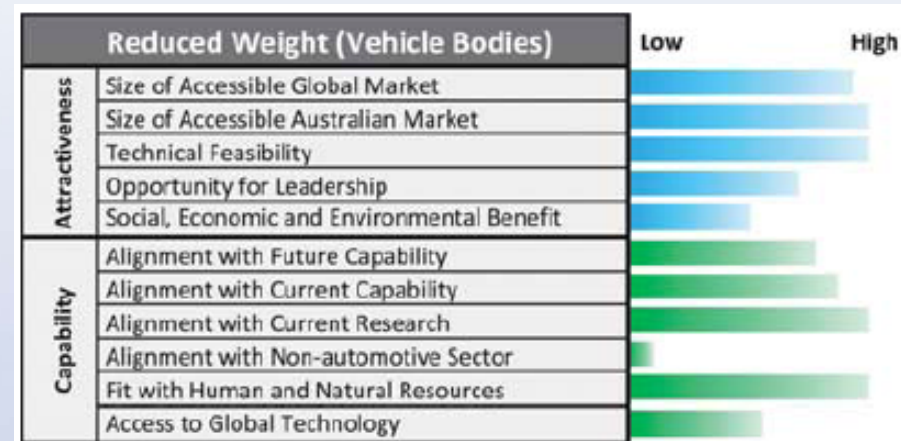
◆ Capabilities

- ❖ Interviews
- ❖ Surveys
 - Automotive
 - Non Automotive
 - Research
- ❖ Workshops

◆ Opportunities

- ❖ International assessment by Deloitte
- ❖ Vehicle producer interviews
- ❖ Workshops

◆ Capability + Attractiveness =
Australian Opportunity



AA2020 Results

- ◆ Technology Roadmap for the Australian Automotive Industry
 - ❖ With a view toward the global market
 - ❖ Building on current and developing capabilities in the Australian industry

- ◆ Four Priority Opportunity Areas
 1. Electrification
 2. Gaseous Fuels
 3. Lightweighting
 4. Data and Communication Systems

- ◆ 32 Specific Applications

- ◆ 32 Recommendations



Applications - Vehicle Electrification

◆ Short Term (2010 - 2012)

- ◆ Market still emerging, limited by product availability

◆ Medium Term (2012 - 2016)

- ◆ Supercapacitors - increased energy density for existing battery chemistries
- ◆ Seamless integrated charging infrastructure
- ◆ Hybrid and electric vehicle production for fleets and taxis

◆ Long Term (2016 - 2020)

- ◆ Modular EV powertrains and modular, standardised battery pack
- ◆ Software and hard ware for EV specific driver interface
- ◆ Design and assembly of power electronics modules
- ◆ System solutions for EV architectures

◆ Vision (Beyond 2020)

- ◆ High energy density batteries
- ◆ Low cost, robust and efficient electric machines

Applications - Gaseous Fuels

◆ Short Term (2010 - 2012)

- ◆ Fast fill solutions for LPG
- ◆ Expansion of LPG retrofit market
- ◆ High capacity, low cost, on-vehicle storage tanks for CNG

◆ Medium Term (2012 - 2016)

- ◆ Natural gas vehicle technology
- ◆ Dedicated LPG system for direct injection engines
- ◆ Increased availability of natural gas refuelling

◆ Long Term (2016 - 2020)

- ◆ Gaseous options still relevant in the face of strong trends away from fossil fuels

Applications - Lightweighting

◆ Short Term (2010 - 2012)

- ◆ Reduced vehicle structure weight by 30%
- ◆ Lightweight road wheels
- ◆ Materials and processes for recycling

◆ Medium Term (2012 - 2016)

- ◆ Energy absorbing foams and adhesives
- ◆ 3D Knitted composites for interior structures
- ◆ Lightweight body and door panels
- ◆ Replacement of steel components with lightweight alternatives eg Al, Ti, Mg and composites

◆ Long Term (2016 - 2020)

- ◆ Light weight modular vehicle platform

Applications - Data Communications

◆ Short Term (2010 - 2012)

- ◆ Roll-out of diverse existing technology options
- ◆ Integration of related devices, improved driver interfaces

◆ Medium Term (2012 - 2016)

- ◆ Provision of real-time traffic congestion and incident information
- ◆ Next generation car navigation systems
- ◆ Improved HMI and driver information

◆ Long Term (2016 - 2020)

- ◆ Provision of dynamic speed limit information
- ◆ Data-gathering from road signs, delivery from central data hub

Enabling Actions

- ◆ Industry Collaboration
 - ❖ Research-Industry
- ◆ Government Support
 - ❖ Policy and targeted research programs
- ◆ Science and Research
 - ❖ Material performance
- ◆ Education and Training
 - ❖ Training of industry
- ◆ Feasibility and Planning

ENABLERS

Industry Collaboration

Collaborative research between stakeholders, whether through Cooperative Research Centres or Centres of Excellence, was identified as a key enabler. Promotion of commercial outcomes from collaborative research programs was highlighted as an area for improvement.

Government Support

Larger development programs were noted as requiring government technology investment through targeted research programs. Policy and regulation relating to emissions reduction was seen as an underlying factor that will increase the viability of lightweighting applications.

Science and Research

Specific research programs were noted in a number of the priority applications. A crash simulation library would facilitate research into the performance of lightweight material and design concepts, while a focussed program would enable the development of new design concepts.

Education and Training

Improved training of design engineers was highlighted as an enabler along with promotion of commercial outcomes in all sectors. An industry education campaign would promote the benefits of lightweighting to all stakeholders.

Feasibility and Planning

Development of a business case to justify investment and secure funding is a critical enabler for most of the applications. This will allow detailed assessment of the global market and competitors, and planning to ensure complementary applications are developed simultaneously.



Lasting Benefits

- ◆ “The process of developing roadmaps is as important as the roadmaps themselves”
 - ◆ Communication, Network building
 - ◆ Supports a spirit of flexibility and openness
- ◆ Direct engagement across the supply chain
- ◆ Involvement of key decision makers essential
- ◆ Consensus building about key areas of concern and interest

- ◆ *AA2020 Roadmap presents a compelling agenda for attracting investment to implement the AA2020 Vision.*

Developing a Roadmapping Culture

- ◆ Industry ownership is key to maintaining momentum
- ◆ Document provides a common frame of reference in which to discuss trends, capabilities and enablers
- ◆ Roadmapping is an iterative process
 - ◆ Industry, market and external environment in flux
 - ◆ Outcomes monitored to review, validate and update document
- ◆ Puts industry on a strong footing to recognise and exploit new opportunities, while rising to emerging challenges

More Information

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Automotive Australia 2020

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