

# **Electric Vehicles Trends & Safety Issues**

**David Glynne Jones**

**Festival Coordinator**

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# PAST

- 1830s - first electric vehicles (primary batteries)
- 1860s/1870s – first electric vehicles with rechargeable batteries
- 1890s/1900 – electric vehicles dominate
- 1900-1930s – electric vehicles decline
- 1930s/1970s – niche applications for road vehicles
- 1970s/1990s – renewed interest – technology limited

# PRESENT

- 2000s
  - strategic drivers strengthen
    - declining fossil fuel supplies - “peak oil”
    - climate change
    - suitability for use with renewable energy
    - very high efficiency (battery electric vehicles)
    - advantages of electric powertrain

# PRESENT

- 2000s
  - Key technology improvements
    - advanced battery technology (lithium-based)
    - electronic power control
  - Tesla Roadster provides technical & commercial validation
    - breaks through perceptions of limited performance
  - Most major auto manufacturers now committed to adoption of electric drive technology by 2015-2020
  - Cost neutral by 2015-2020

# FUTURE

- Significant market penetration by 2020
- Possible market dominance by 2025-2030
- Broad application across all road transport sectors
- Further technology improvements – lower costs, higher performance

# BENEFITS

- Elimination of tailpipe emissions
- Potential elimination of energy source emissions
- Significant reductions of thermal and noise emissions
- Reduced dependency on carbon-based energy sources
- Utilise existing energy distribution infrastructure (grid)
- Enable rapid transition to low/near zero emission private and public road transportation
- Enable new transportation modes (eg Personal Public Transport, “convoy” mode operation of private cars)

# DISBENEFITS

- Relatively low range (short term)
- Relatively high cost (short term)
- Other transition issues

# ACT & Region

- First city-wide roll-out in Australia (Canberra) - 3<sup>rd</sup> in world
- Broad implications for improvement of transport performance in the ACT & region
- Strong support for electric transport from ACT Government
  - Transport emissions are 20% of ACT GHG emissions
  - 50% of ACT fleet will turnover by 2020



# SAFETY ISSUES

- Operational safety
- Maintenance safety
- Crash safety
  - Occupants
  - Emergency services

# OPERATIONAL SAFETY

## PROS

- Simplicity and ease of operation
- Good acceleration across urban speed range (maximum torque from rest to 30-40% of rev range)
- Superior handling, traction & braking (low CG, optimum weight distribution, optimum drive configurations, precise motor control, regenerative braking)
- Selectable performance settings
- No handling of volatile liquid fuel

# OPERATIONAL SAFETY

## CONS

- Near-silent operation at residential speeds (0-50 km/h)
- Deceptive acceleration profile at low-moderate speeds
- Handling of mains voltage connections for vehicle charging

# MAINTENANCE SAFETY

## PROS

- Simplicity of maintenance (minimal moving parts, sealed systems)
- No exposure to volatile liquid fuel

## CONS

- Potential exposure to lethal voltages with high energy source
  - 300-400 volts, 15-85 kWh

# CRASH SAFETY

## OCCUPANTS

### PROS

- Superior crash performance resulting from optimised structures
- No exposure to volatile liquid fuels

### CONS

- Potential exposure to lethal voltages with high energy source
- Potential exposure to battery contents
- Potential exposure to uncontrolled release of stored energy

# CRASH SAFETY

## EMERGENCY SERVICES

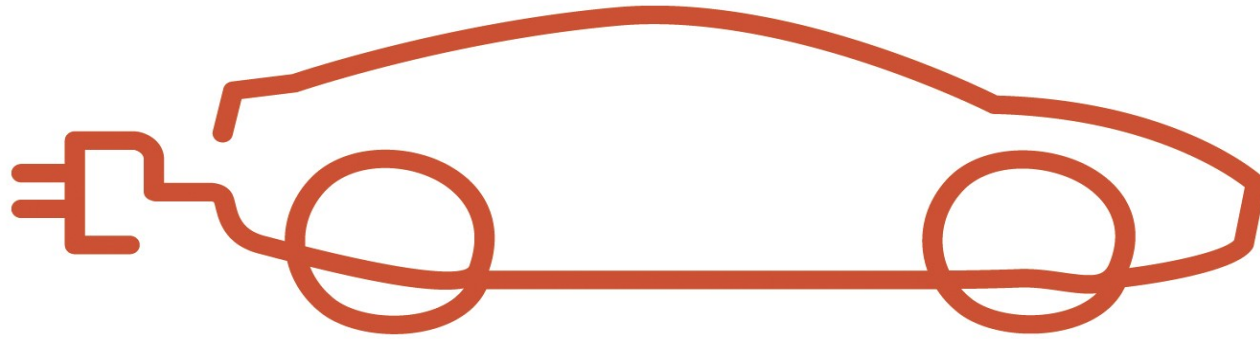
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### CONS

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# Questions & Answers



CANBERRA INTERNATIONAL  
ELECTRIC  
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