University of South Australia

Transport Systems

Update on Vehicle Technologies for Fleets

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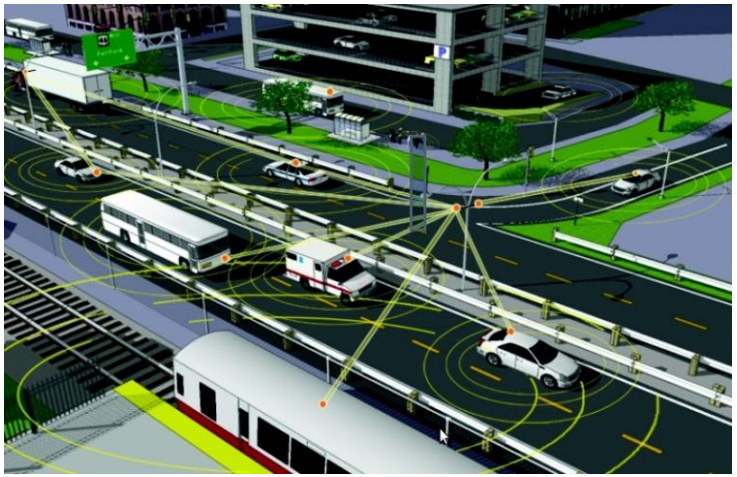
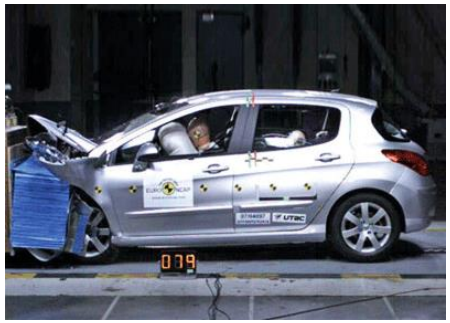
Transport Systems

- **Some of the next big technologies will enable:**
  - Greater safety
  - Greater transport system efficiency
  - Lower environmental impact
- **Are happening outside of the vehicle !**
  - V2V
  - V2I
  - V2X
- **All under the umbrella of C-ITS**
- **ITS Deployment in Adelaide**
- **Bluetooth**
- **EV's**



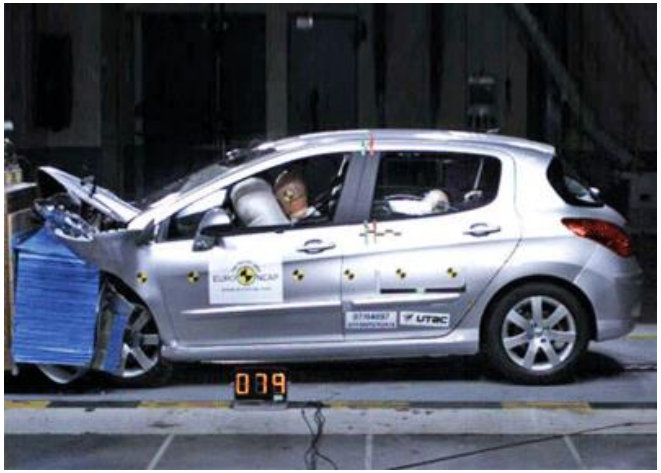
Transport Systems

- **Intelligent Transport Systems**
  - Intelligent Transport Systems (ITS) are the application of modern computer and communication technologies to transport systems, to **increase efficiency**, **reduce pollution**, and to increase the **safety** of the travelling public.
  - ITS Australia (https://www.its-australia.com.au/)

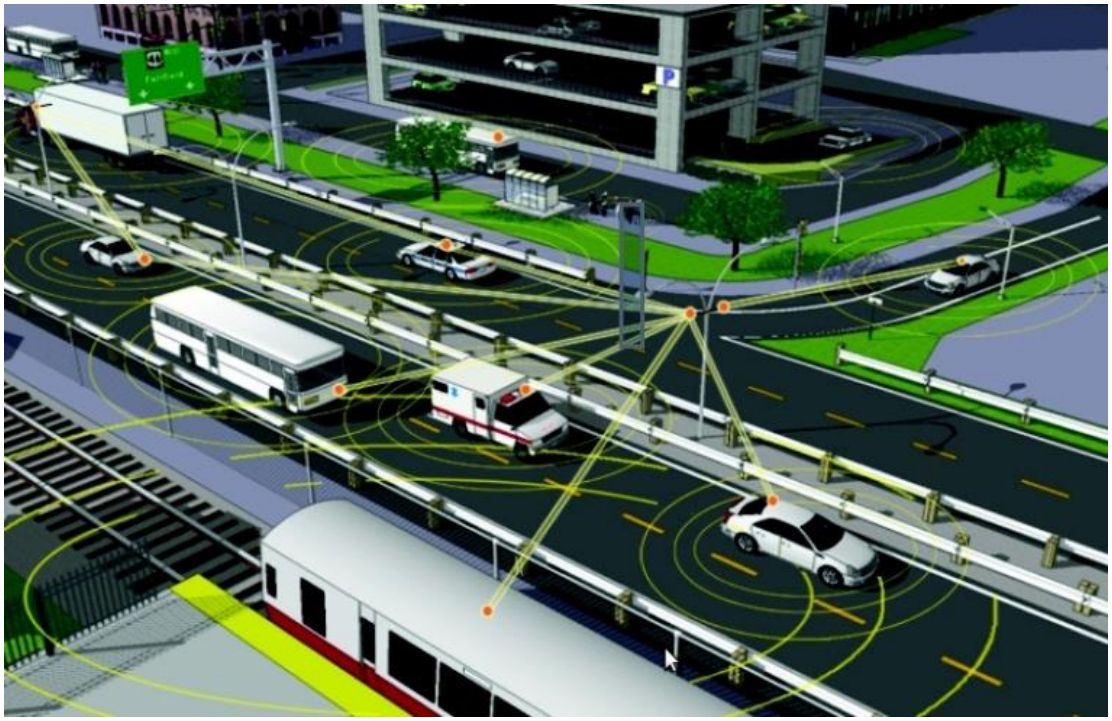


- **In-vehicle systems**
  - Focus is around vehicle safety
    - electronic stability control, lane detection, adaptive cruise control, intelligent speed assist etc
  - Start off in higher end models
  - Over time become standard across the range
- **These in-vehicle systems are now influencing the way ANCAP awards its star rating**
  - “Points are also awarded if the vehicle is fitted with safety features such as Anti-lock Braking System (ABS) Electronic Stability Control (ESC) and seat belt reminders.”

- **C-ITS Latest Applications**
  - **Vehicle-to-vehicle** – intersection arrival, collision avoidance systems and emergency notification systems.
  - **Vehicle-to-Infrastructure systems** – traveller information services (real time navigation, weather warnings , hazards, car parking and fuel availability), traffic signal and variable speed control, tolling and freight management systems.



- **Vehicle to Vehicle (V2V) and Vehicle to Infrastructure (V2I)**
  - V2X
  - Main application is safety and traffic efficiency
    - With traffic efficiency leading to environmental benefits
    - **But** the full range of applications are yet to be explored



- **C-ITS trials happening OS**
  - Connected Vehicles
  - Daimler announcing the largest ever field-test of its car-to-X vehicle communications system in Germany
    - 120 vehicles
  - Connected Vehicle Safety Pilot Model Deployment Program
    - U.S. Department of Transport (DoT)
    - Ann Arbor region of Michigan.
    - 3,000 vehicles hitting the road in the world's biggest ever real world test of connected-vehicle communication technology.

Transport Systems

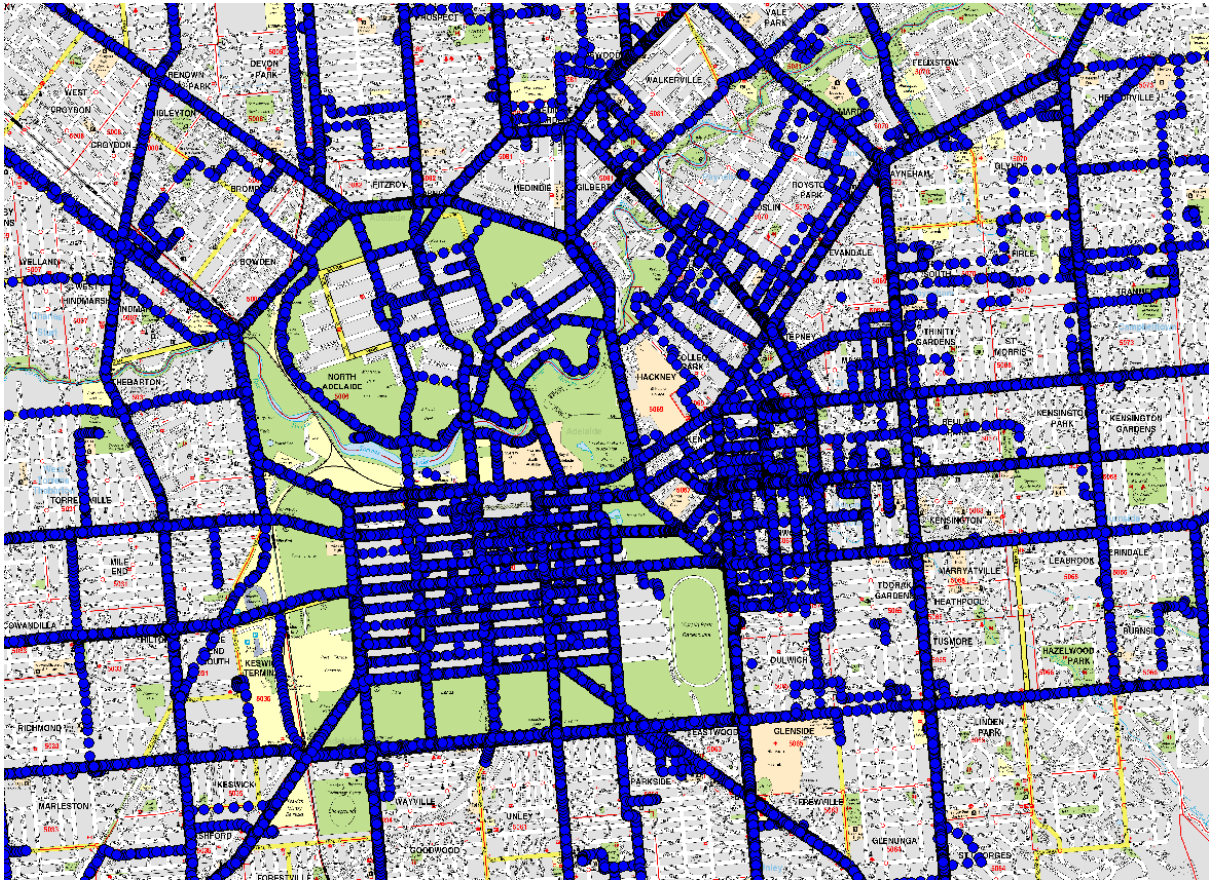
- **C-ITS taking off overseas**
  - Codha Wireless (Adelaide Based) involved in many other US and European trials
- **The next generation of vehicle safety systems will be based around C-ITS technologies**
  - How will NCAP score these ?
  - Will the 5 star car of the future require C-ITS ?
- **C-ITS is starting to make its way into high end vehicles overseas (Connected Vehicles)**
  - C-ITS Penetration rates ???

Transport Systems

- **C-ITS trials already happening in Australia**
  - Newell highway NSW (Heavy vehicles)
  - Cooperative ITS Initiative (CITI) project – Picton Road Wollongong
- **SA Government, UniSA and Codha Wireless performed a trial of C-ITS**
  - March 2011 to October 2011
  - Up to 10 DPTI Pool cars instrumented with OBU
    - Part of Metropolitan regions fleet
  - Road side unit (RSU) installed at DPTI Metro
  - Data uploaded to server when vehicles within range of DPTI Metro

- **Data collected**
  - Around 300,000 data points
  - 1800 trips
    - 205 AM peak (7-9)
    - 1064 Inter peak (9-4)
    - 298 PM peak (4-6)
    - 248 Night (6PM – 7AM)
  - Average trip length – 18km
  - Average trip time – (31min 41 secs)

- **Adelaide CBD**



- **Demonstration day**
  - Emergency Electronic Brake Light
  - Road worker Alert
  - Intersection Collision Warning

- **4-way Intersection warning**

- **So What does this mean for Australia ?**
- **Worst case scenario**
  - Overseas models come to Australia and have their C-ITS features turned off, or don't work due to interoperability issues
  - Its happened before:
    - Early days of ABS
    - Air bags etc etc

- **The Commonwealth Government realise this**
- **So have commissioned AUSTROADS to coordinate C-ITS efforts here**
  - Issues
    - Spectrum
    - Communication protocols
    - ...

- **ITS in Adelaide**
  - Traffic Management and Control System (TMCS)
    - Using Streams to manage the traffic system
      - Traffic Signals
      - Variable Message Signs
      - CCTV
      - On/Off Ramp management

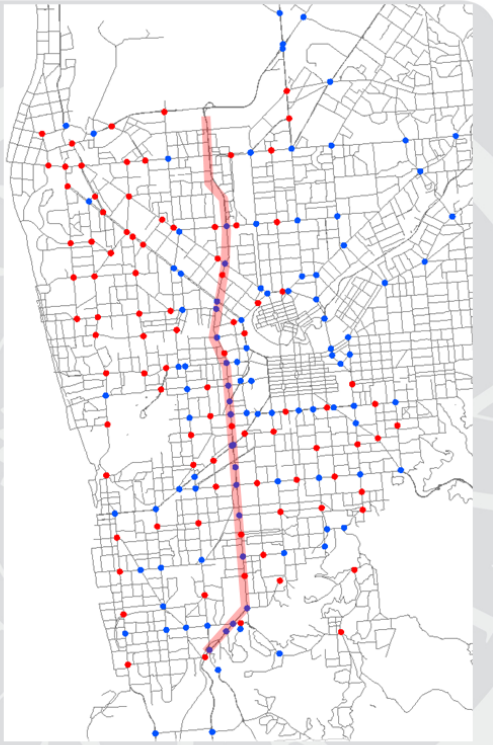
  - SCATS Third Party Licence Agreements
    - Provision of real time traffic monitoring data from the traffic signal system to private third parties for on-sale

- **ITS in Adelaide**
  - Far Northern and Western Road Condition Signs
    - 30 changeable message signs has been deployed in the remote far north and west of South Australia. Each sign is solar powered and communicates via satellite. The signs advise road users of the status of a road, controlled via Pt Augusta and Norwood control centres
  - South Road Superway project
    - first installation of Lane Use Management Signs (LUMS)
  - Southern Expressway Duplication
    - Change the ITS from a reversible control function to a monitoring and incident management function

- **ITS in Adelaide**
  - Bluetooth
    - Travel time and road performance data

Coverage

- 115 active receivers (blue)
- Additional 90 about to be installed (red)
- About 200 more needed for full network coverage



Transport Systems

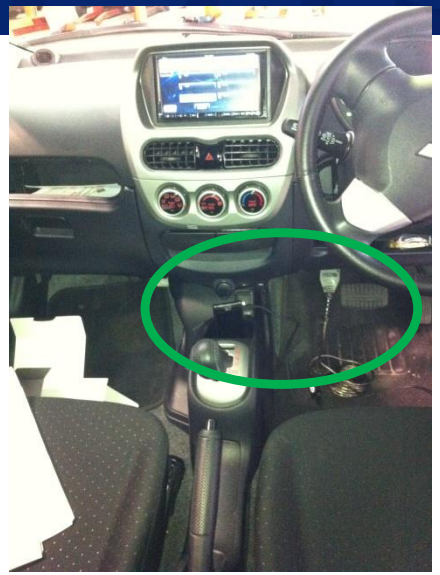
- **Electric vehicles (EVs) are clean, quiet, smooth and reliable, but . . .**
  - range 100 - 200 km
  - recharge speed 15 - 40 km/h
  - fast charge 80% in 30 minutes

- **The way we use EVs will be different to the way we use conventional cars.**
- **So how applicable are they to our current travel patterns**
  - Are the fit for purpose ?
- **Plug in hybrids as interim technology ?**

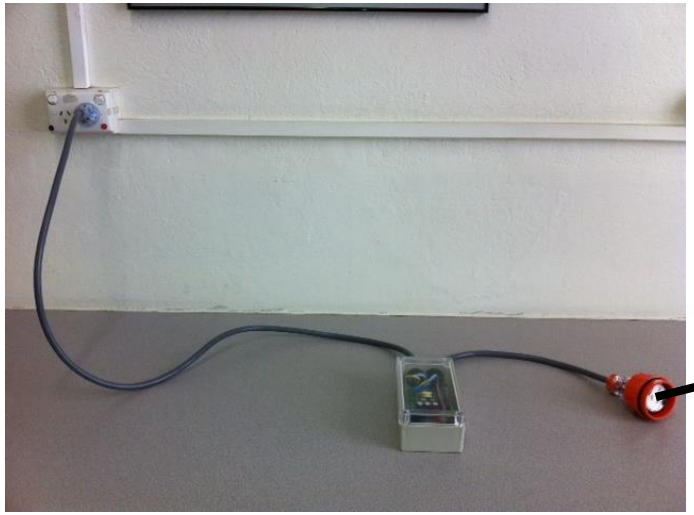
Trial of EVs

- **9 iMiEVS in SA**
  - 6-7 to be logged
    - RAA
    - 2 SA Gov
    - ETSA
    - Marion Council
    - ACC
    - Club Assist

EV Logging V1

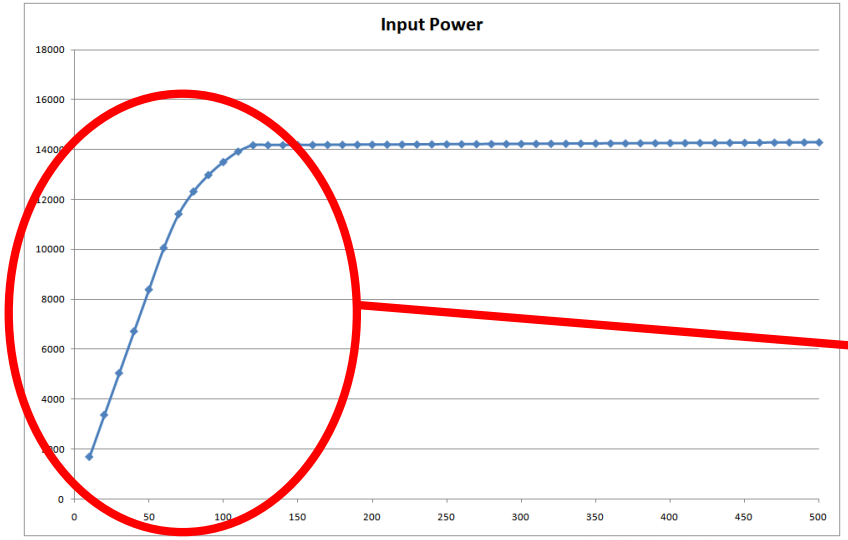


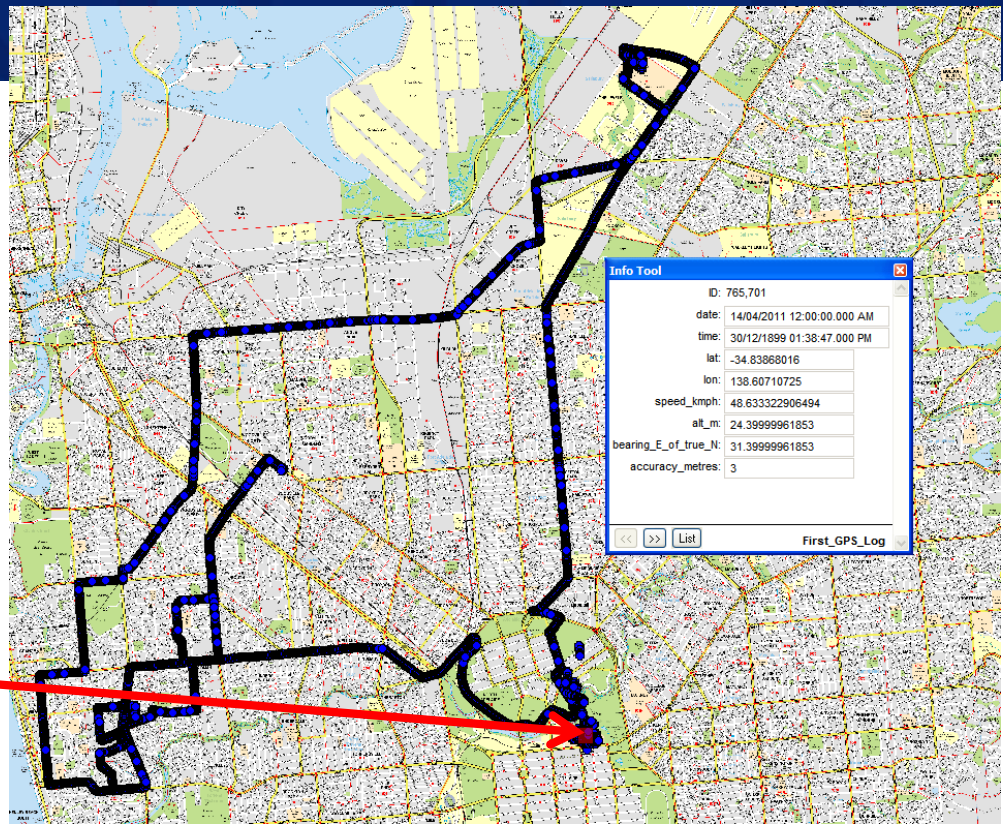
- **Logging GPS Sec by Sec**
  - Time
  - Position
  - Speed
- **Logging input Energy**
  - Recharging Time and total energy



1 iMiEV Instrumented

- **Results**

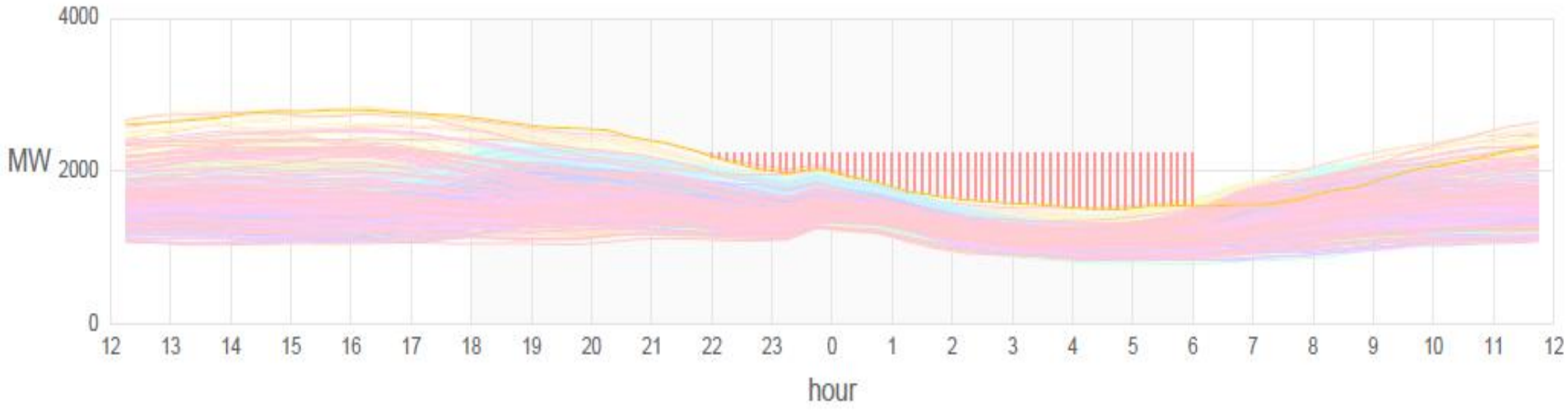




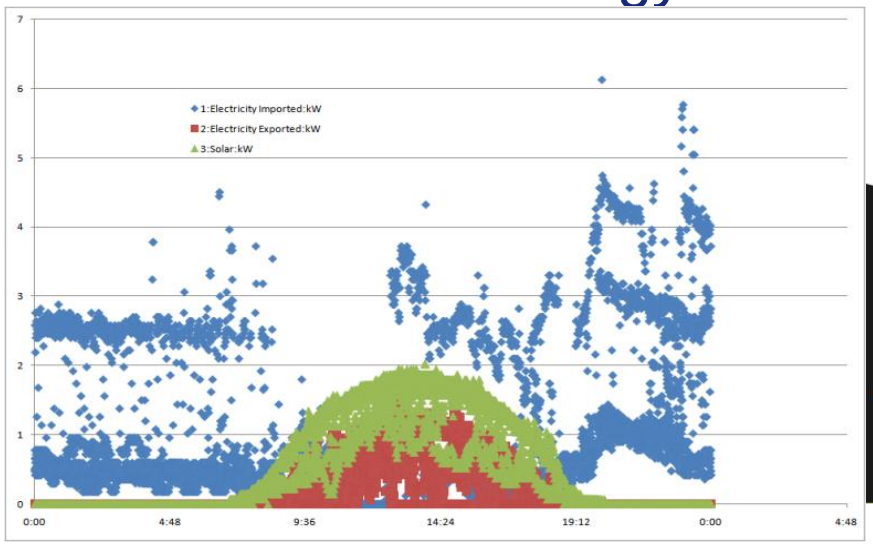
This recharging session took 2 hours before iMiEV was fully charged
Time of day !!

Spare capacity for power generation?

- **South Australia: 25 million EV km**



- **Living Lab Energy use**
- **Lochiel Park Residences**
  - 7 Star Urban development
  - With Household energy monitoring
- **National first**
  - Vehicle energy use
  - Household energy use



- **Fleet mangers need to be abreast of new vehicle technologies**

BUT

- **Will these technologies help determine the residual value of the vehicle at end of lease ?**
  - **No**
- **Will technologies ensure vehicle users take the vehicle in for its required service**
  - **Probably not**
- **Will technologies determine how many kilometres the vehicle is driven every quarter/month ?**
  - **Not directly**
- **Will technology help decipher FBT policy changes**
  - **No, But could contribute to reporting ?**
- **Will ITS help a vehicle become fit for purpose**
  - **Depends on the purpose ?**

ITS for Fleet Managers

But But

- **Will vehicle technologies contribute to the next generation of vehicle safety systems**
  - **Yes**
- **Will technologies contribute to a more efficient road transport system**
  - **Yes**
- **Will this increased efficiency and lead to lowering environmental impacts and fuel use**
  - **Yes**

Transport Systems

- **A significant amount of vehicles on the roads are fleet vehicles**
  - This is a good way to influence governments and vehicle manufactures to integrate more fleet applications into vehicles
  - AfMA would be a powerful voice in this context

- **Hence ensuring new technologies will be of real benefit to fleet managers and the community**