



# Energy in NSW, 2006 and beyond

The need to focus on base-load power

Presentation to AIE Sydney Branch seminar, July 19<sup>th</sup> 2006

Richard Hunwick  
(02) 9410 9834

## In NSW, since 2004:

- ❑ Rush to air-condition households has accelerated.
- ❑ Interest in new generation capacity in NEM (including NSW) is focussing on open-cycle GT peak power plant.
- ❑ Some commitment to additional base and intermediate-load generation capacity: existing generator upgrades, Tallawarra CCGT station.
- ❑ Reliance on imported power (esp. from Qld) is growing.
- ❑ Natural gas prices and availability is more uncertain.
- ❑ Rate of development of coal-bed methane disappointing.
- ❑ Capacity surpluses are still being eroded—the existing generation base is two years older--and more tired.
- ❑ State economy has been relatively weak, easing demand pressures. As growth accelerates, so will power demand.

# The dash for peak capacity

Peak generation capacity is easier to develop, so this is where the money is being invested.

*Is this investment soundly based?*

**By 2020** (“the day after tomorrow”, in energy industries):

- “Smart meters” will be installed in virtually all businesses and households.
- Rooftop PV capacity will be significant, esp. in terms of summer afternoon peak power demands.
- Significant amounts of storage will be connected into the distribution grid, in the form of **plug-in hybrid cars**.

**By then, plant with a cost of electricity above \$300/MWh won't get despatched.**

# Plug-in what?

## **In NSW in 2020 we can expect there will be:**

- 0.5m plug-in hybrids registered (10% of State's total vehicle fleet).
- Average on-board energy storage capacity: 20 kWh. Of these:
- Half will be parked and connected to grid at any time 6am-8pm.
- Average stored energy available in each parked vehicle: 10 kWh.
- Average charge/discharge rate of each parked vehicle: 10 kW.

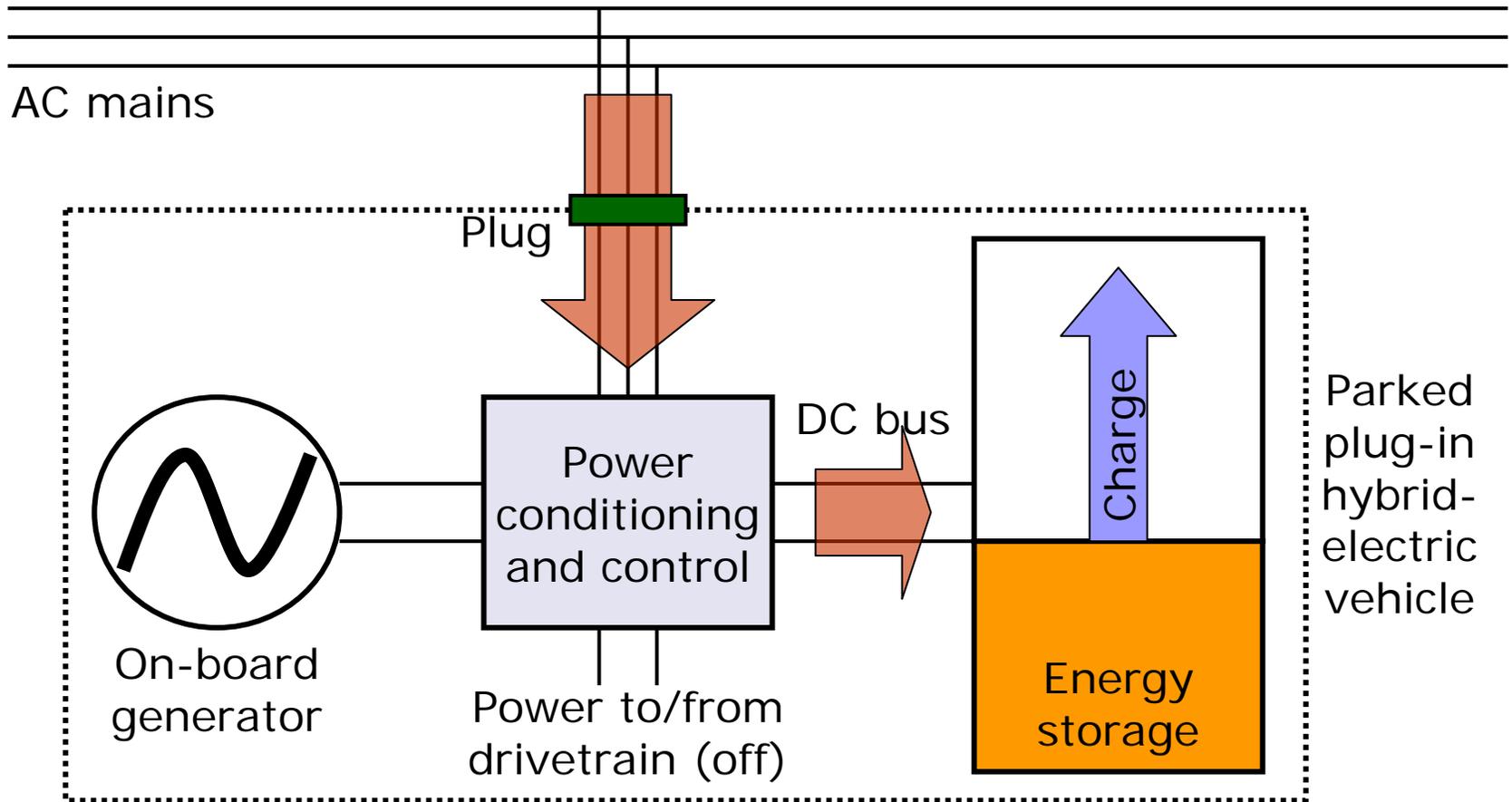
## **This implies an available resource of up to:**

- 2.5 GW power instantly available on demand.
- 2.5 GWh stored energy instantly available on demand.
- By resorting to the plug-in hybrids' on-board generators, much more energy would be available.

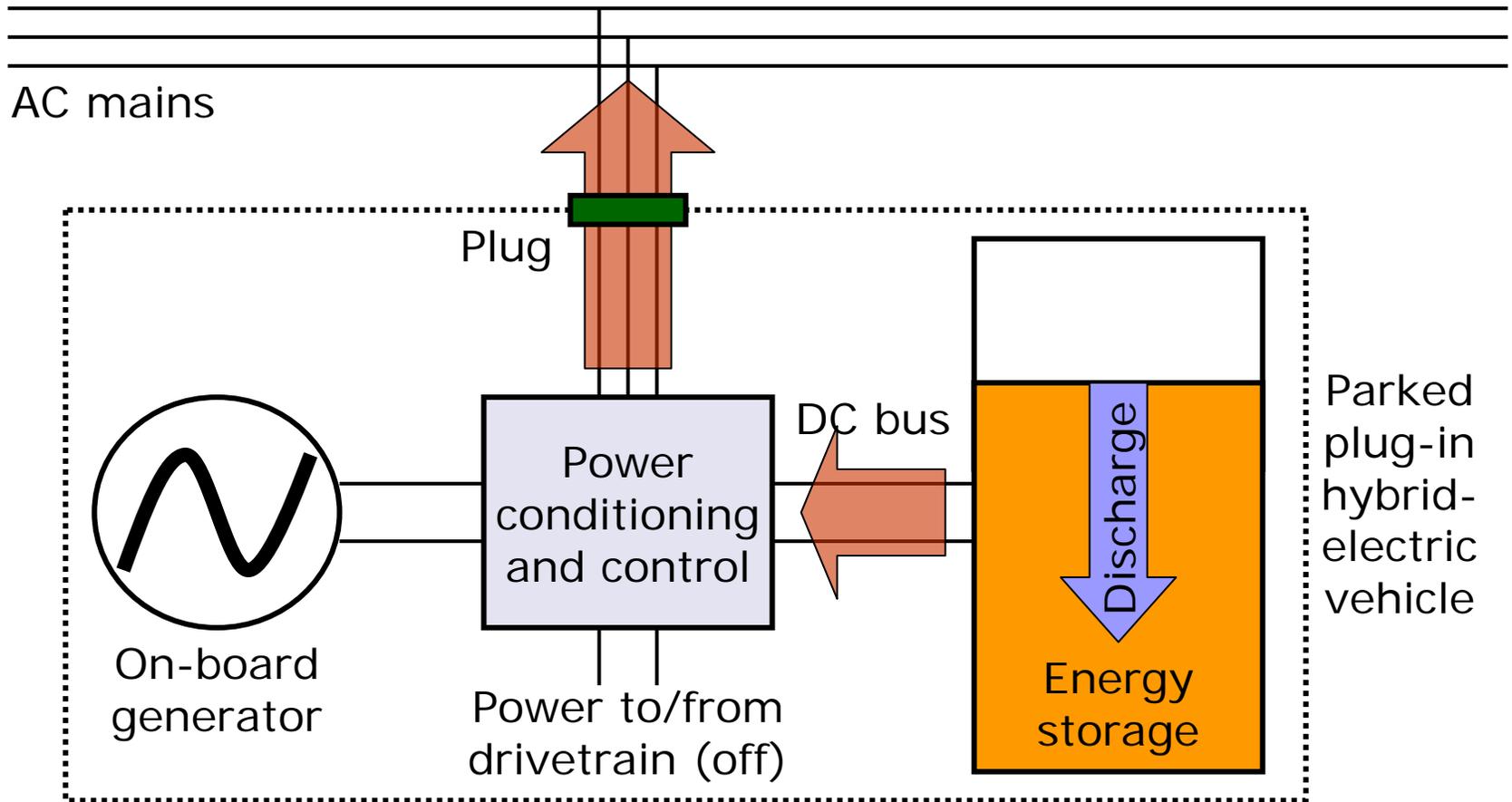
***All of this would be paid for by the motorist (although distributors should pay for the parking charge/discharge infrastructure).***

# Plug-in hybrid-based energy storage system.

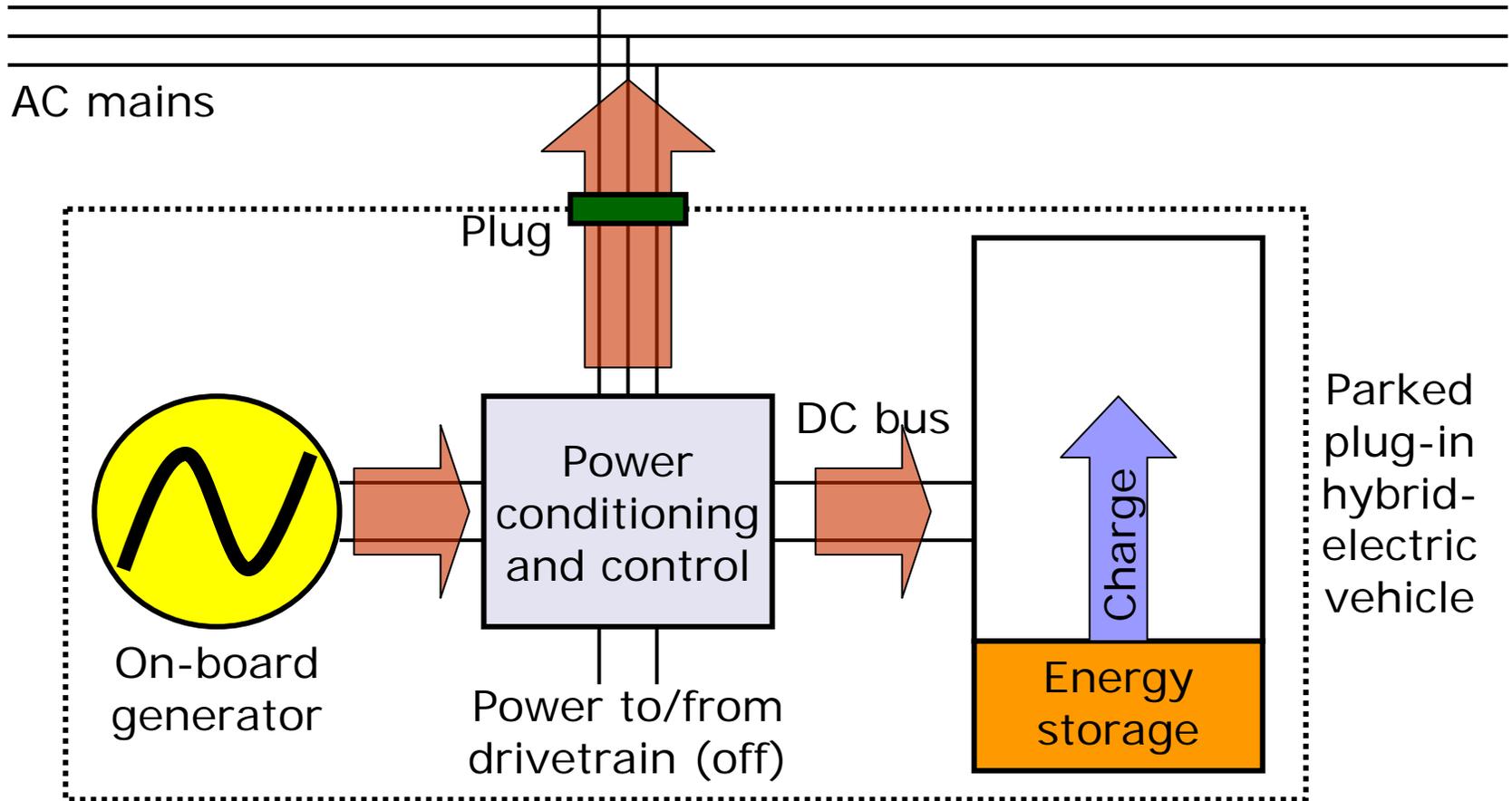
Case 1: Power spot price  $< \$25/\text{MWh}$ .



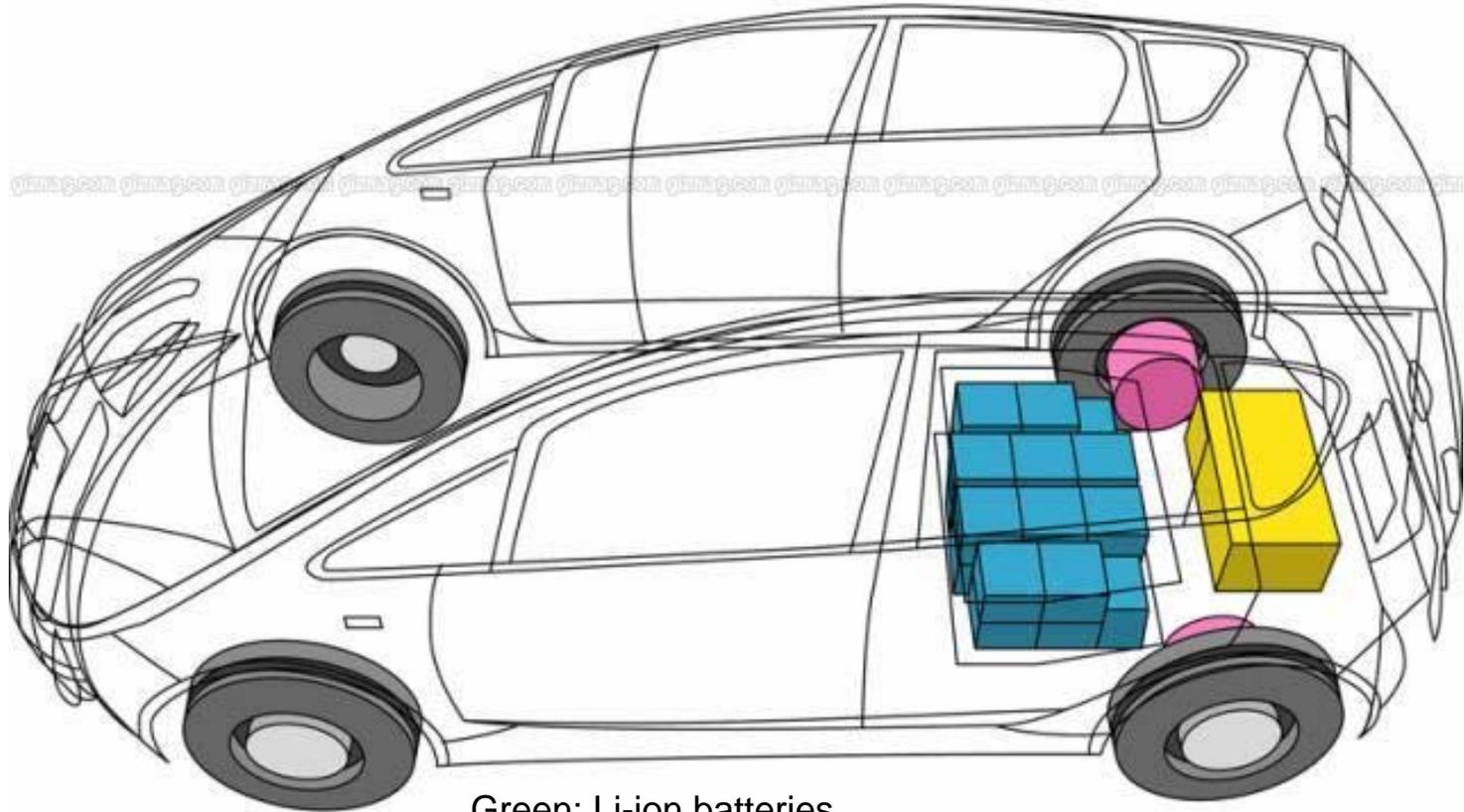
# Plug-in hybrid-based energy storage system. Case 2: Power spot price $> \$100/\text{MWh}$ .



# Plug-in hybrid-based energy storage system. Case 3: Power spot price $> \$300/\text{MWh}$ .



# Mitsubishi electric vehicle schematic



Green: Li-ion batteries  
Yellow: Power-conditioning  
Pink: In-wheel motor-generators

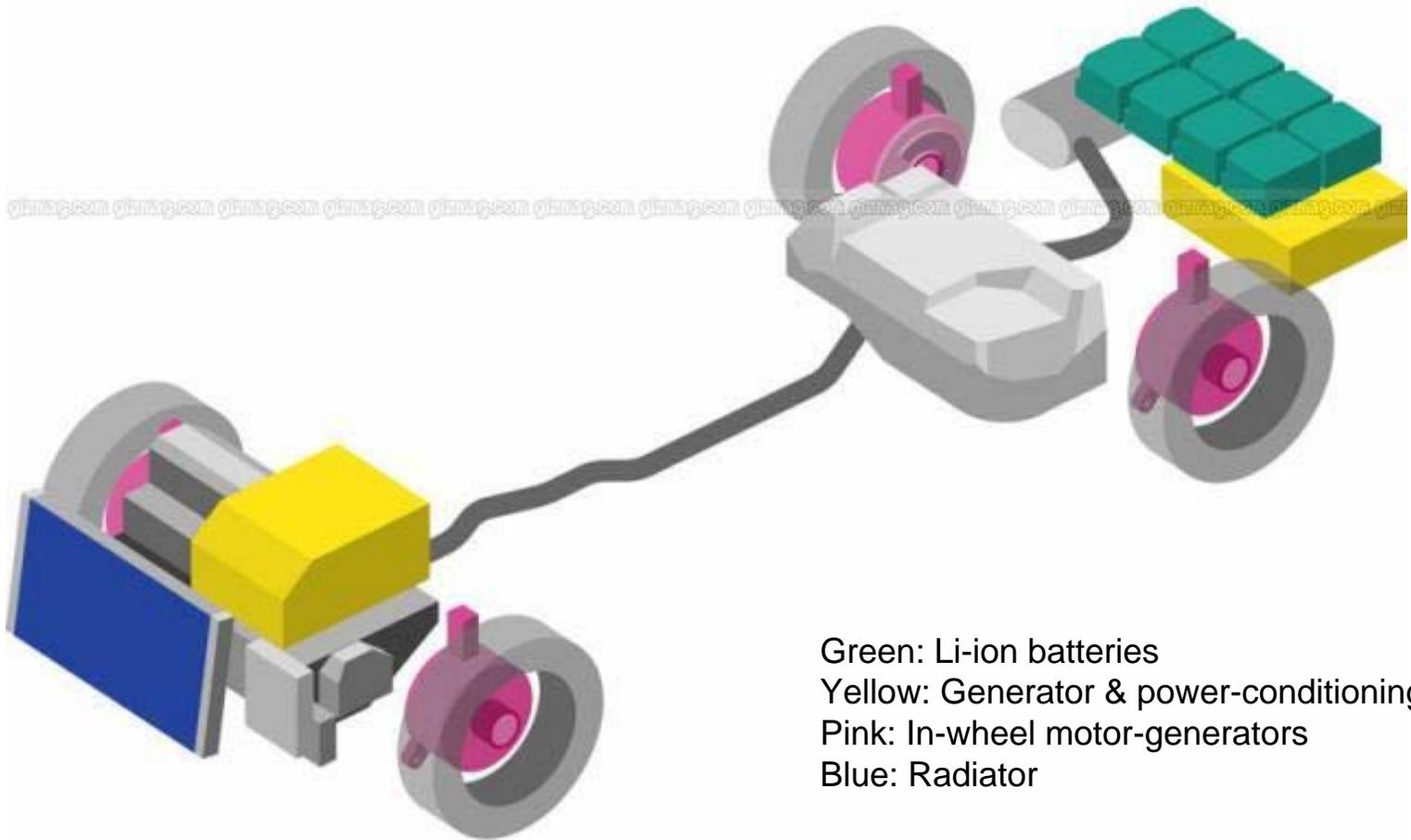
Source: Gizmag

# Mitsubishi in-wheel motor-generator



Source: Gizmag

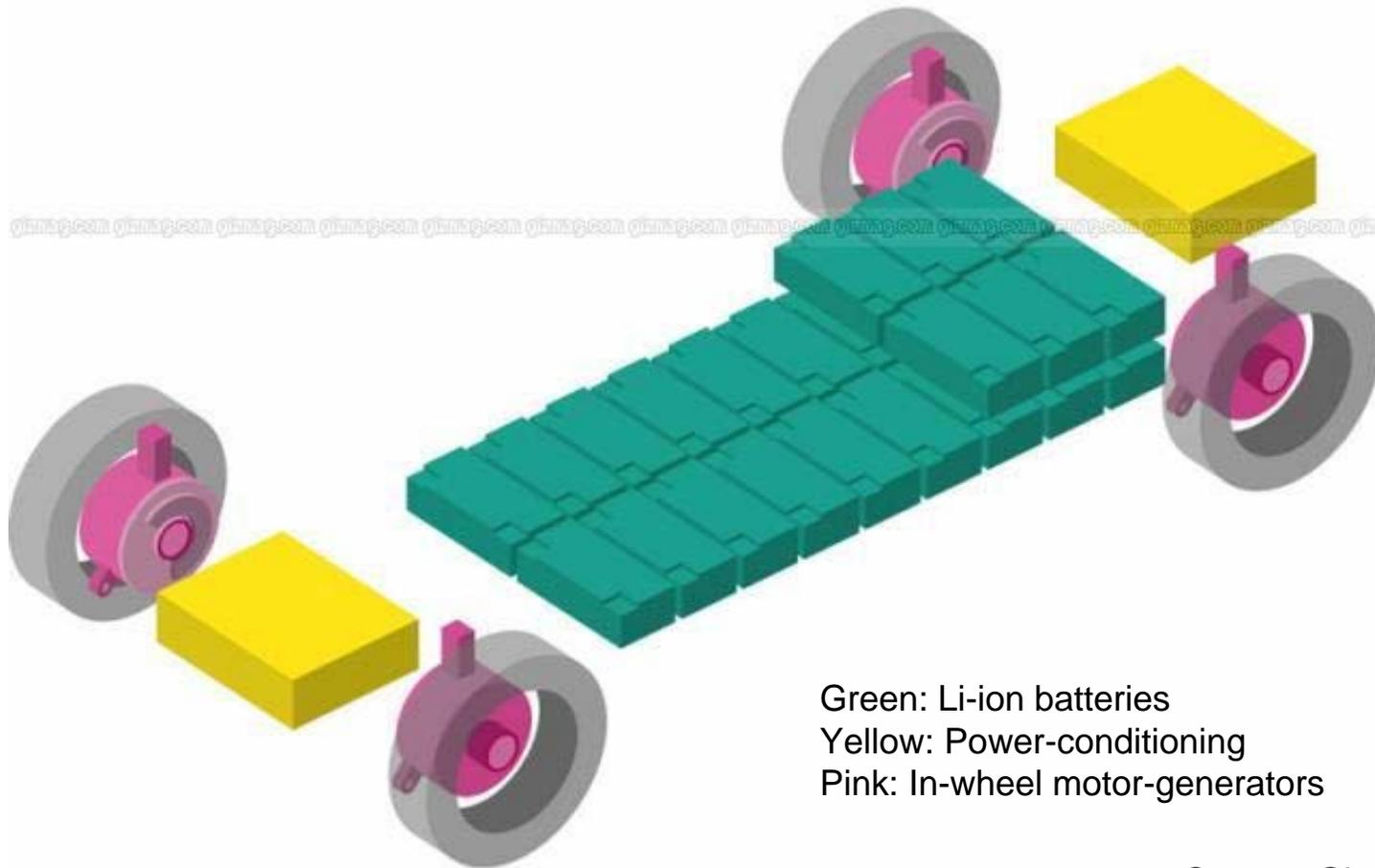
# Mitsubishi hybrid-electric vehicle schematic



Green: Li-ion batteries  
Yellow: Generator & power-conditioning  
Pink: In-wheel motor-generators  
Blue: Radiator

Source: Gizmag

# Mitsubishi all-electric vehicle schematic



Source: Gizmag

## Net new NSW electricity contribution by energy sources considered. Year 2015

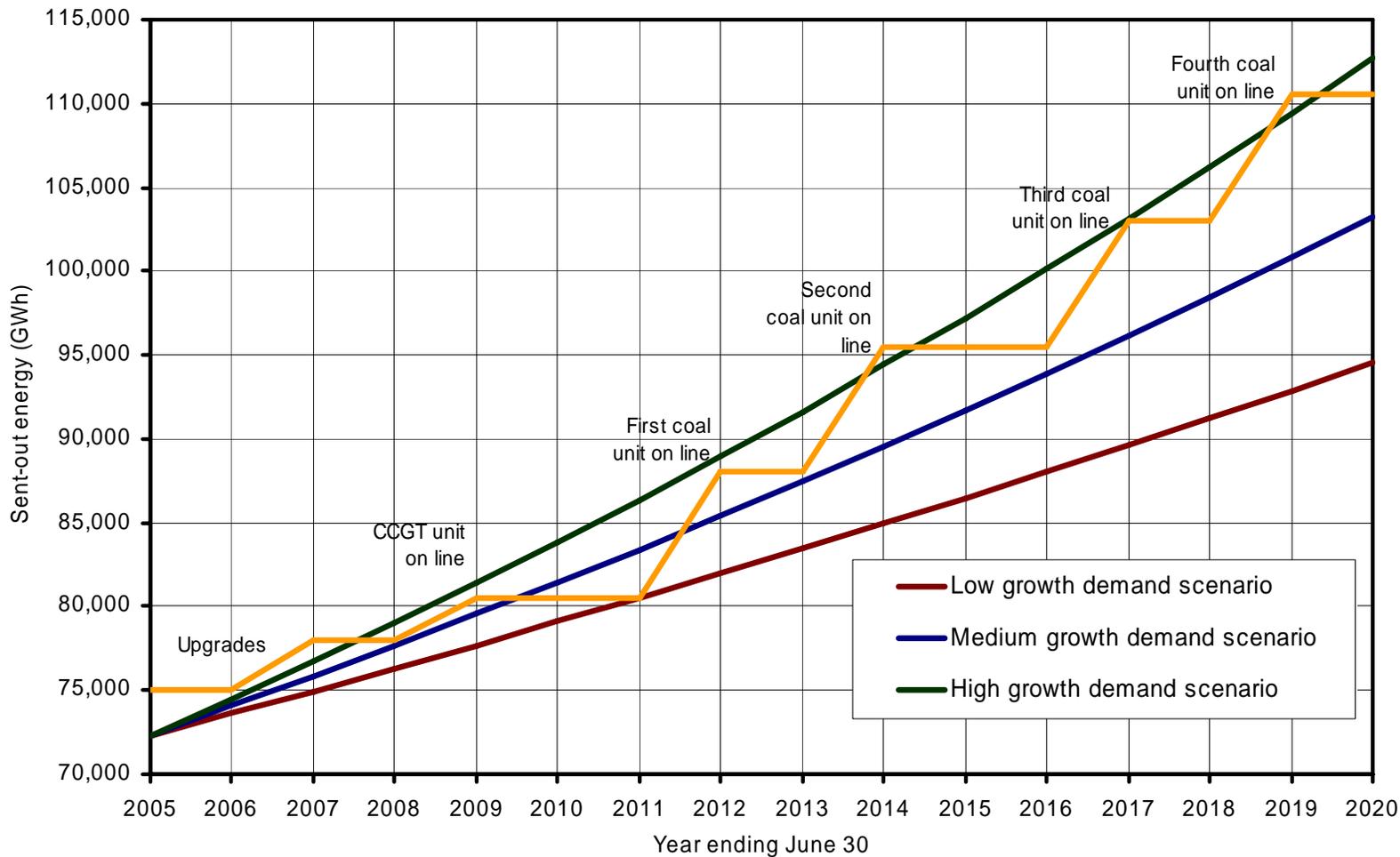
	<i>Contribution in 2015 GWh sent out</i>	<i>Average cost in 2008 \$/MWh sent out</i>	<i>CO<sub>2</sub> emissions/ GWh net, '000t</i>
Upgrades	3,000	30	920
Hydropower	Small	50	Small
Natural gas	2,500	45	350
Nuclear power	Nil	60	Small
New renewables:			
Biomass	200	60	Small
Solar (thermal & PV)	100	150	Small
Wind	1,200	65	Small
<i>Supply from existing (2005) plant</i>	<u>75,000</u>		
TOTAL	82,000		
Demand (Medium)	<u>87,000</u>		
<b>Shortfall</b>	<b>5,000</b>	<b>&lt;30 (coal)</b>	<b>780 (USC coal)</b>

# Whither the base-load power?

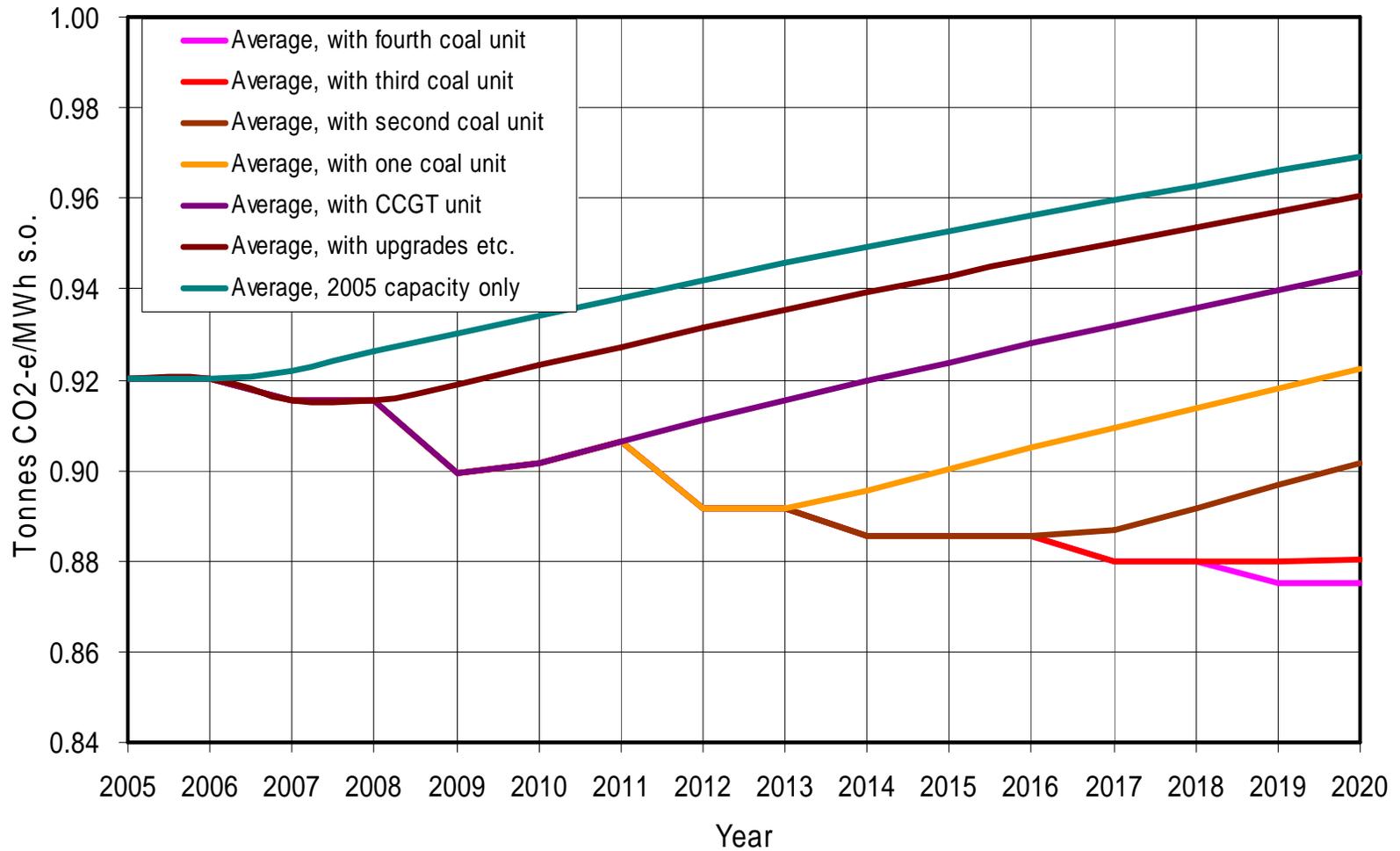
- For the next decade at least, coal promises the cheapest electricity; for NSW, and much of Australia: <\$30/MWh sent out.
- Within 10-15 years, CCS retrofitting will be feasible, increasing electricity cost by around \$10-15/MWh s.o.
- A state of the art power station would reduce GHG emissions/MWh by 15% cf. best Australian practice.
- Alternatives (including do nothing) promise higher cost electricity, hence less money for other things.
- Alternatives (including do nothing) on balance would be detrimental to the NSW economy, and for the global environment.

***NSW should be more supportive of its major resource***

## NSW electrical energy demand and supply projections to 2020



## Greenhouse gas intensity of NSW generation options



## Greenhouse gas emissions from NSW generation options

