

Business Spectator

COMMENTARY

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The electric revolution is on track

As Alan Kohler [wrote a fortnight ago](#), the race to bring electric vehicles (EVs) to market has begun and many believe the impact of this technology will be profound.

Automakers are planning to bring over 30 new EVs to the global market within three years and cumulative production is planned to exceed 1 million units in that time. Recent market research shows that over one third of Australian car buyers will consider an EV for their next purchase. While they may have to wait a few years to access the new products, Australians should at least expect to see plug-in cars from Mitsubishi, Toyota, Holden, Nissan, Smart and Tesla on our roads by 2013. Meanwhile, a local cottage industry is building to fill the looming supply gap and provide consumers with early exposure to the technology through retrofitting.

The new breed of lithium-ion battery EVs promises full highway capability with the expected set of features and accessories. Driving ranges from 100km up to 400km per charge are sufficient for a large segment of the market considering that 90 per cent of Australians drive less than 100km each day.

A typical 40km commute can be recharged in 3 hours from a standard power outlet, and considerably faster using the higher-power chargers or battery-exchange offered by commercial infrastructure providers such as Better Place and Charge Point. Software vendors such as Google and GridPoint are also providing off-the-shelf intelligence to network the charging stations and manage the scheduling of charging loads.

International standards are being evaluated by Standards Australia to guarantee safety in the batteries and high-voltage systems and ensure accessibility to charging infrastructure.

Battery lifetime expectations have improved to meet industry requirements although, given the limited on-road experience, automakers might only provide limited warranties on their early products. What is also clear is that Australia will need new workforce skills to support all this new technology.

Motoring with electricity at \$0.20 per kilowatt-hour achieves one-third the cost of petrol at \$1.30 per litre, with the powerful incentive of it being home-grown power, not imported oil – plus there's the option of using renewable power.

The industry also expects EV maintenance to cost about half that of petrol vehicles, and the combined low-cost of motoring can outweigh the amortised incremental cost of electric powertrains and battery degradation. Nonetheless, consumers may not recognise the total cost benefits if they get sticker-shock from predicted vehicle prices of \$40,000 or more. Therefore new business models such as battery leasing and fleet EV subscriptions will provide commercial opportunities to shield consumers from upfront costs and realise the overall savings.

Meanwhile, over \$4 billion of global automotive stimulus funds will foster innovation and economies of scale to drive costs down further but, unlike other markets, Australia still lacks consumer incentives to promote demand. Policymakers argue that consumer incentives cannot succeed without adequate EV supply, yet those same incentives provide the investment signal for automakers to confidently bring products to Australia.

To avoid being on the tail end of the EV revolution, those policy makers should also consider the societal benefits of EVs, because they are compelling – far more than converting your car to LPG, which does get a subsidy.

Each EV will avoid over 8 barrels of imported oil annually, saving \$700 per vehicle in our trade deficit at current prices (and let's not forget military expenditures in the Middle East either).

The same EV will further avoid 150kg of toxic urban pollution each year, with a public health value of \$400 per vehicle according to the Australian Transport Council. Even with the coal-fired Australian grid, our studies show an EV on average will reduce net transport greenhouse gas emissions by 1 tonne each year, increasing to 4 tonnes with 100 per cent green power.

Though the CPRS permit price is \$10 per tonne, the estimated societal cost of GHG emissions is closer to \$50 per tonne – leading to benefits from the EV of up to \$200 per year. Over five years, these externalities all add up to over \$6,000 per vehicle.

For the grid, numerous studies have shown that there is excess off-peak capacity to recharge an EV fleet. Smart charging functionality in EVs can build upon the national smart meter, smart grid and broadband rollouts to shift the majority of charging loads to off-peak and mitigate coincidental loads during the peak.

For electric utilities, that means more power sold at opportune times – increasing asset utilisation without a need for network expansion – equalling more profit. Utilities in the US such as PG&E and SCE already offer discounted EV tariffs to attract EV customers.

Turning cities into energy reservoirs

Additionally, a networked fleet of smart-charging batteries can potentially provide utilities with low-cost grid ancillary support services and the holy grail of grid energy storage. Using vehicle batteries to store and return power to the grid – known as 'vehicle to grid' or V2G technology – would perform a traditionally costly function and would do much to support a high penetration of intermittent renewable energy such as wind and solar in the grid.

To get to 20 per cent renewable by 2020, we'll need much more of this grid support and it would be quite a coup for EVs to enable green power in excess of their own requirements for recharging.

While there are presently significant regulatory barriers to such a scheme, our studies estimate that a networked EV providing grid services could enable up to 43 megawatt-hours of renewable energy each year, compared to the 3 megawatt-hours required to power the EV alone. This would produce further savings of 37 tonnes of GHG emissions from the stationary energy sector with a societal value of almost \$2,000 per year per vehicle.

When you look at the total potential benefits, you can see why the US provides a consumer tax credit of \$US7,500 for every EV sold, drawing products into that market and away from ours.

EVs also fit well into the reshaping of cities for sustainability. Buses and light rail can also be EVs, with the potential to be 100 per cent renewable.

Yet despite the need for more public transit, cycling and walking, private motor vehicles will still be present. EVs make increasing sense in dense urban environments with reduced kilometres travelled in smaller vehicles. They're quieter and cleaner too, and the economics of EVs make sense for community car-sharing.

For transit infrastructure planning, there are potential synergies in clusters of EV recharging around electrified public transport nodes. Putting it all together may even lead green developers to offer packaged communities that include eco-friendly house and land with clean energy and plug-in car.

EVs could completely reshape the way we fuel our lifestyle and redefine the place of vehicles in our society. Cars are evolving to become "smart electric mobility appliances" in tandem with the greening of the grid and the concept is riding a wave of tens of billions of green industry and government dollars invested in electric powertrains, smart grids and renewable energy. This revolution will unfold rapidly – businesses that are not planning for these changes risk missing major opportunities.

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