

Impact of high electric vehicle uptake on generation development in NZ

Brian Bull

(brian.bull@electricitycommission.govt.nz)

The Electricity Commission

- Wholesale
 - Retail
 - Security of supply
 - Energy efficiency
 - Compliance
 - Transmission
 - Modelling and forecasting
- ↓
- Developing generation and demand scenarios
- ↓
- Impact of Electric Vehicles**

The Commission's 'vision' for EVs

- Fairly blurry!
- PHEVs (plug-in hybrids) for domestic use
 - Mass market uptake kicking off around 2020
 - Mixture of new and 'NZ new'
 - Steady improvement in battery technology
 - Rising to a high proportion of domestic vehicles during 2030s
 - Charging...
 - at home
 - in parking buildings
 - at service stations?
 - at intersections???
- Probably commercial EVs too, and definitely mass transport

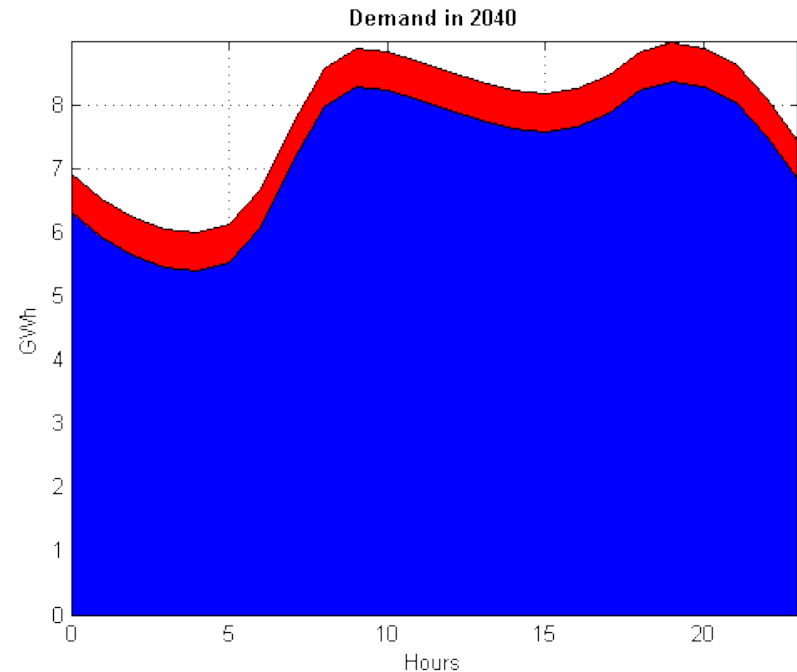
Generation implications

- Well, there will be lots of options for new generation by 2030
- Some major thermal generators retiring around then?
- But...

- When are people going to charge these critters?

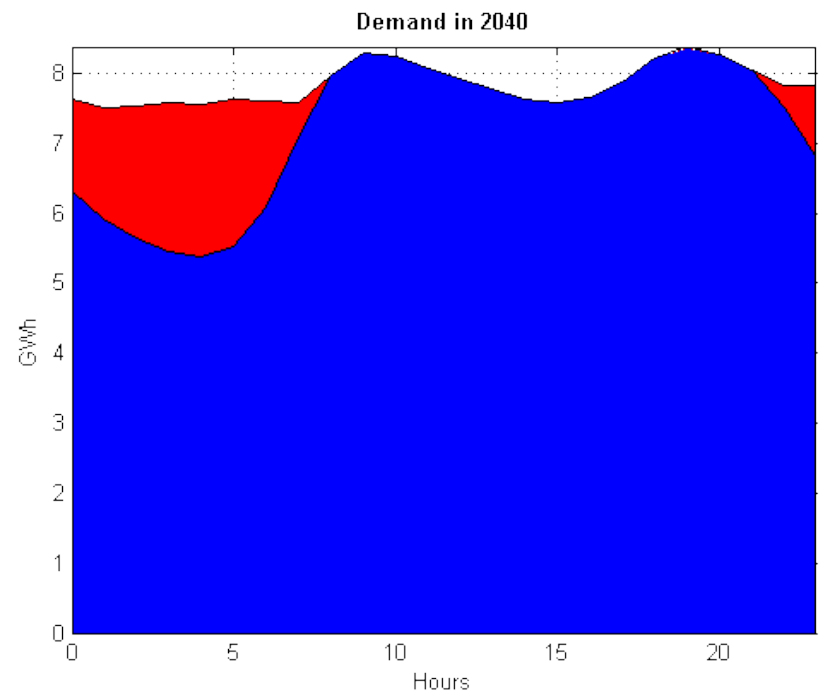
Whenever they like?

- Peak demand increases
 - people charging their cars when they get home from work
- Need much more transmission, distribution capacity
- Wholesale prices very variable (maybe retail too)
- Need more generation to meet peak
 - thermal peakers (and mid-order)
 - hydro (various types)
 - demand-side response



Or only at off-peak times?

- 'Valley filling' –
 - charge vehicles during the night - and the middle of the day
- Less network investment needed
- Less new generation
 - but run existing plant more steadily
- Favors some generation types:
 - geothermal
 - baseload thermal
 - wind and marine
 - *if* charging load follows output



EVs can support intermittent renewables

- Aggregate charging load to provide ancillary services
 - Frequency keeping
 - Instantaneous reserve
 - Inter-hour balancing
- All these services would be needed to facilitate high levels of intermittent renewables
 - (wind, marine, run-of-river hydro)
- Even better with V2G (vehicle-to-grid)
 - Car batteries act as electricity storage, which can be drawn on when required
 - Also usable for peak shaving
- Vehicle owners and aggregators would get paid for providing these services