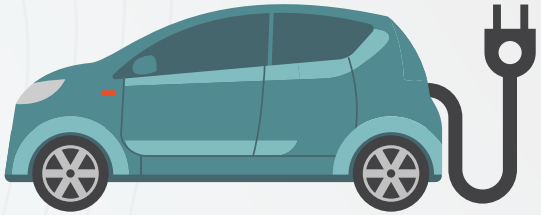
ELECTRIC VEHICLES
UNLOCKING LOWER ENERGY PRICES



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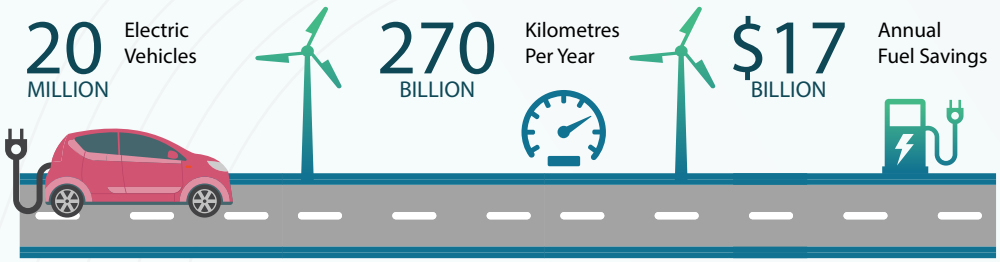
IMAGINE A WORLD IN 2050 WHERE 60% OF AUSTRALIAN VEHICLES ARE ELECTRIC

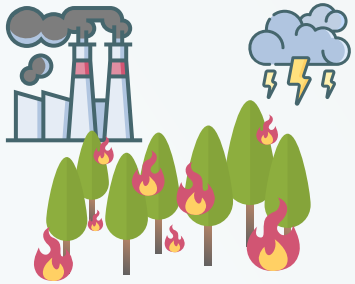
FUEL SAVINGS

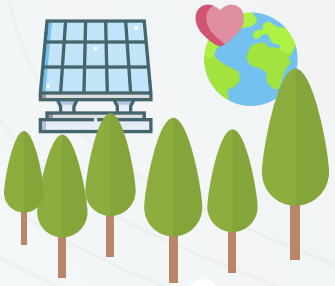
Electric vehicles (EVs) cost about a third to fill up compared to petrol. With the price of EVs dropping, this could mean significant savings for Australian car owners.



REDUCING CARBON FOOTPRINT

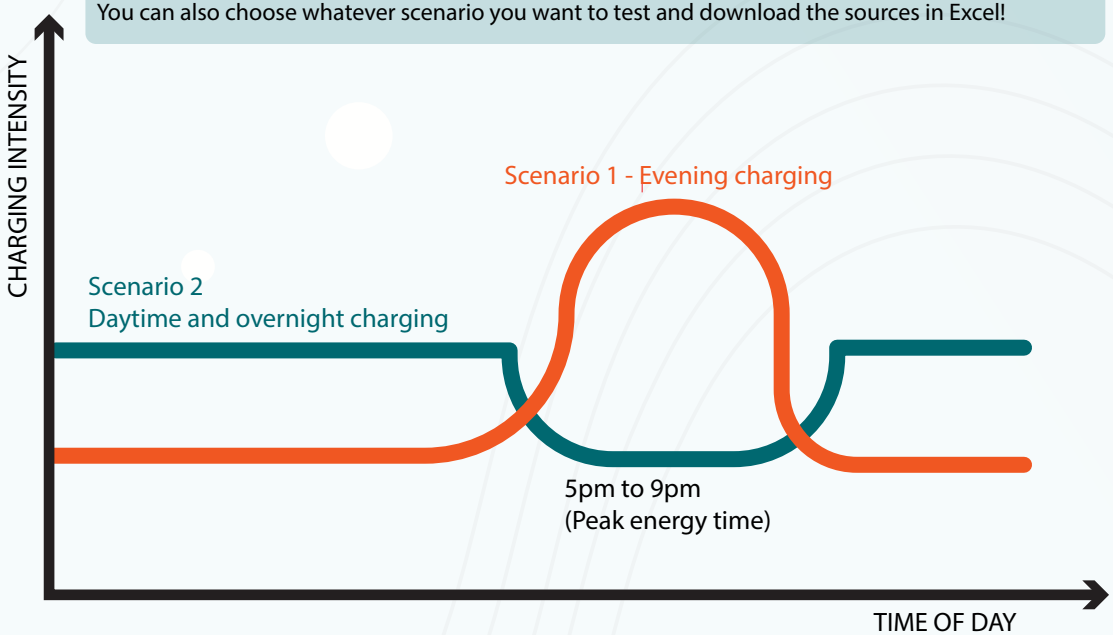
Electric vehicles fuelled by renewable electricity will materially lower carbon emissions.





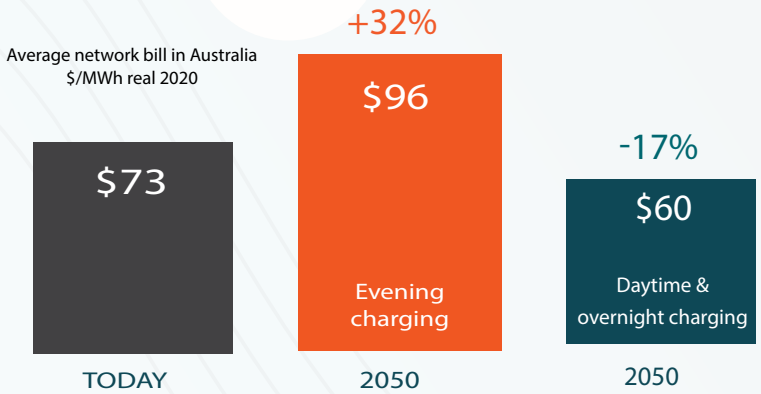
BUT ELECTRIC VEHICLES CAN ALSO LOWER ENERGY BILLS IF WE CHARGE OVERNIGHT AND IN THE DAY

Our app looks at 2 charging scenarios to see the impact on electricity network charges in Australia.
•Scenario 1 reflects today's charging patterns where most charging occurs in the evening period.
•Scenario 2 is where most charging occurs overnight and in the day.
You can also choose whatever scenario you want to test and download the sources in Excel!



Our app showsthat charging during peak hours (Scenario 1) could increase average network electricity prices in Australia by 32% by 2050 compared to today. But charging more in the day and overnight (Scenario 2) could save 17% off network prices.

This is a difference of $400 in a typical household bill by 2050, or about an $8 billion difference in electricity costs per year by 2050.

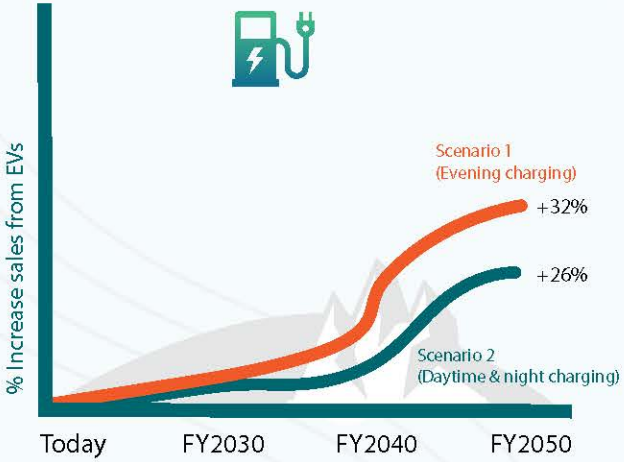


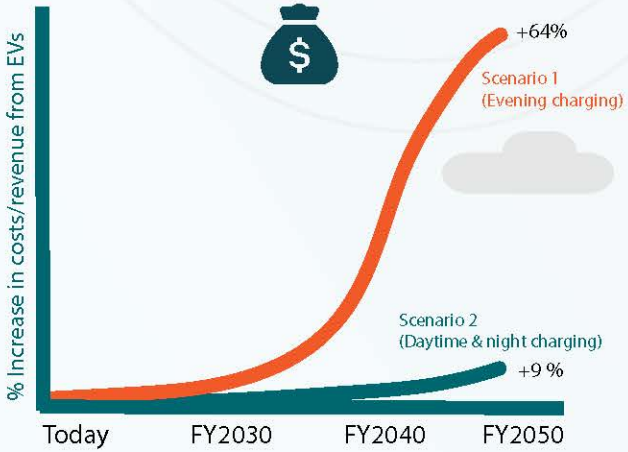
UNPACKING THE DYNAMICS AT PLAY

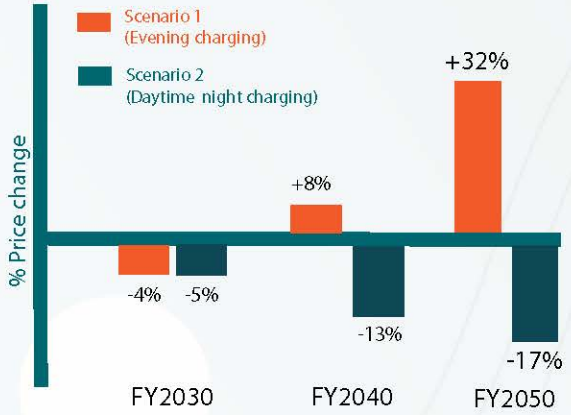
Our app looks at how much more you will pay for each unit of electricity you consume ($/MWh) when electric vehicles start to gain momentum. This is the best way to ask if you are getting better value for your electricity service.

? So how to measure price impact?

% Increase in energy sales − **% Increase in costs/revenue** = **% Decline in average price**





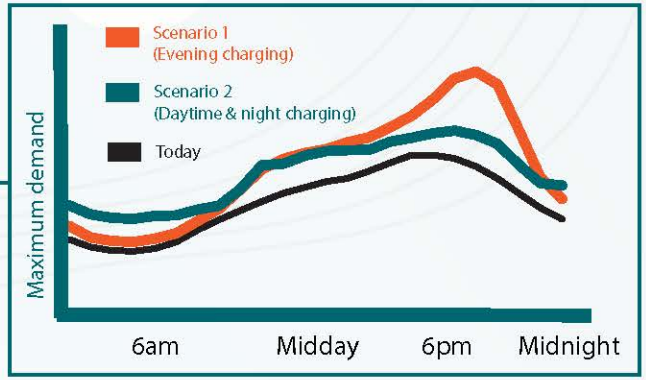


In Scenario 1, we have evening charging, with little charging being delivered from household solar and batteries. This maximises sales from the grid.

In Scenario 2, we have day and night time charging, with more customers using their own solar and batteries to charge. Also charging during the day gives more opportunities to use solar. So this reduces energy sales from the grid.

In Scenario 1, charging most occurs in the evening without support of solar and batteries. This is when the network is most stressed. To meet the extra congestion, networks upgrade infrastructure, increasing the asset base, leading to higher returns on capital.

In Scenario 2, customers are charging more in the day and overnight,when the network has spare capacity. Charging in the day allows for more charging from solar, and some of the additional peak can be met through batteries. While sales are higher, upgrades are minimised.



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BENEFITS VARY ACROSS NETWORKS

NETWORKS WITH LOW ASSET BASE VALUE, PEAKY DEMAND AND HIGH EV TAKE UP MOST AT RISK OF PRICE SHOCKS UNDER EVENING CHARGING

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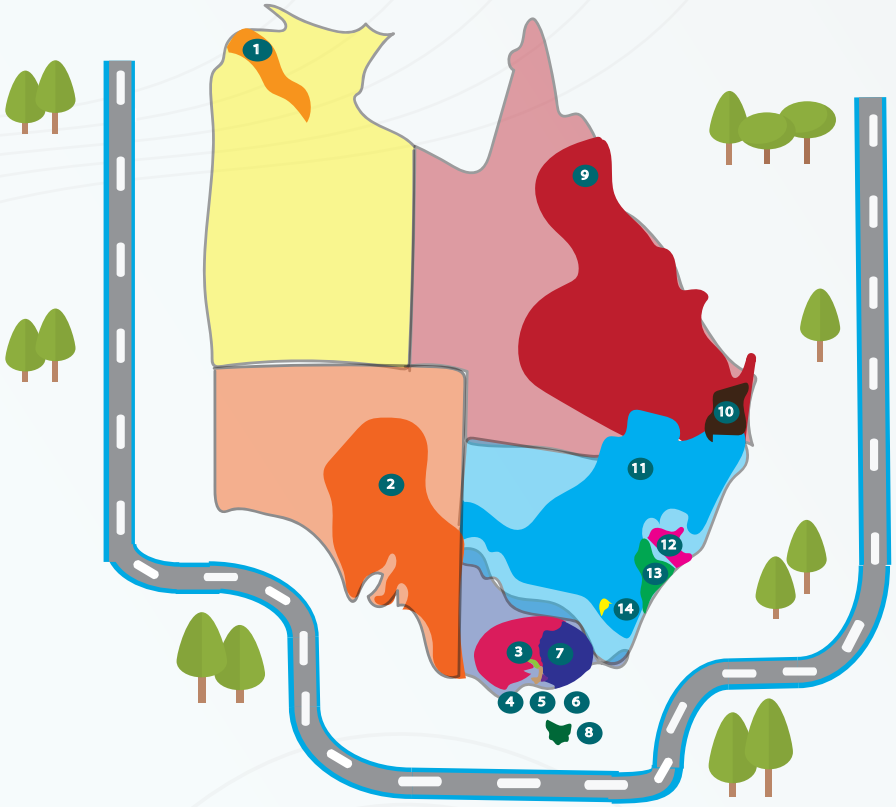


1 NT - Power and Water (Darwn)

0.14m EV

25% increase in underlying energy

$96 network price today ($/MWh)

$120 +25% network price in 2050 under evening (peak) charging

$85 -12% network price in 2050 under day and overnight charging

2 SA - South Australia Power Networks

1.40m EV

32% increase in underlying energy

$80 network price today ($/MWh)

$130 +63% network price in 2050 under evening (peak) charging

$69 -14% network price in 2050 under day and overnight charging

3 Vic - Powercor

1.76m EV

40% increase in underlying energy

$60 network price today ($/MWh)

$89 +48% network price in 2050 under evening (peak) charging

$45 -25% network price in 2050 under day and overnight charging

4 Vic - Jemena

0.73m EV

43% increase in underlying energy

$61 network price today ($/MWh)

Data unavailable

5 Vic - United Energy

1.44m EV

46% increase in underlying energy

$56 network price today ($/MWh)

$90 +60% network price in 2050 under evening (peak) charging

$40 -29% network price in 2050 under day and overnight charging

6 Vic - Citipower

0.71m EV

30% increase in underlying energy

$51 network price today ($/MWh)

$49 -5% network price in 2050 under evening (peak) charging

$41 -21% network price in 2050 under day and overnight charging

7 Vic - AusNet

1.57m EV

52% increase in underlying energy

$78 network price today ($/MWh)

$101 +29% network price in 2050 under evening (peak) charging

$55 -30% network price in 2050 under day and overnight charging

8 Tas - TasNetworks Distribution

0.53m EV

26% increase in underlying energy

$56 network price today ($/MWh)

$81 +46% network price in 2050 under evening (peak) charging

$49 -13% network price in 2050 under day and overnight charging

9 Qld - Ergon Energy

1.71m EV

31% increase in underlying energy

$97 network price today ($/MWh)

$145 +49% network price in 2050 under evening (peak) charging

$85 -13% network price in 2050 under day and overnight charging

10 Qld - Energex

3.34m EV

38% increase in underlying energy

$65 network price today ($/MWh)

$63 -3% network price in 2050 under evening (peak) charging

$48 -25% network price in 2050 under day and overnight charging

11 NSW - Essential Energy

1.80m EV

33% increase in underlying energy

$78 network price today ($/MWh)

$129 +66% network price in 2050 under evening (peak) charging

$68 -13% network price in 2050 under day and overnight charging

12 NSW - Ausgrid

3.44m EV

31% increase in underlying energy

$67 network price today ($/MWh)

$74 +10% network price in 2050 under evening (peak) charging

$52 -22% network price in 2050 under day and overnight charging

13 NSW - Endeavour

2.02m EV

28% increase in underlying energy

$52 network price today ($/MWh)

$61 +17% network price in 2050 under evening (peak) charging

$42 -19% network price in 2050 under day and overnight charging

14 ACT - Evo Energy

0.34m EV

23% increase in underlying energy

$93 network price today ($/MWh)

$108 +16% network price in 2050 under evening (peak) charging

$80 -14% network price in 2050 under day and overnight charging

LEGEND

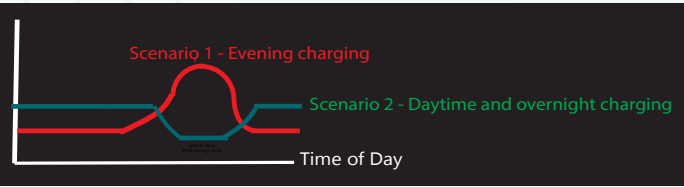
= Electric Vehicles by 2050

=Increase % in underlying energy

= Network price today ($/MWh)

= Network price in 2050 under evening (peak) charging

= Network price in 2050 under day and overnight charging

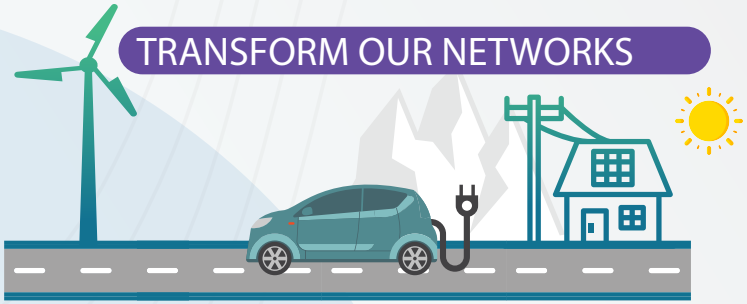


MAXIMISE THE BENEFITS OF EVs

ELECTRIC VEHICLES PROVIDE A ONCE IN A GENERATION OPPORTUNITY TO LOWER ELECTRICITY PRICES, AND CLEAN UP OUR ENVIRONMENT.

MAXIMISE EV TAKE UP

TRANSFORM OUR NETWORKS



1 IMPROVE EV TECHNOLOGY

- REDUCE MANUFACTURING COSTS
- IMPROVE DRIVING RANGE
- FUEL EFFICIENCY

2 PROMOTE EVS

- GOVERNMENT R&D
- PUBLIC FLEET ELECTRIFICATION
- REDUCE TAXES ON EVS

3 PRICING INCENTIVES

- CHEAP TARIFFS IN THE DAY AND OVERNIGHT
- EV SPECIFIC TARIFFS WITH TIME OF DAY PRICING

4 INFRASTRUCTURE

- PUBLIC CONNECTION POINTS
- ACCESS TO SUPER FAST CHARGING

5 RENEWABLE INTEGRATION

- COMMUNITY BATTERIES TO MEET PEAK DEMAND
- SMART SYSTEMS TO MAXIMISE SOLAR EXPORTS

CALCULATION STEPS FOR THE EV APP

Total vehicles today in network

× Annual vehicle growth rate in state

× Percentage of vehicles that are EV

= **ELECTRIC VEHICLES ON ROAD IN 2050**

Kms travelled by typical vehicle today

× Energy consumed by typical EV

× Fuel efficiency improvement

= **CONSUMPTION FOR EACH EV**

Electric vehicles on road in 2050

× Consumption for each EV

= **INCREASE ENERGY SALES BY 2050**

Annual EV consumption by 2050

↓ Daily EV consumption by 2050

↓ Daily charging profile of EV owners

↓ Daily charge by hour for EV

+ Maximum demand day by hour in 2020

− Demand met by solar and batteries

= **MAXIMUM DEMAND OF GRID IN 2050**

% increase in maximum demand

↓ % increase in network size

↓ % increase in RAB

↓ Impact of RAB on revenue

= **INCREASE IN REVENUE (%)**

Increase in energy sales by 2050

÷ Energy sales today

= **INCREASE IN SALES (%)**

Increase in revenue (%)

÷ Increase in sales (%)

↓ Today's network price

= **PRICE IN 2050 ($/MWH)**

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