So... what's my REAL range?

One of the first questions a new EV owner asks is "What's its range?". But as Bryce Gaton explains, that can be a difficult question to answer.

Range estimates for electric vehicles (EVs)—and for that matter, vehicles in general—have long been the source of frustration and contention. For the same EV, the published driving range can vary by 30% or more, depending on the country in which it is sold.

Given that it is unlikely that drivers are all that different, this means some of those estimates are either way too low or way too high! (Table 1 demonstrates how dramatically these figures differ for several popular EV models.)

So which estimates are right, and which are wrong? Perhaps more importantly, which ones bear the closest relationship to what an average driver can expect in real life? By the end of this article, you'll be able to assess the accuracy of EV range figures, and also work out what sort of range to expect when you actually take your EV out onto the road.

It depends on who you ask...

First, although it might sometimes appear that way, government-mandated range estimates—as provided by manufacturers and websites—are not plucked from thin air.

In fact, they're derived through one of three international testing standards, and the question of which one has been used in providing the range figure for your EV is the single most important consideration in assessing that figure's accuracy.

The three tests are:

- NEDC (New European Driving Cycle);
- WLTP (Worldwide Harmonised Light Vehicle Test Procedure); and
- US EPA (Unites States Environmental Protection Agency).

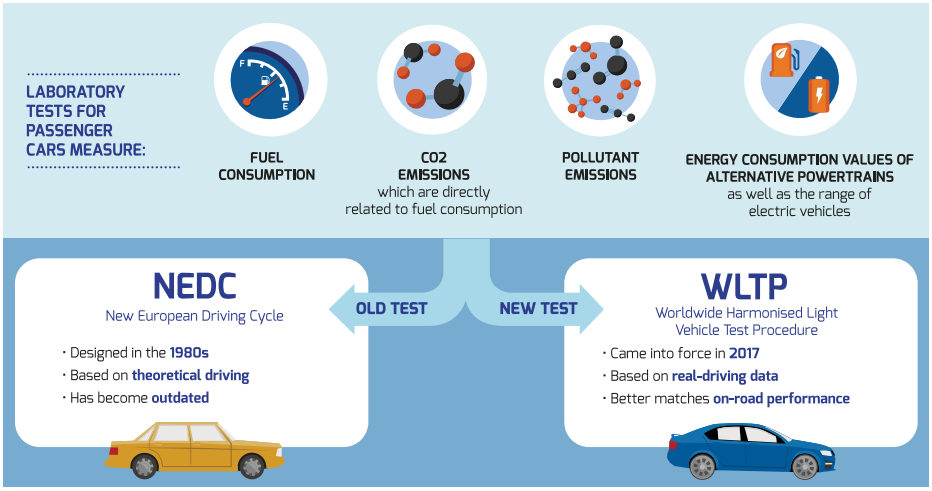
These three test cycles vary in the proportion of city and country driving included, and also in defined climatic conditions. The European test cycles—both the NEDC and the WLTP—tend naturally to favour inner city and suburban driving, whilst the US EPA tests include more outer suburban and highway driving trips.

NEDC is the older of the European standards, and became notorious for producing range figures that were around 30% above distances actually achievable in real life—particularly so towards the end of its reign. This was partly to do with the NEDC test cycle becoming too settled, as well as being too based in theory: the test is carried out in a laboratory and uses outdated theoretical driving models (developed in the 1970s!) rather than actual real-world data.

Together, these two factors led to auto manufacturers becoming quite adept at gaming the system by producing cars optimised to the tests. (And don't forget Volkswagen's outright cheating of the test

Vehicle	NEDC	WLTP	US EPA
Nissan Leaf 40kWh	315	285	243
Hyundai Kona 64kWh	557	484	413
BMW i3	359	310	245
Renault Zoe	403	300	(Not sold in USA)

Table 1: Comparison of test cycle range estimates for vehicles sold in multiple countries. All figures are in km.



An overview of the differences between the NEDC and its replacement, the WLTP.

Source: wltpfacts.eu

> *Our outdated fuel quality and fuel economy standards mean our windscreen sticker range estimates (as well as those [in] the Australian Green Vehicle Guide) ... are wildly over-optimistic.*

cycles in the 2015 scandal that became known as "Dieselgate".)

As a result of the perceived failings of NEDC, in 2017 Europe introduced the WLTP test cycle to provide better real-world driving range estimates for European driving conditions and usage. All new vehicles sold in Europe must now be rated using the WLTP standard. The graphics above and below set out how the test works, along with how it differs from the NEDC.

...on where you ask...

Sadly, here in Australia our outdated fuel quality and fuel economy standards mean our windscreen sticker range estimates (as well as those on the Australian Green Vehicle Guide website) are effectively the wildly over-optimistic NEDC ratings. This results in the quite understandable disappointment felt by some new EV drivers who cannot even get close to the ranges quoted.

As mentioned earlier, NEDC distance figures are around 30% greater than what an average driver can expect to achieve. So here in Australia, how can one find out what a realistic EV driving range is? This is where both the European WLTP and Environmental Protection Agency in the USA rating systems come in.

Through the application of the WLTP test cycles, European range estimates are now much closer to what drivers can achieve in the real world, but they do reflect the fact that European drivers do more suburban and inner city driving than their Australian counterparts (EVs are more efficient in stop-start city driving, due to regenerative braking, than at high speed highway driving—the opposite of ICE vehicles).

As such, they can still be optimistic for some Australian drivers, but if you don't travel much out of the inner to middle suburban areas, they will be pretty accurate for your needs. On the other hand, if you do more outer suburban and highway driving, it is well worth referring to the US EPA ratings.

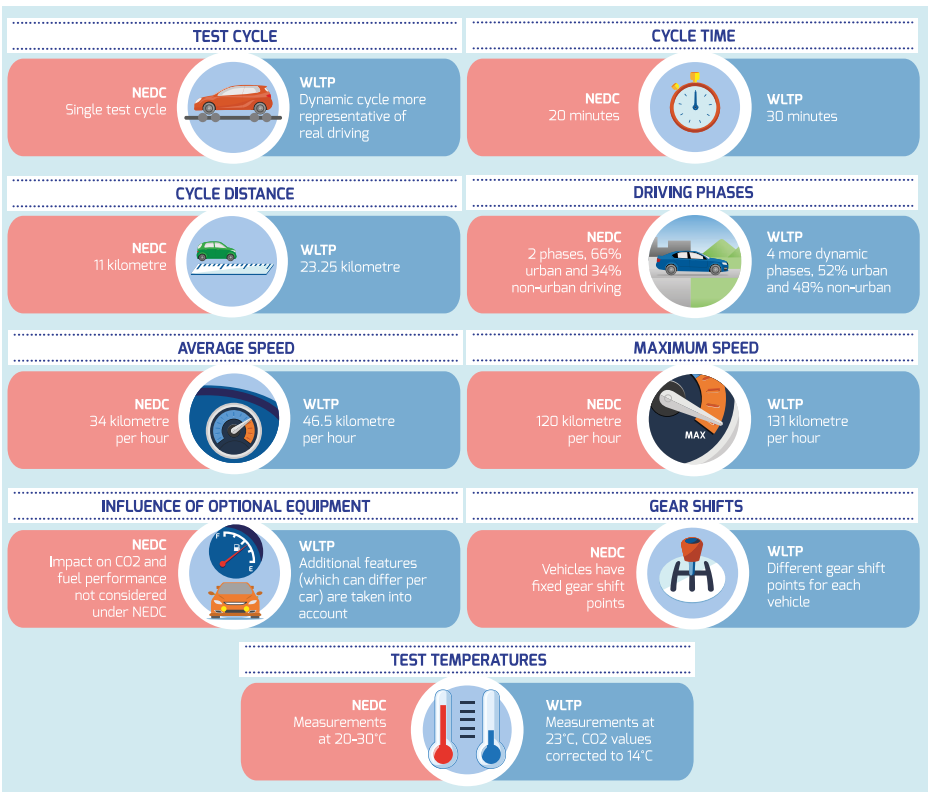
The US has long set its own very different set of vehicle consumption testing standards. The EPA tests have always been regarded as more stringent and realistic than the European ones—they involve testing cars on a glorified treadmill called a dynamometer—and US EV drivers report regularly that they can easily achieve (and even sometimes exceed) US EPA range figures.

...and how you ask!

In view of the above, I suggest three strategies to employ when researching the range of a new EV to buy, in order to ensure your chosen EV is likely to meet your driving needs:

- Step one

Check which test cycle was used to give the range estimate. If it's the NEDC or the current



More details on the difference between the NEDC and WLTP.

Source: wltpfacts.eu

Depending on how you measure it, this Nissan Leaf's range is either 243 km, 315 km, or somewhere in between. Happy driving!

Image: Nissan Australia

Green Vehicle Guide figure, subtract 30% for starters!

- Step two

Find the WLTP range estimate. To do this, check the manufacturer's advertising material—in the absence of a governmental mandate to use the WLTP for their official range estimate, manufacturers often quote the WLTP figure as well as the Australian mandated NEDC ones.

If the local website of the manufacturer of the car in which you're interested doesn't provide this information, try their website overseas—you can try either the manufacturer's global website or their European one.

However, when checking overseas websites, it's important to remember to check the fine print on the details of the car you're examining, and make sure you're making a like-for-like comparison—things like wheel and tyre sizes can vary from country to country.

You should also remember that, as discussed above, while WLTP estimates are closer to real world ranges, they're not perfect—they may still be up to around 10% too high if you venture onto the highway more often than the European WLTP standard allows for.

- Step three

Finally, if you do a large amount of highway travel and/or want a conservative estimate of the vehicle range, check the US EPA rating. Conveniently, the US EPA's testing covers almost all EVs available in Australia. (The exception is Renault, who do not sell vehicles in the US).

Concluding remarks

It is worth remembering that all of these test standards are still perfectly fine for comparison *between* vehicles. In other words, if the NEDC rating for Car A is higher than the NEDC rating for Car B, then all things being equal, you can expect Car A to go further before needing charging. However, you must always ensure you are comparing apples with apples; i.e. when making comparisons, always ensure you are using the *same* test cycle (NEDC, WLTP or US EPA).

Ultimately, though, fuel/energy consumption is a very individual thing. Getting a rating that reflects your individual usage is a bonus—but checking the rating system under which your chosen EV is tested, and doing as much research as possible before purchase, certainly helps avoid disappointment.

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Bryce is a member of the Melbourne branch of Renew and a committee member of the Australian Electric Vehicle Association.

RESOURCES:

WLTP facts
wltpfacts.eu

Australian Green Vehicle Guide
greenvehicleguide.gov.au

US EPA range comparisons
fueleconomy.gov/feg/findacar.shtml