LEGISLATIVE ASSEMBLY
FOR THE AUSTRALIAN CAPITAL TERRITORY

STANDING COMMITTEE ON PLANNING, TRANSPORT, AND CITY SERVICES
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Submission Cover Sheet

Inquiry into electric vehicle (EV) Adoption in the ACT

Submission Number: 65

Date Authorised for Publication: 8 September 2022

On electric cars

I wish that the ACT government takes the following into consideration. These are all matters that will contribute to a holistically sustainable and progressive approach to electric vehicle adoption in the ACT.

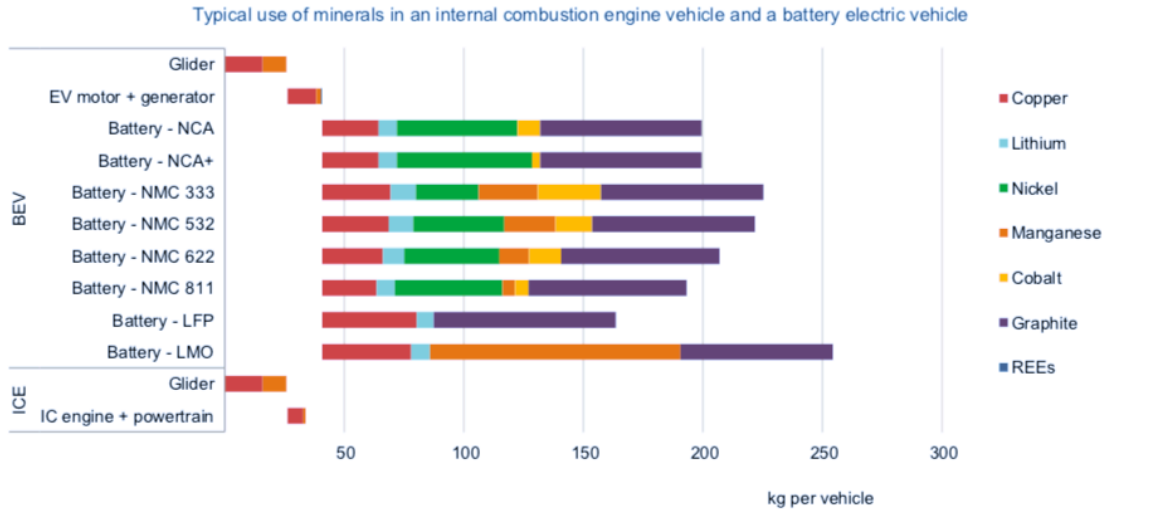
The best and most fair method for consumer payment **is for the consumer to pay for the amount of power needed to charge their vehicle at each charging**. This will best reflect the amount of use a vehicle actually gets: those who fail to economise with their vehicle usage and driving style will end up paying more.
With home chargers, this can be effectively accomplished by wiring them into the home meter. For **public chargers, they need to be capable of registering the amount of electricity a individual consumer uses. Free-of-charge stations are not equitable as they will subsidise excessive vehicle use and also pass the cost of the electricity usage and the vehicle itself onto those less able to afford them.**

The ACT needs to look carefully at a substitution method for the decrease of revenue that would come a with decrease in fuel excise (transferred from the federal government). Distance-based charging penalises those who live in outer areas (which are also often poorer and with lower property values) compared to those who live in the inner city. A higher registration fee would have the same effect and also not result in benefits to an individual from voluntary action. Fairness and equitability should weigh heavily on the mind those who need to draw up the mechanism to gain revenue for infrastructure. It goes without saying that a system that is more effective at delivering its functions does not require penalisation of competing systems, nor encouragement by government of *private* consumers. Smartphones did not supersede flip-out phones by the latter being taxed or the former being subsidised.
Cars, for example, had multiple advantages over horses. They did not leave excrement everywhere, they could not frighten and bolt, they did not need land to grow fodder or be exercised, they travelled quicker and did not have to be cared for daily. This made cars an option that democratised long-distance personal transport. They started out expensive, and yet a person of modest means living in the city could afford one as years went on in a way that a horse, needing land and fodder and servants, could never be afforded. Cars did not supersede horses by bans on horses or subsidies to consumers to buy cars. They won out because they proved ultimately superior at delivering their function, which is personal transport.

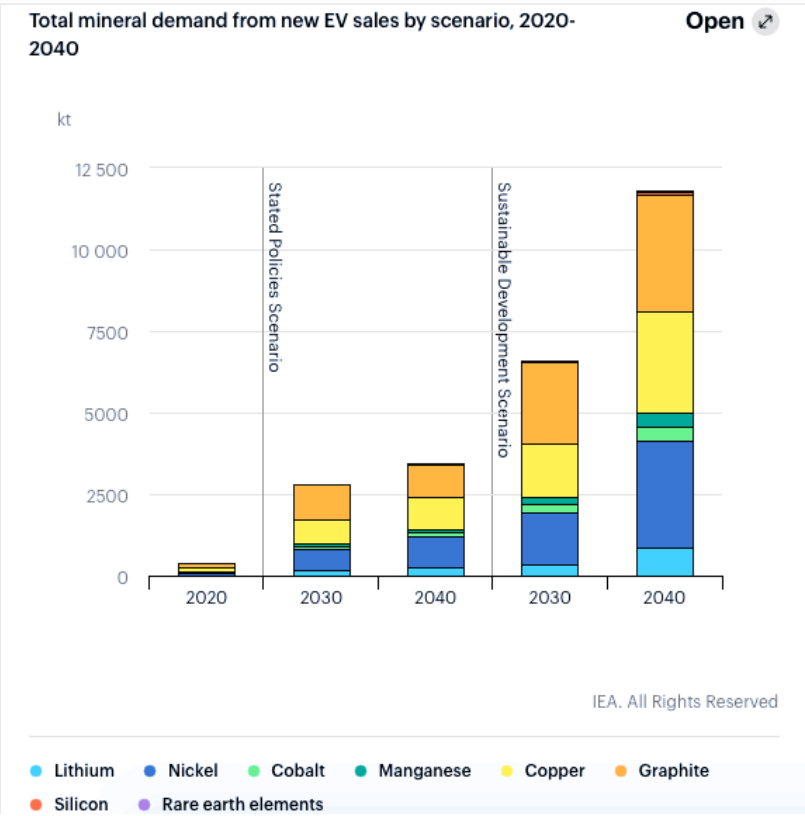
Industry development opportunities for electric cars need to be considered in a very broad context. **There is no point in verbally pledging to support an industry while the factors that are need to establish it remain obstructed**. For example, environmental impact laws: will they affect anyone who wants to establish a car factory here? It is noteworthy that many European countries such as Norway or Italy do not have the lengthy, burdensome environmental approvals processes that Australia or America have.

One example of this is minerals. The following charts from the International Energy Agency's study The Role of Critical Minerals in Clean Energy Transitions are shown below, detail their predictions for the requirements of minerals to enable electrification

EVs use around six times more minerals than conventional vehicles

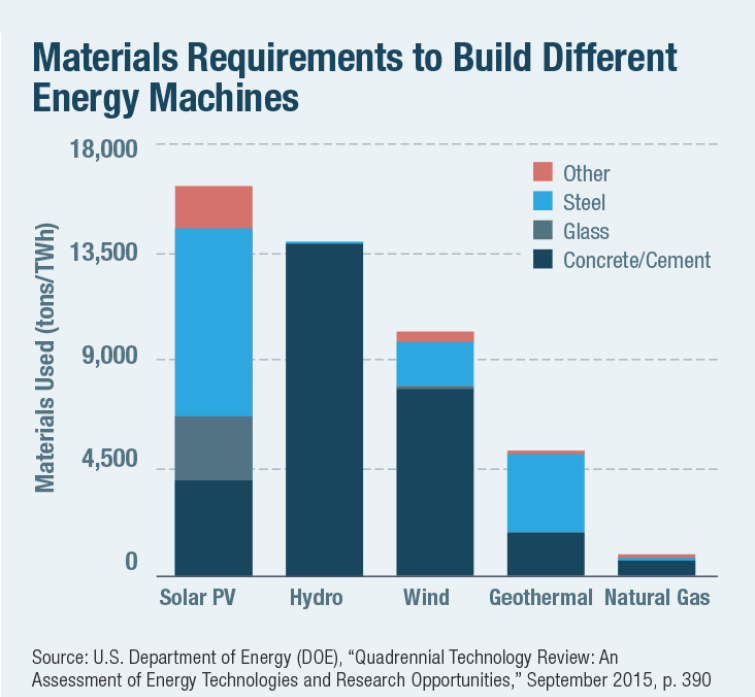


Notes: For this figure, the EV motor is a permanent-magnet synchronous motor (neodymium iron boron [NdFeB]); the battery is 75 kilowatt hours (kWh) with graphite anodes.
Sources: Argonne National Laboratory (2020b, 2020a); Ballinger et al. (2019); Fishman et al. (2018b); Nordelöf et al. (2019); Watari et al. (2019).



Given this demand, would the ACT Government be willing to support increased mining to enable it, **knowing that Australia has the world's second-largest reserves of cobalt and lithium**, for example. Would the ACT government be willing to lobby the Federal government to enable this energy transition?

This is also important because **renewables** are more material intensive (Mills 2020), **and** require more land area (Van De Ven et al., 2021)**, than non-renewables even as they produce much, much less carbon dioxide**. The **same goes for electric vehicles**, as the IEA charts above show.



Given that efficiency and improvement, not to count the massive increase in wealth over the past two centuries, has to do with getting more from the same or even from less, this would be a step backwards.

One may look at this next point and go 'wait, what?' However, I will explain why this is a reason:

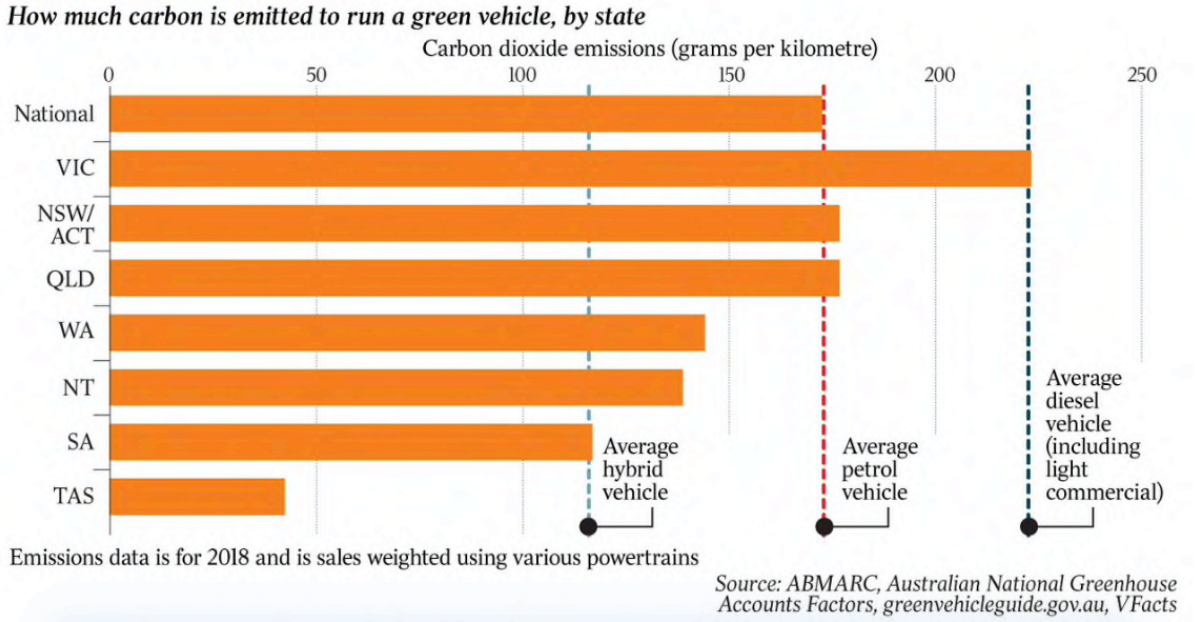
A good vehicle should be able when ten or fifteen years old to take one from Canberra to Mildura (800 km) in one day, with a full load for four or five people.

I have had a car, pre-owned, that has done this. The reason for this is thus: to be able to get out to the rest of the country, including the areas that are remote, rural, or otherwise out of the way is a positive social good. It connects one better with the land, and its history and inhabitants from before colonisation to the present day. One can also see the conditions of those on whom we depend to feeds us and often clothe us: if Canberra were to blink out of existence tomorrow, the effect on the country would be far less deleterious than if all the farmers and farms, or forests were to disappear. **To be able to travel easily makes one better able to connect with the country one does not experience in day-to-day life. It enables cultural exchange and experience, and the sort that does not simply go to fashionable tourist centres**.

To be progressive is to encourage greater mobility for all. In the past, aristocrats decried the ability of the then-new railways to enable the lower classes to travel, possibly to tourist spots or on journeys only the rich could experience before, or to and from homes

that weren't the slums or tiny rural cottages that characterised nineteenth-century Europe.

In 2019, ABMARC performed modelling of emissions produced by electric vehicles in each state (note that the ACT is combined with NSW as it is not separate on the national electricity market:



Note the only in two states did electric vehicles achieve emissions equal to or lower than a hybrid. Furthermore, ***the states with the greatest population and greatest generation capacity perform the worst***.
From this modelling and even taking into account improvements in carbon intensity since, one must therefore conclude:

> **Hybrid vehicles should be treated as equal to fully electric vehicles in terms of emissions reduction potential.**

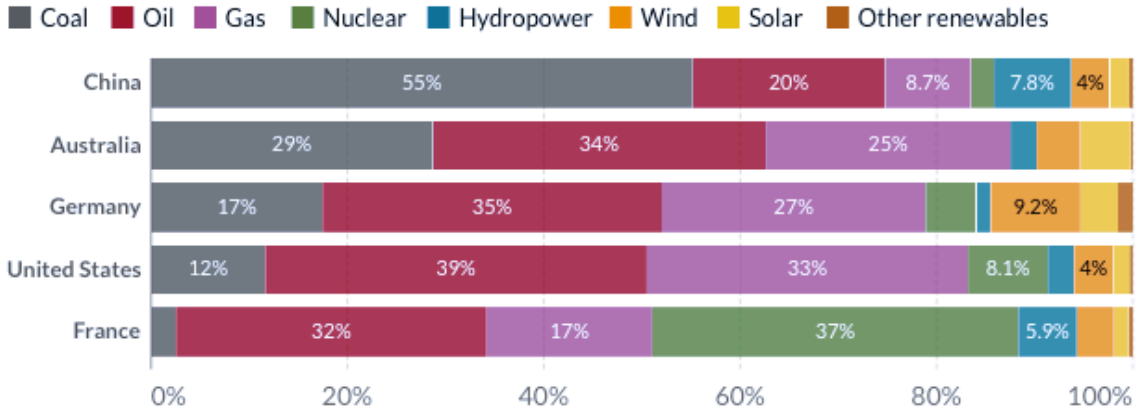
From the above, one can see that the source of electricity must be taken into account both during the manufacturing and use. For example, consider the follow countries: China, France, Germany and the United States as well as Australia:

Primary energy consumption by source, 2021

Primary energy is calculated based on the 'substitution method' which takes account of the inefficiencies in fossil fuel production by converting non-fossil energy into the energy inputs required if they had the same conversion losses as fossil fuels.

Our World in Data

Add country Relative



Source: Statistical Review of World Energy - BP (2022)

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1965 2021

Electricity consumption from fossil fuels, nuclear and renewables, 2021

Our World in Data

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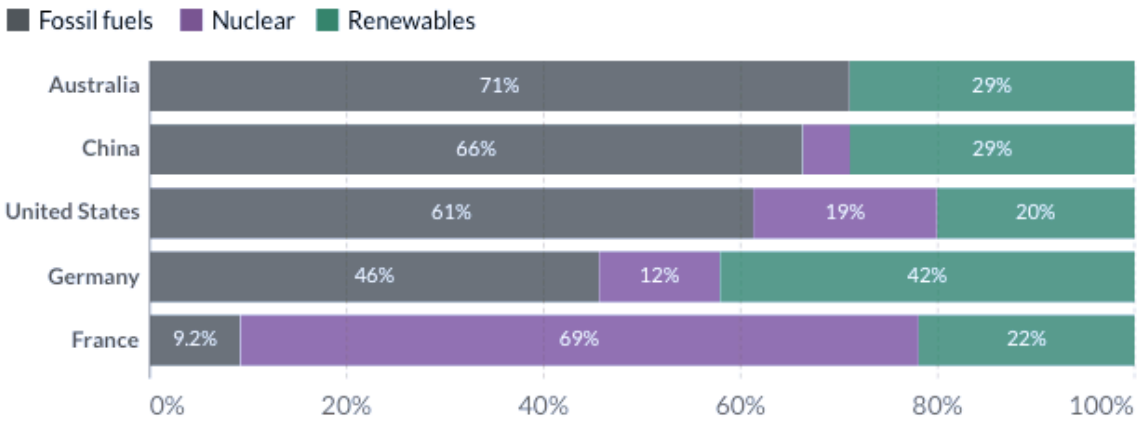

Source: Our World in Data based on BP Statistical Review of World Energy (2022) ; Our World in Data based on Ember's Global Electricity Review (2022). ; Our World in Data based on Ember's European Electricity Review (2022).
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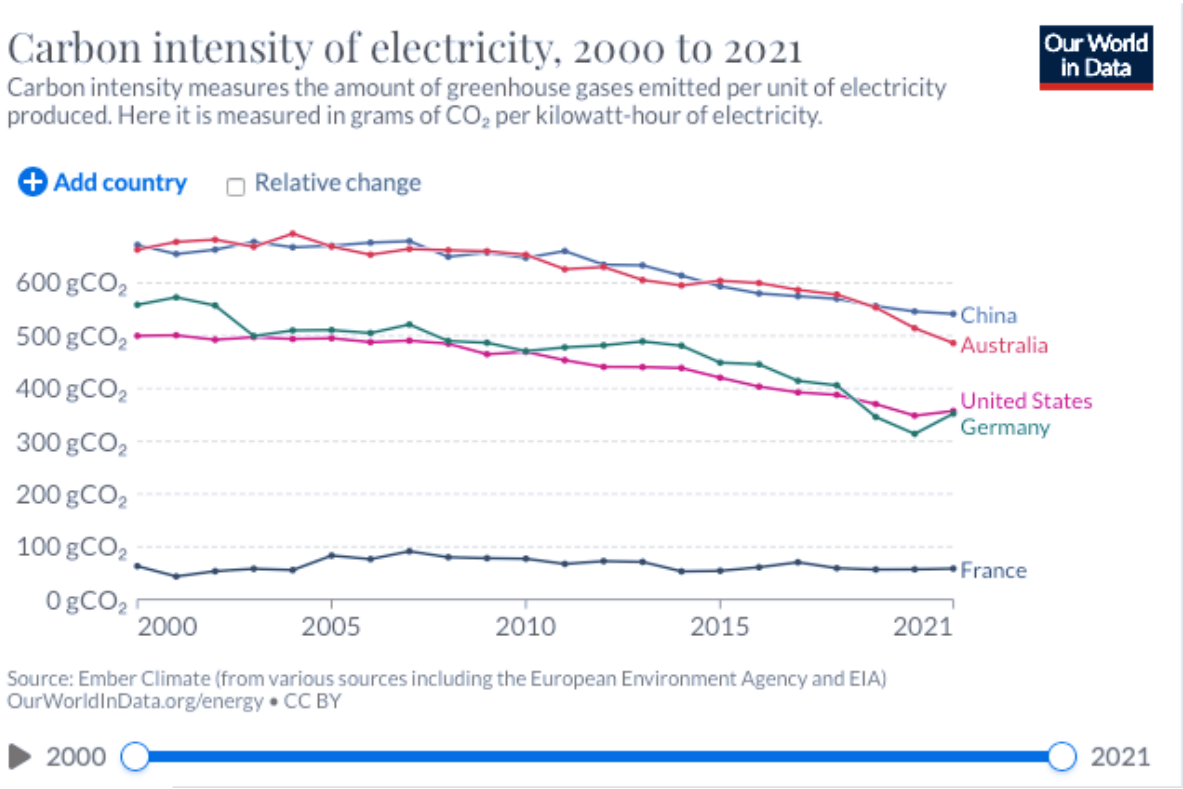
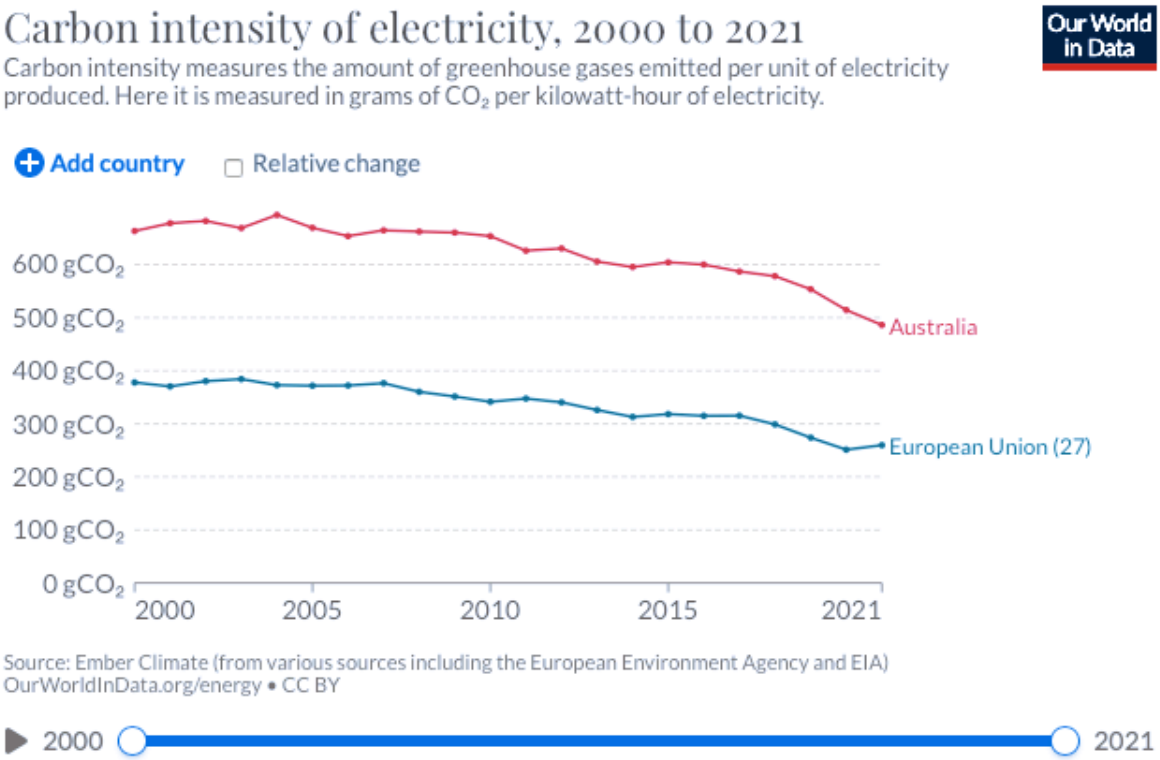
1985 2021



One should be easily able to see from the foregoing that any use of electricity is going to have vastly different implications for carbon dioxide emissions.
One may note that France's electricity has about one-sixth the carbon intensity of Germany's despite having half the proportion of renewables, due its heavy use of nuclear power. This environmental group (Environmental Progress, 2018) calculated that **had Germany invested the same amount in nuclear as in renewables, they could have completely decarbonised both electricity and car transport,** and *still* have been able to export power. Is the ACT Government willing to encourage such out-of-the-box and innovative measures?

Hawkins, et al., 2012, noted that an electric car would break even with a petrol-powered car after a distance of 80,000 kilometres on an 'average European electricity mix'. Comparing this to Australia's, we can see…



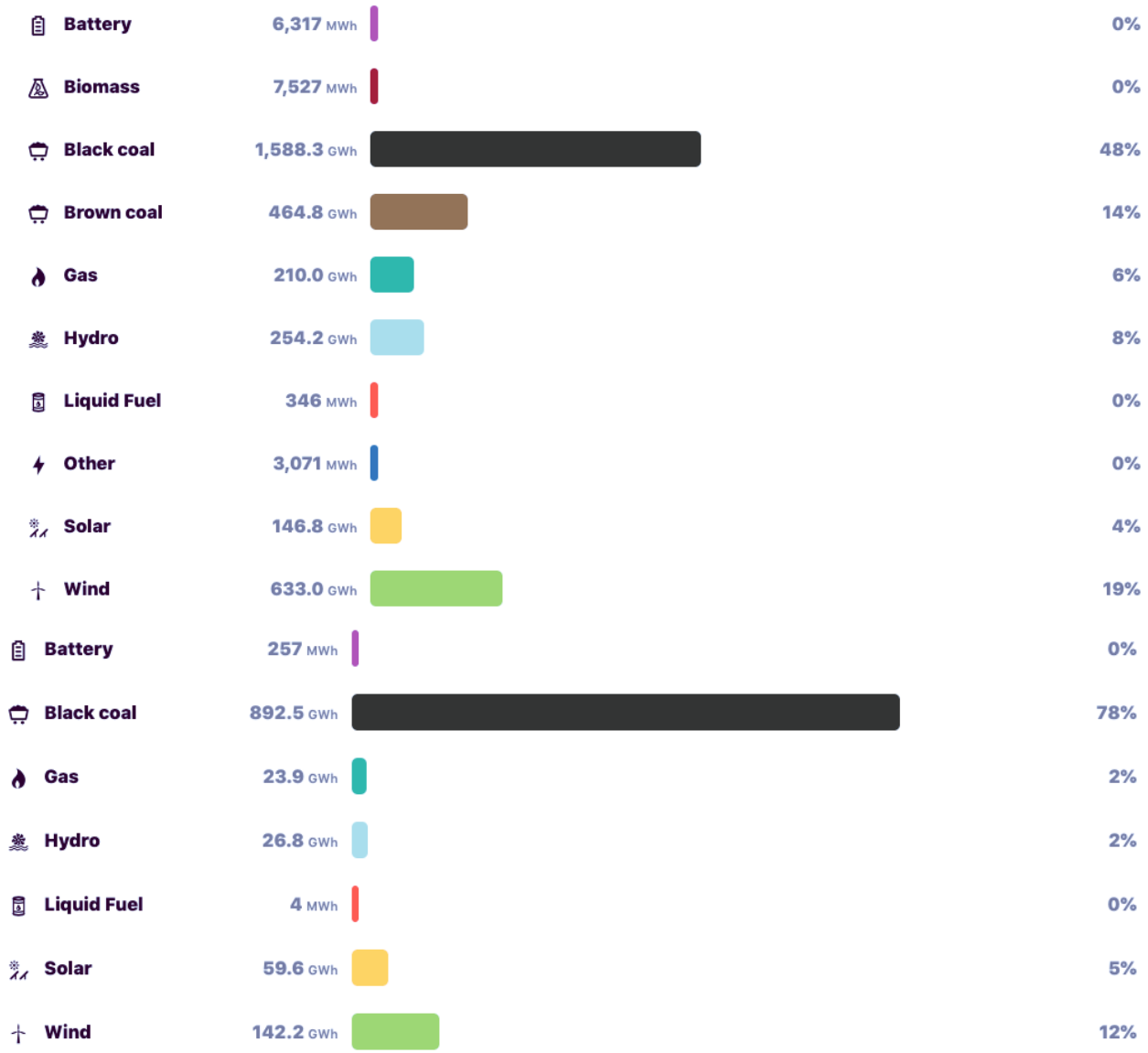
… that any use in Australia will have far less benefit (the uptick in European carbon intensity in 2021, a year marked by frequent energy shortages, is also interesting). Although that paper is old, the minerals amounts that IEA references above are from recent studies, and so the picture is unlikely to have changed enough.

A recent paper, Burton et al. 2022, examined hybrids and pure EVs with respect to US electricity by each state, and came to conclusions reinforcing those noted above:

> These rates [of emissions] are shown to be relatively independent of marginal demand at the highest marginal demand levels, indicating that they will be relatively insensitive to the addition of renewable electricity generation capacity up to the point at which curtailment occurs regularly unless the most carbon-intensive electricity sources are preferentially deactivated. […] **We find that currently there is no evidence to support the idea that BEVs lead to a uniform reduction in vehicle emission rates in comparison to HEVs and in many scenarios have higher GHG emissions**.

The paper discusses two recently released electric vehicles (Kia Niro and Hyundai Ioniq) and notes in the conclusion **that there is a trend to larger battery packs which actually serves to increase the advantages of a hybrid over a full EV in emissions reduction**.

Further to notes that ACT's buying habits will not affect the country as a whole: the ACT is a generator in only a very small way, and so the purchasing of renewable power elsewhere leaves less for other places and does not really influence the *proportions* of generation. Indeed, the National Electricity Market's statistics **do not separate the ACT from NSW**. Below shows the generation proportions of the nation as a whole over the last six months, and of NSW/ACT:



Furthermore, the energy and carbon intensity of electric car production is rather less likely to have changed than consumption, as much of the production does not take place in these places. Much of this production will be of components sourced from countries with poor environmental records, for example, lithium shipped from South American countries or cobalt from the Democratic Republic of the Congo to China for processing. Much metals processing takes place this way, shipped long distances, oftentimes to be processed in one manner somewhere, and then to have another stage take place on a different continent. **The whole supply chain needs to be considered for sustainability**.
For example, Hawkins et al, 2012 noted that **under all circumstances, the output of toxic pollution for the production of an electric vehicle is worse than that of an equivalent internal combustion powered vehicles**.

There are ethical issues to consider. To quote an article on this problem:

> "The world cannot mine and refine the vast amounts of minerals that go into batteries—lithium, nickel, cobalt, manganese, palladium, and others—at anywhere close to the scale for this rapid transition to electric vehicles (EVs) to occur. The dirty secret of the green revolution is its insatiable hunger for resources from Africa and elsewhere that are produced using some of the world's dirtiest technologies. What's more, the accelerated shift to batteries now threatens to replicate one of the most destructive dynamics in global economic history: the systematic extraction of raw commodities from the global south in a way that made developed countries unimaginably rich while leaving a trail of environmental degradation, human rights violations, and semipermanent underdevelopment all across the developing world."

'**Democratic Republic of the Congo**' should come to mind when one is thinking of the materials needed for a battery-powered future.

Therefore, to ensure the best outcome, the following is recommended:

> **The carbon intensity of the production and disposal of the vehicle including its components should be factored in to any judgement of its carbon dioxide emissions.**
>
> **Other sustainability factors and ethics need to be considered likewise**.

This will have the effect of supporting manufacturers that *source* and *produce* their vehicles and the components for them in a sustainable manner.

Competition effects manifest themselves in everything. **Electrification of everything will increase the intensity of electricity consumption**. Therefore, one should keep in mind that electric vehicles also compete against electric heating. Electric vehicles will compete against storage batteries for minerals. Furthermore, using the batteries in vehicles for grid stabilisation may have unforeseen effects: it will impose greater number of charging cycles on batteries and shorten their life.
One must also account for the ability of future electrical generation systems to take the strain of increased electrical demand. To quote the abstract of Capellan-Perez et al., 2019:

> A novel methodology is developed to dynamically assess the energy and material investments required over time to achieve the transition from fossil fuels to renewable energy sources in the electricity sector. **The obtained results indicate that a fast transition achieving a 100% renewable electric system globally by 2060 consistent with the *Green Growth* narrative could decrease the EROI [Energy returned on energy invested] of the energy system from current ~12:1 to ~3:1 by the mid-century, stabilizing thereafter at ~5:1. These EROI levels are well below the thresholds identified in the literature required to sustain industrial complex societies. Moreover, this transition could drive a substantial re-materialization of the economy, exacerbating risk availability in the future for some minerals.** Hence, the results obtained put into question the consistence and viability of the *Green Growth* narrative.

Of course, if one prefers a ‘degrowth’ position, this is all fine. Degrowth would also massively exacerbate social inequalities. It is a fundamentally regressive standpoint.

Also keep in mind that both Germany and California have very high electricity prices. California’s are the highest in the United States.

Ref:

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