LEGISLATIVE ASSEMBLY
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STANDING COMMITTEE ON ENVIRONMENT, CLIMATE CHANGE AND BIODIVERSITY
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Submission Cover Sheet

Inquiry into Renewable Energy Innovation in the Australian Capital Territory

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STANDING COMMITTEE ON ENVIRONMENT, CLIMATE CHANGE AND BIODIVERSITY

Inquiry into Renewable Energy Innovation in the ACT

ACT Legislative Assembly
Canberra ACT 2601

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Submission

Submitted by: David Glynne Jones
[redacted]

Submitted on: 14 May 2021

Scope of Submission

This submission:

- broadly addresses the Terms of Reference established for the Inquiry;
- considers:
  - the transport sector within the ACT
  - the transport sector servicing the ACT

Purpose of Submission

The purpose of this submission is to propose the establishment of an ACT Operational Hub for Renewable Energy Transport Innovation & Adoption (OHRETIA).

The purpose of the Operational Hub for Renewable Energy Transport Innovation & Adoption would be to:

- assist the identification and operational evaluation of innovations that will facilitate the ACT's effective adoption and transition to renewable energy transport
- coordinate & collaborate with other relevant organisations to assist the ACT in achieving the full spectrum of benefits – environmental, social & economic – from the transition to renewable energy transport
- reduce the costs and risks of transition to renewable energy transport
- inform & advise policy for the ACT's transition to renewable energy transport
- advise & assist operational policy implementation
- facilitate operational adoption of renewable energy transport in key sectors

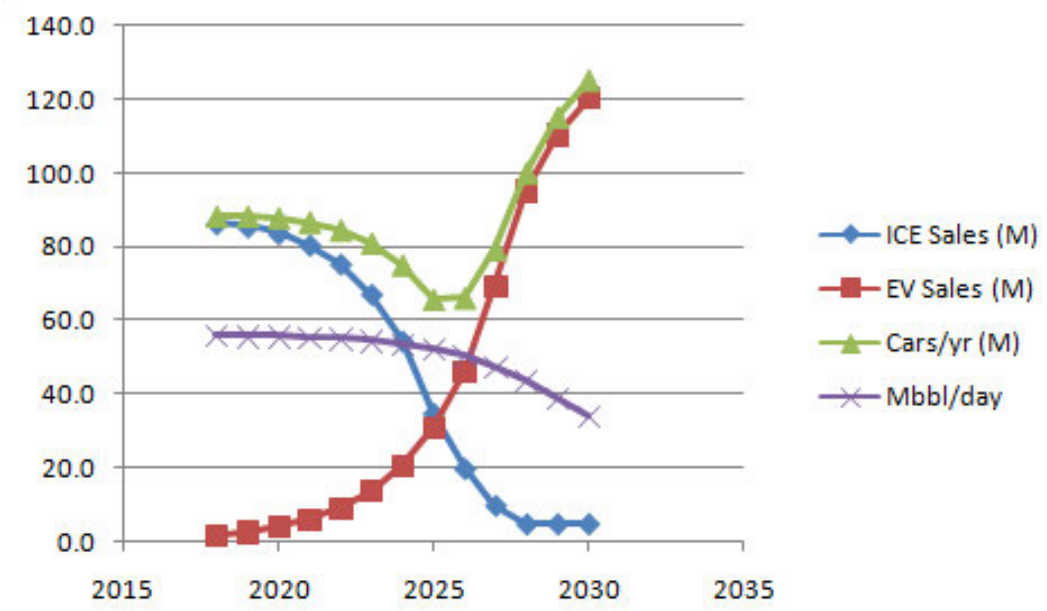
Submission

a. Overview

1. The transport sector dominates ACT GHG emissions (~ 60% in 2020).
2. The transport sector provides the single largest opportunity to reduce ACT GHG emissions quickly, with significant environmental, social and economic benefits.
3. The ACT is well-located for early evaluation and adoption of emerging and innovative renewable energy transport across key sectors including:
   - road
   - rail
   - air
4. The issues around effective transition to renewable energy transport to achieve optimal benefits at least cost and risk are complex.
5. The proposed Operational Hub for Renewable Energy Transport Innovation & Adoption would assist in clarifying key issues and reducing the complexity of relevant policy information and advice without sacrificing quality.

b. Renewable Energy Transport

1. For the purpose of this submission Renewable Energy Transport (RET) is broadly defined to include transport and energy technologies, assets, resources, services and systems that enable the utilisation of renewable energy for the transport function.
2. The global transition to renewable energy transport is accelerating. A decade ago the general view of the automotive industry was that the transition from internal combustion engine (ICE) vehicles to electric vehicles (EV) would be an evolutionary process over many decades.
3. The emerging consensus of independent analysts now is that the global automotive industry transition from ICE to EV is disruptive and will be substantially complete by 2030.



Source: EVs, Oil, And ICE: Impact By 2023 And Beyond (Ross Tessien)

https://seekingalpha.com/article/4225153-evs-oil-and-ice-impact-2023-and-beyond

4. A new analysis by Bloomberg New Energy Finance (BNEF) has found that electric cars and vans will be cheaper to make than combustion engine cars in every light vehicle segment from 2027 at the latest across Europe.

   https://thedriven.io/2021/05/11/new-bnef-analysis-finds-that-evs-will-be-cheaper-than-ice-cars-by-2027/

5. Major automotive manufacturers including VW, Audi, Mercedes and Volvo have already stopped the development of new ICE powertrains, in anticipation of ending ICE vehicle production by 2030.

6. Many countries have already announced their intention to end the registration of new ICE vehicles by 2030, and some countries have recently revised this forward to 2025.
7. Rapid and continuing improvements in battery performance and a 90% reduction in costs over the last decade have resulted in battery electric traction emerging as the dominant technology in electric road transport, and playing an increasingly significant role in other transport sectors including rail, aviation and marine.
8. A decade ago the consensus view was that, while battery electric traction would meet the performance and range requirements for light road vehicles, the heavy road transport sector would rely on developments in hydrogen technology.
9. A similar view dominated the rail sector, and “hydrail” (hydrogen rail) was the primary focus of renewable energy rail traction developments.
10. This view has shifted significantly in recent years, and it now appears that battery electric traction will be the dominant renewable electrification technology across both the road and rail sectors.
11. Battery electric road prime movers that can service the Canberra-Sydney, Canberra-Melbourne and Canberra-NSW SE region routes will be available within the next 2-3 years, with direct operating costs 20% lower than current diesel prime movers.
12. By the mid-late 2020s it will be possible to “electrify” the Canberra-Sydney rail route for both freight and passenger trains using battery electric traction, eliminating the need for expensive front-end investment in traditional overhead wire infrastructure while gaining the full benefit of access to low-cost renewable electricity.
13. Traction energy costs for battery electric trains will typically be in the order of 10-20% of current conventional diesel traction.
14. Battery electric traction is also emerging as the preferred technology for renewable electrification in the light, general and regional aviation sectors.
15. Electric commuter aircraft with a range of up to 800km could be operating by the mid-2020s, and battery developments could see this range increase to ~ 1500km by 2030.
16. Early indications are that the direct operating costs (energy + maintenance) of electric aircraft will be around 30-35% of direct operating costs for comparable ICE aircraft using fossil fuels.
17. Aircraft manufacturers are planning to introduce electric regional airliners to the market by the early-mid 2030s.
18. Battery electric traction is now well-established as the preferred renewable electrification technology for the inshore and coastal shipping sectors.

19. The capacity of battery packs in electric vehicles is increasing rapidly, and the future battery capacity of regional and national electric transport fleets will be significant in relation to grid stabilisation requirements.
20. The ACT has a road transport fleet of ~ 350,000 vehicles. If 50% of this fleet is transitioned to battery electric traction by 2030, the aggregate storage capacity of the fleet will be in the order of 17.5 gigawatt-hours (GWh). If 5-10% of the fleet is grid-connected at any time using vehicle-to-grid (V2G) facilities, around 875-1750 megawatt-hours (MWh) of storage capacity could be available to provide grid services at marginal cost.
21. Assuming the ACT road transport fleet is fully transitioned by 2040, this could increase to around 2500-5000 MWh.

c. Environmental & social benefits

1. Elimination of transport-related:
    1. GHG emissions
    2. ICE exhaust emissions (urban health impacts)
2. Reduction of transport-related:
    1. Particulate emissions (eg brake dust)
    2. Thermal emissions
    3. Noise emissions

d. Energy efficiency

1. Renewable energy transport can achieve energy efficiencies 2 to 3 times better than fossil energy transport
2. In addition to eliminating GHG emission can also reduce aggregate sector energy consumption by an order of magnitude.
3. The very significant amounts of energy storage used for renewable energy transport will create synergies with grid renewable generation and storage.
4. Development of appropriate models of operation (eg charging strategies for heavy road and rail transport batteries between 1MWh and 50MWh) will contribute further to improved energy & economic efficiencies.

e. Economic efficiency

1. Renewable electrification has the potential to reduce transport energy costs by an order of magnitude, through:
    - reduction of primary energy costs (~ $40-60/MWh for renewable electricity vs $125-150/MWh for liquid fossil fuels at wholesale)
    - big differences in “tank-to-wheel” efficiency
        - petrol ICE ~ 25%

- diesel ICE ~ 35%
- battery electric traction ~ 80%

2. The Australian road transport sector (20 million vehicles) currently uses around 32 gigalitres of liquid fossil fuel (petrol + diesel) each year, at a wholesale cost in the order of $40 billion.
3. The ACT has a road fleet of ~ 340,000 vehicles (all types), with an annual wholesale cost for transport sector fossil fuels in the order of $500-700 million.
4. At projected wholesale renewable electricity prices by 2040 Australia's road transport energy costs could fall to less than $10 billion.
5. The commensurate reduction for the ACT would be to less than $150 million.
6. Fossil fuel used in the Australian and ACT transport sector is mostly imported, whereas renewable energy for the sector would be generated entirely within Australia, with a consequent improvement in the balance of trade and greatly improved transport energy security.
7. Transition to renewable energy transport has the potential to transform the ACT economy.

j. Operational Hub for Renewable Energy Transport Innovation & Adoption

1. The proposed Operational Hub for Renewable Energy Transport Innovation & Adoption (OHRETIA) would operate as part of a network of relevant government, industry, R&D, consumer and other organisations
2. Key roles would be to assist in:
    - reducing the complexity of policy information and advice with sacrificing quality
    - maximising transition benefits
    - reducing transition costs and risks
3. Where possible it would aim to complement and make good use of established capabilities (eg advanced energy & transport modelling), supplementing these where needed.
4. The organisation could be established initially with a relatively small staff complement, tasked with developing an initial plan of operations and identifying key tasks and objectives, in-house and external capabilities and relationships, and future capability, staffing and budgetary requirements.

David Glynne Jones

About the submission author

David Glynne Jones is an independent community advocate for the adoption of renewable energy technology across all sectors of the Australian economy.

In 2010 and 2011 he jointly coordinated the Canberra Electric Vehicle Festival, an event that introduced many thousands of Canberrans to modern mass-produced electric vehicles for the first time.

Since 2019 he has been collaborating with Derek Woolner in authoring and publishing articles on the implications of emerging energy technologies for defence policy, strategy and future acquisition programs.

David is currently assessing the operational and economic implications of emerging advanced battery technology for renewable electrification of the Australian transport sector and large-scale synergies with renewable energy generation and storage.