هيئة تنظيم الخدمات العامة

Authority for Public Services Regulation

'SPOTLIGHT ON' A Sustainable Future Series brought to you by

THE ANGLO-OMANI SOCIETY
الجمعية البريطانية العمانية

OBBC

Electric Vehicles in Oman – What is the outlook and what are the priorities for the Authority for Public Services Regulation

Ian Benfield, (Acting) Director of Strategic Development

During 2018 & 2019 the Authority for Public Services Regulation (the Authority) engaged international experts to advise on best practices for plug-in light-duty electric vehicles (PEVs) and provide a series of recommendations. Though it is not possible to summarise all of the issues raised in the report in this article, a number of the key findings are set out below, together with updates on recent progress in Oman, where these are known.

Though PEVs currently carry a higher upfront cost than conventional internal combustion engine (ICE) vehicles, the report suggested that:

- Even without the electricity price subsidies from which residential customers in Oman benefit PEVs would be expected to have lower fuel and maintenance costs relative to ICE vehicles and are likely to be attractive to drivers on an economic basis. With the existence of subsidies this benefit is increased;
- If PEVs are encouraged to charge during off-peak periods there could be medium term benefits to all electricity ratepayers through enhanced efficiency in the use of the electricity networks; and
- PEVs can reduce carbon dioxide emissions, improve local air quality, and reduce noise pollution.

Most importantly, the value proposition of PEVs is improving fast. Falling battery prices are reducing upfront costs and electric driving range is increasing. Automakers plan to begin selling more than 120 PEV models during the next few years and vehicles with an electric range exceeding 320 kilometers are already on the market. These include the first plug-in electric sports utility vehicles (SUVs), a popular vehicle segment in Oman. Reasonable forecasts (such as those from Bloomberg New Energy Finance) suggest PEVs will reach upfront price parity with ICE vehicles by 2024 or 2025 and PEV adoption forecasts continue to be revised upward, with forecasts of between ten and fifty percent of new vehicle sales expected to be PEVs by 2040.

Though wide-scale adoption may lag other markets, Oman will not be immune to these forces, regardless of whether Oman implements clear PEV policy targets. As PEV adoption increases in Oman, appropriate public and private charging infrastructure must be available.

PEV charging technologies are improving. At present, PEVs charge at 3 "levels." Level 1 uses a regular electric outlet and the charging connector, provided with the vehicle, provides up to 8 km of range per charge hour. This has been popular for home charging in the US and Europe and has been sufficient for relatively small vehicles, but may be too slow for larger vehicles and as battery capacity (and hence vehicle range) continue to increase. Level 2 uses higher powered (7 to 22 kW) electric vehicle service equipment (EVSE) and is popular for home, work, malls, cinemas, parks and hotels. Level 2 charging provides up to 100 km of range per charge hour and is expected to be the most common home charging facility in Oman. Level 3 (DC fast charging or DCFC) achieves an 80% charge in under 30 minutes. Level 3 facilities are however much more expensive and much less suitable for home use. Recently, "ultra-fast" DCFCs have been developed that can support 350 kW charging.

Despite the progress noted above, at the time of writing this article PEVs in Oman either face or are perceived to face a number of barriers, such as:

1. Lack of suitable PEV models (potentially a significant issue for Oman due to the preference for larger vehicles, the small size of the market and extreme heat conditions);
2. Insufficient charging infrastructure and driver range anxiety;
3. Limited awareness and enthusiasm; and
4. Upfront cost premium of PEVs compared with internal combustion engine vehicles.

The first of these may be argued to have delayed widespread PEV adoption in Oman for a few years, but is expected to diminish as larger vehicles become available in the GCC region. It is notable that most SUV manufacturers have now begun to release a range of new models in this market segment and this is expected to continue.

PEV customers charging vehicles in private locations typically pay regulated electricity prices. Some utilities in Europe and North America offer PEV-specific time-of-use (TOU) prices designed to be more attractive than default rates if charging is carried out during off-peak periods. In the Middle East, there are no specific rates for PEV usage and customer metering (especially in Oman) is generally inadequate to support such sophisticated pricing approaches. However, Oman has introduced TOU rates for large industrial and commercial customers and has plans to significantly upgrade metering infrastructure. As a result, there is the potential for PEV specific, or more general off-peak rates to emerge in the medium term future. In the meantime, given subsidised residential electricity pricing, home charging is likely to be quite

attractive compared with the running costs of an ICE vehicle.

Internationally, public charging facilities have been delivered by both public and private investment, with the latter provided by site hosts, automakers, or specialist electric vehicle service providers (EVSPs). The outcome for each jurisdiction is driven by the availability of direct Government financial support; the regulator's views on competition and its support for utility based investments. The presence of committed EVSPs that are expected to maintain installed assets over the long term is also a significant factor. In Oman, although facilities are still somewhat limited, it is now a requirement that new fuel stations on major public highways must include EV charging facilities and this has helped support the development of a range of facilities sufficient to enable the journey to Dubai to be made by PEV. At the same time, free of charge facilities are also available at an increasing number of hotels and malls.

These developments, combined with the primary expectation that (in common with experience in California and taking into account the nature of Oman's housing stock) most charging will take place at home, plus enhanced vehicle range and the further improvements in battery technology that are expected in the next few years, should act to reduce customer "range anxiety" in time. In turn, especially when combined with Government requirements to install facilities at new fuel stations, this should permit Oman to progress in a manner that supports the provision of facilities where they are driven by customer demand, rather than regulatory mandate. That customer demand will increase rapidly when price parity becomes a reality and the Authority is therefore working to ensure the electricity distribution companies have in

Internationally there is some debate in relation to the question of what service providers may charge for the use of their facilities and this is also a debate that may impact Oman in the future. Some charge a flat monthly fee, others bill drivers on the basis of kWh used, or parking time, or some combination. Most commonly, for example in Europe, California, New Jersey, Pennsylvania, Hawaii, Ontario, Jordan and Abu Dhabi, the charging fees of EVSPs are not licensed or economically regulated.

As a result, the Authority does not believe, given the present state of the market, the risks taken by providers of EV charging infrastructure and the fact that most customers are expected to charge at home (and so have a large element of choice) that it should intervene to regulate the prices charged by service providers.

Jurisdictions actively promoting PEV adoption do so in a variety of ways. Some have established PEV adoption targets whilst others have proposed bans on the sale of new internal combustion vehicles by a future date and these are driving development of the vehicles and infrastructure from which Oman can be a passive beneficiary. In addition, a number

of governments provide direct or indirect financial incentives to purchase as PEV such as rebates, tax credits or tax exemptions and these have been very useful in the period during which there has been a large gap between the upfront capital cost of EVs versus ICE vehicles. Furthermore, PEVs may also be exempted from vehicle registration or other government fees. In addition, access to dedicated high occupancy vehicle (HOV) lanes, waived bridge or road tolls, waived congestion fees, free or discounted parking, and preferential treatment in vehicle registration lotteries have also been used by Governments and related agencies to spur PEV adoption.

Cities, municipalities and states have also implemented building codes in relation to PEV readiness that have typically required home and/or commercial builders install conduit, wiring and electrical capacity sufficient to support Level 2 charging, though stop short of requiring installation of the EVSE itself. That will be an important issue for Oman to review as new building codes are developed.

Internationally, limited awareness and familiarity with PEVs has been a major barrier to consumer adoption. Many jurisdictions have made educational efforts through public agencies, automakers or non-profit organisations. 'Ride and Drive' events, dealership training, and programs to expand EV exposure through taxis, rental cars and government and commercial fleets have all played a role in this respect. For example, Japan, France, UK, US, China, Canada, Norway and Sweden all signed a Government Fleet Declaration in Morocco in 2016 to commit to varying levels of ZEV procurement, whilst Amsterdam and Dubai have recently incorporated PEVs into their taxi fleets. In Oman the Authority supported an Electric Vehicle Road Trip from UAE to Oman and return during early 2019, with the Executive Director making the keynote address to the eMobility Forum.

Other measures taken to improve the experience of PEV drivers include:

- Standardizing roadway signage and development of public databases to help drivers (and app developers) to locate public charging facilities;
- Regulations requiring that all charge points accessible to the public be usable by anyone without the need to enter into a pre-existing contract, offer non-discriminatory prices, and be compatible with all vehicles; and
- Restrictions on the use of PEV parking areas by ICE drivers and arrangements to ensure that PEV drivers only occupy spaces for the necessary or reserved period of charging time.

With respect to vehicle compatibility in Oman, the GSO Final Draft of Standards document lists the Type 2 European connector as the standard for AC connectors and it is likely that this will be deployed in Oman. Connectors utilized for DCFC are CHAdeMO, CCS, Tesla, and the Chinese GB/T connector. Because these differ by automobile manufacturer, the availability of both CHAdeMO and CCS EVSE will be necessary in Oman.

In some markets there are concerns in relation to the impact of PEV charging on power quality and the availability of sufficient network capacity to support, for example, widespread on street charging. However, such matters as phase unbalance are much less significant where load is primarily connected on 3-phase service, as in Oman.

Above all it is important to take account of the fact that the PEV industry is continuing to evolve. Barriers are reducing: customers are now more aware of PEV potential; dealers can be expected to bring new and more attractive models to market as price convergence continues; battery capacity is beginning to reduce range anxiety.

To conclude, Oman Vision 2040 sets out a compelling case for Oman's future. We intend to support the implementation of that vision whenever and wherever we can. Against that background the role of the Authority will be assessing how best to react and support as the roll-out is driven by customer preference based on economic fundamentals, by further technological innovation and by private sector know-how

and finance.

We will therefore:

Continue to share our thoughts, views and expectations with other Government and private sector stakeholders, such as dealers and infrastructure service providers;
Ensure that electricity distribution companies are ready to provide the local level networks to support customer home charging as demand grows and to reinforce those networks where necessary;
Work with the Government and distribution companies to ensure the provision of a sufficient highway charging network, that takes account of the enhanced battery range and charging times of today's PEVs and charging infrastructure, without restricting innovation or forcing investments that later end up as stranded;
Work with the Government to finalise standards of safety for charging infrastructure, using approaches already adopted across the GCC, where we can; and
In time, monitor the impact of PEV charging on our networks and on electricity demand via enhanced metering infrastructure and assess the case for implementation of price signals and other arrangements that incentivise customers to charge their vehicles during off-peak periods.