



energy

Development of Storage and its impact for Renewable Energy

Ray Noble – Consultant to APSE Energy, REA & WElink Energy on Solar, Storage & EV's

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GROWING THE RENEWABLE ENERGY ECONOMY

Storage Technologies

- Various technologies can be used to store electricity e.g compressed air, thermal, flywheels as well as many types of batteries
- Many of these technologies are still 10/20 years away
- However Lithium Ion battery technology developed, initially for phones and computers, is now being used to power Electric Vehicles.
- There will be NO Government subsidies for Storage.



Lithium Ion Battery development

- The Nissan Leaf had an initial range of 90miles per charge but this is now up to 155miles and heading for 200miles
- Charging times were 8 hours but now a fast charge in 30 minutes
- Just like Solar, mass production allows improvements in efficiency and rapid cost reduction
- Tesla brought performance EV's to the market with a 260mile range



Tesla

- Tesla introduced the Model 3 and 400,000 put down deposits for a car to be delivered in 2017. Complete shock to the Motor Industry who struggle with Dieselgate
- Tesla announced the of the building of the Giga plant to drive down battery costs
- Tesla also shocked the World of Energy by announcing they were going to offer Energy Storage for Buildings



Then Tesla announced Energy Storage offer

- Tesla products are Powerwall for small buildings and Powerpack for large buildings and Utility scale projects
- Most other battery manufacturers are following with rapid expansion, particularly those that supply the motor industry e.g LG, BYD, Samsung, Sony, etc
- BMW brought out the i3 and demand exceeded supply, range was 140mile now up to 200miles



Storage – benefits to Domestic Customer

- If a Domestic has a Solar PV Roof, then the electricity normally exported to the grid can be stored, yet still claim the deemed export tariff, but avoids drawing the stored quantity of electricity from the grid on an evening
- If no Solar then Storage provides no benefit as grid price is standard over full 24 hrs unless you have a white meter.
- But Smart meters will change everything



Example - typical

Solar Export on 50% at 4.85p/kWh
Grid price 15p

Storage – benefits to Commercial Customer

- Commercial customers have half hourly priced electricity
- Peak pricing if between 4.30pm and 7.30pm
- Moving electricity using Storage can reduce bills
- With Solar PV on the building it provides even more benefits as it avoids any exported electricity that would normally only attract a low daytime price. Even in poor Solar weather the battery can be topped up from the grid in daytime



Example of a Leisure Centre

Daytime grid price 5.97p/kWh

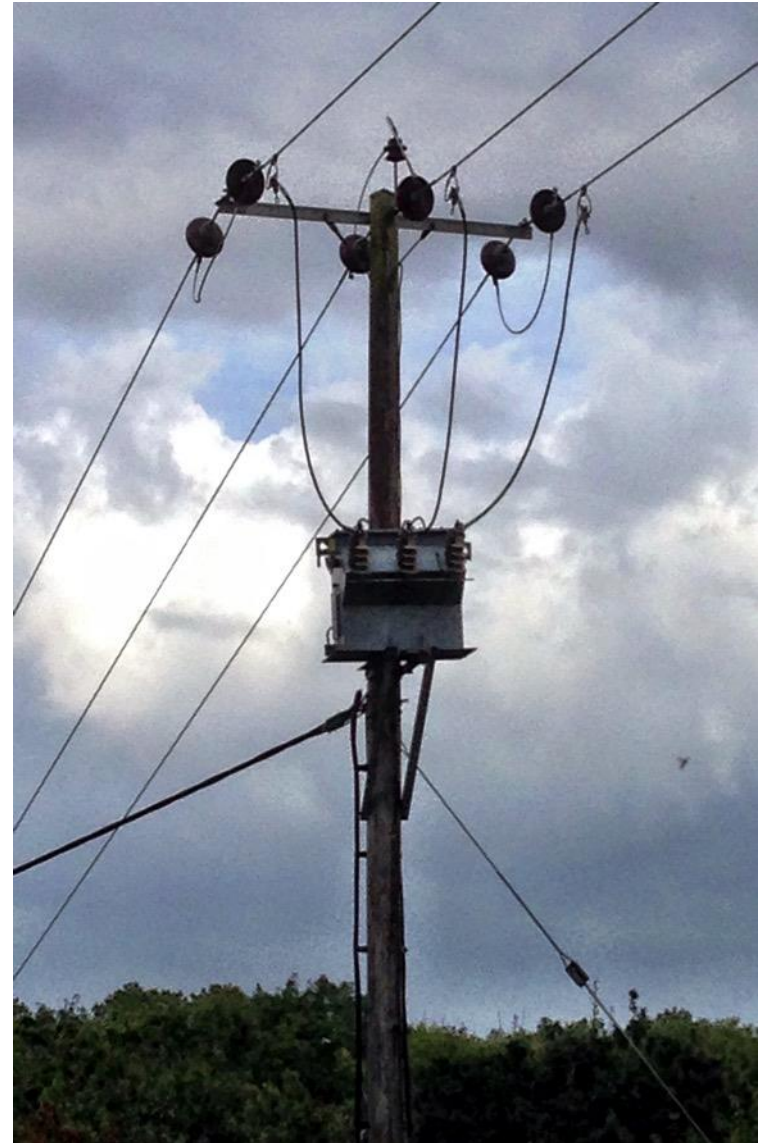
Evening grid price 5.13p/kWh

4.30 to 7.30 grid price 21.1p/kWh

Size and charge battery in daytime and avoid drawing any peak time electricity

Storage – benefits to Grid

- Storage of electricity in batteries provides many complimentary benefits to the grid
- Fast Frequency Response, Fast Demand Response, Voltage Control can help both National Grid & Distribution Network Operators manage their Grid and avoid costly upgrades
- As the deployment of Storage grows it will also provide Capacity support, avoiding the high cost of stand by generation

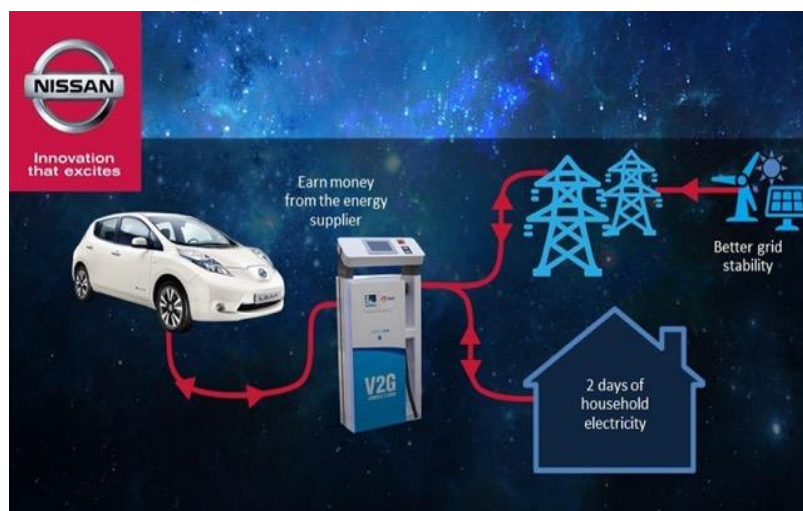
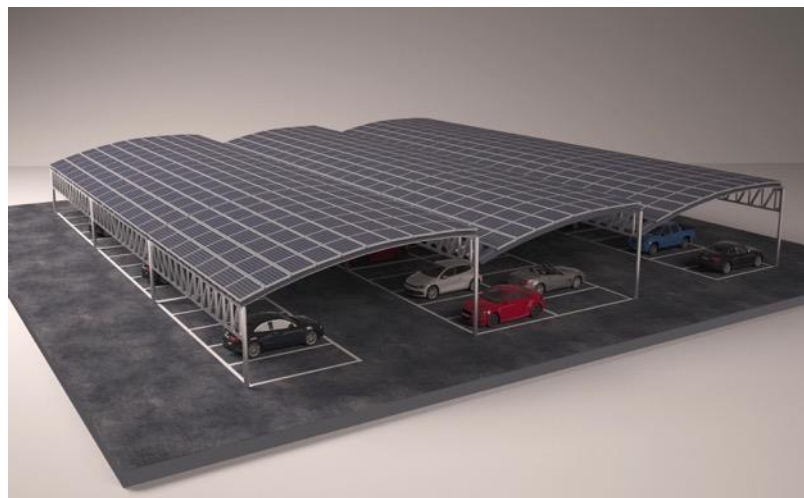


System Warranties and Prices

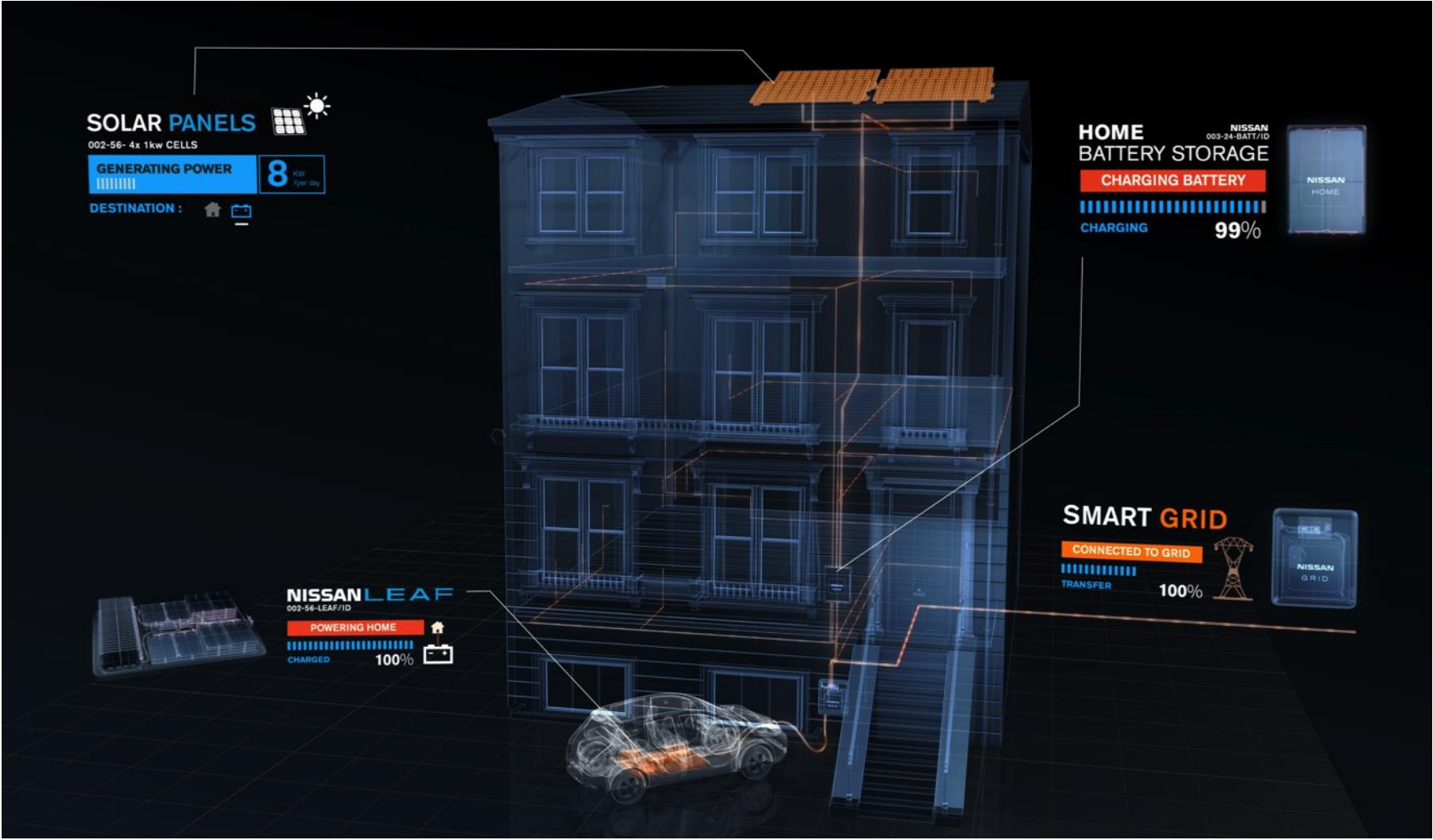
- Only purchase “Systems”
- Battery warranties are useless unless the battery is charged and discharged correctly
- Manufacturers are offering “Power Warranties” – output to be a minimum of 60% original at 10 years – developing industry
- Warranties only any good if backed by large parent company
- New market, many new players but attracting many cowboys
- Nissan offering Domestic system installed for £3k

To be clean EV's need Clean Electricity

- Fast charging presents some challenges to the grid – Storage will be used at fast charging points
- EV Batteries heading to provide a 350 mile range (no more range anxiety)
- Using Solar to charge EV's provide total clean transport
- Charge your car in daytime from Solar and power your house at night – this is the future.



Nissan now offering a complete solution



Other fast movers in Storage?

- Motor Industry never stands still and this year is launching Hydrogen Fuel Cell vehicles to selected markets (up to 450 mile range)
- Likely to be developed more for heavier transport particularly in Cities solving pollution problems
- Hydrogen transport infrastructure starting in some UK cities
- Often seen as the holy grail of Renewables, Hydrogen allows electricity to be transferred over very large distances



Where will Battery Technology take us?

- Batteries would be too heavy was the thought!!



Where will new buildings go now?

- Zero Carbon Buildings are not dead!
- Designed with Solar and Storage and also to link with EV's
- Visit Berkeley after September and see the future today
- Nothing will stop the Acceleration of Clean Technology



Thank You

Ray Noble

rn.solarbipv@gmail.com

