

Storage Options – Developments, Applications and The Way Forward

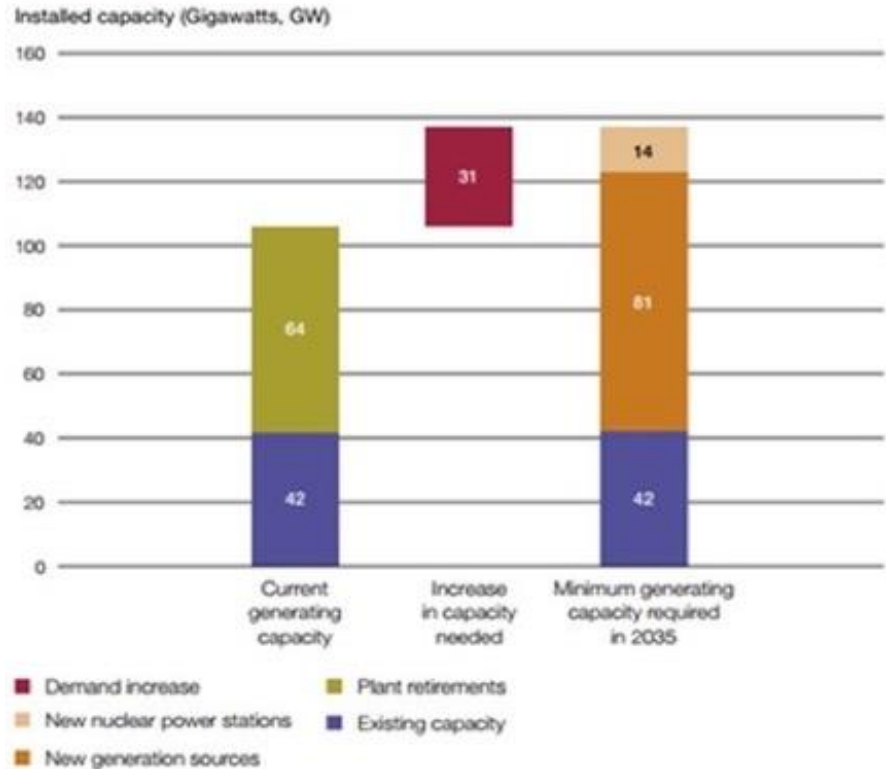
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Government's Energy issues (1)

- Years of no investment in energy
- Many power stations reaching end of life
- Grid requires upgrading
- Demand for electricity increasing

The UK's energy challenge up to 2035

The Department projects that electricity demand may increase at the same time that a large proportion of existing generating capacity retires



Notes

- 1 The Department projects a range of scenarios for the future of electricity generation. This figure uses the scenario based on its central estimate of economic growth and fossil-fuel prices and shows the generating capacity required to meet the Department's security of electricity supply and decarbonisation objectives.
- 2 The figure shows total installed capacity – the maximum electrical output that power generators can produce unadjusted for plant availability and outages.
- 3 New generation sources includes 17 GW from European electricity interconnectors.

Source: National Audit Office analysis of Department of Energy & Climate Change energy and emissions projections data

Government's Energy issues (2)

- Environmental rules have killed Coal
- Renewables now making a big impact, many being connected at the distribution end of grid
- Nuclear is expensive, few want to invest
- Biomass coming from Canada!
- Gas supply not guaranteed beyond 2035
- Government need an Energy Strategy



Government and Energy issues (3)

- Money and support funding is running out
- Market will have to decide – lowest price wins!
- Distributed Generation is happening
- What is the future value of a National grid
- Air Source heat pumps need electricity
- Transport now needs electricity (EV's & Rail)
- Cities are struggling with pollution issues



Industrial Strategy

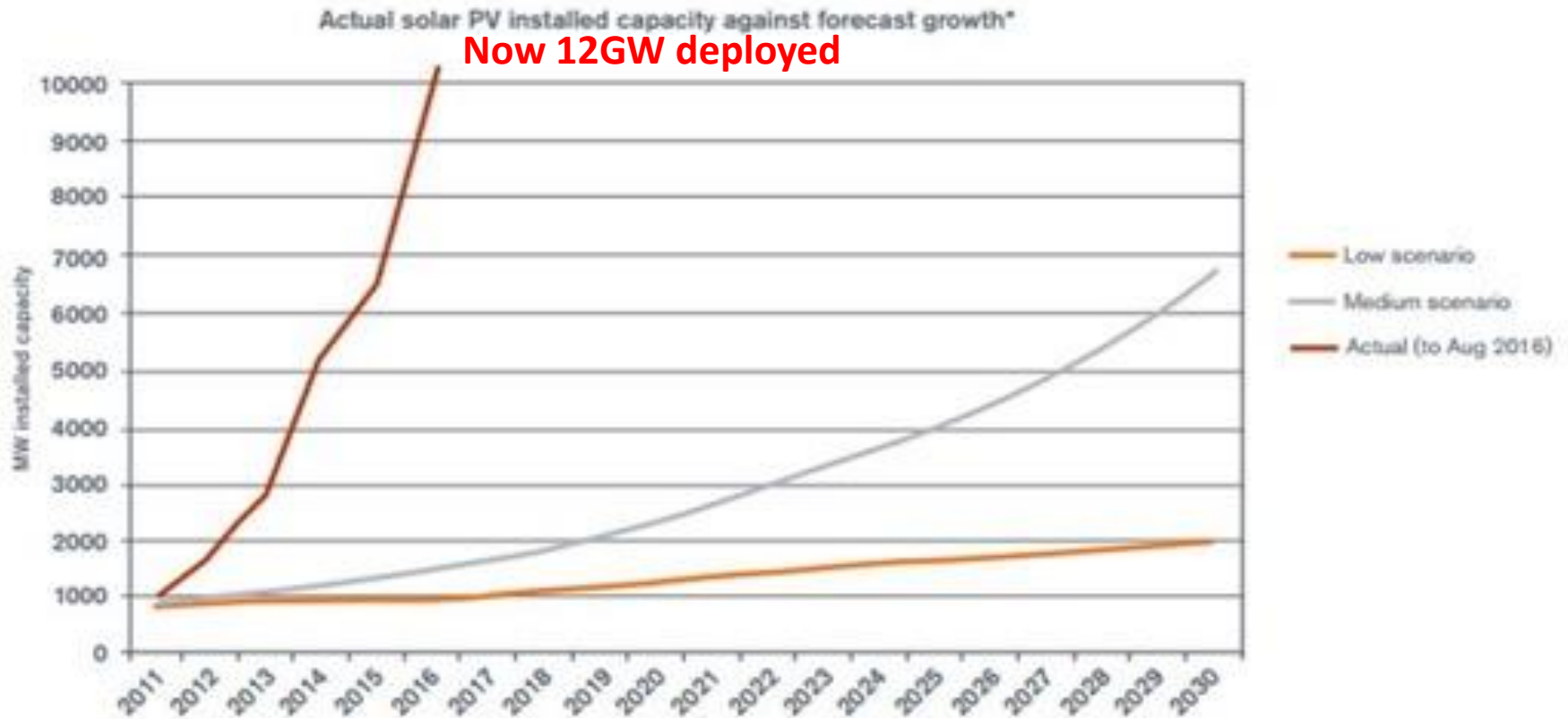
- Security of Supply is vital (particularly with Brexit)
- Must be competitive with other Countries on energy
- Wind (Onshore) and Solar will soon be the cheapest form of energy generation across the World
- Solar / Wind with Storage is a game changer
- Air Source, Ground Source Heat Pumps together with UK grown Biomass and AD all have a major part to play
- **Government must have a planned TRANSITION**
- Will Nuclear ever be built? Can we wait?
- What happens if Energy suppliers go bankrupt!
- What investment should be made in the Grid or Distribution System
- Storage allows off grid solutions to become a reality

Speed of Technology advancements

- Electronics Industry lead development for Phones and Computers developing smaller but more powerful batteries
- Motor Industry now developing the same technology to power Electric Vehicles
- This same technology is now entering the power industry at all levels, including buildings.
- All based around Lithium Ion battery technology



Global mass production drives down cost rapidly



* Low and Medium Scenarios come from the EA Technology 2012 report 'Assessing the Impact of Low Carbon Technologies on Great Britain's Power Distribution Networks'. Actual installed capacity is from DECC solar photovoltaics deployment data.

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energy

Storage price drop faster than Solar

Motor Industry flat out on EV's

- Nissan Leaf was first but had short range (85miles) and created “range anxiety”
- Tesla delivered a 260mile range and supercar performance
- Now all Car Manufacturers are introducing EV's across their full range by 2019
- Dieselgate has caused VW to rethink and strategy now is to be a market leader in EV's
- Motor Industry also working on Hydrogen Fuel Cell power



Motor Industry feels threatened!

- Tech Companies - Google, Apple, Amazon, etc – all looking at making cars
- Apple tried to buy McLaren!
- Saw Tesla come from no where to shares worth more than General Motors
- All involved in self driving car development
- Could either compete with Motor Industry or be part of the supply chain – as Intel did in computers cars could be powered by “Apple”



EV's are solutions to Pollution

- Ranges of 200 to 350miles are now possible (range anxiety will be dead!)- 500mile being a target
- Some talking of the end of new fossil fuel cars sales by 2025
- Charging of EV's now 30mins puts stress on the grid - 5min charge time is target - how can the grid cope!
- Talk of a ban on diesels and a scrappage scheme
- All delivery vans will soon all be electric



Emissions and Pollution solutions

- All City transport can be clean
- Fossil fueled City transport is on the way out
- Electric buses – even double decker's are now running
- Hydrogen Fuel Cell buses are also being developed
- Island ferry boats can now be powered by electric
- However we need a plentiful supply of clean electricity for transport to be “clean”



Fossil Fuels on their way out

- Charging EV's at home or locally (Supermarkets & Offices) with long runs topped up at Service Areas
- Grid will not cope with fast chargers and need Storage as an interface
- Increased supply of Solar and Wind electricity is essential
- Solar canopies over surface parking linked with Storage provides "clean" electricity



Smart Transport and Housing



Thank You

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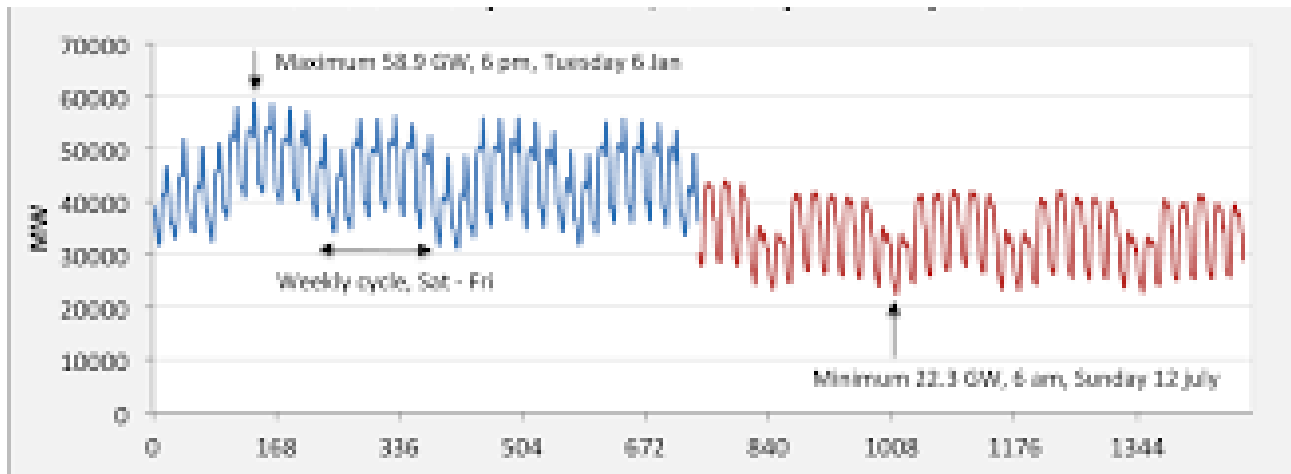


Issues for LA's to consider when investing in batteries, grid connectivity and capacity

Ray Noble – APSE Advisor

Energy Industry is changing fast

- Large amounts of Storage allows the variations between Winter and Summer demand to be levelled out
- At times in Summer we have too much electricity
- At times at night we have too much electricity
- DNO's and NG on learning curve!



Time of use tariffs & Smart meters are coming

- Time of use tariffs are going to be standard across all users, even domestic
- 4.00pm to 8.00pm is the highest charges (Red Zone)
- Using electric or charging EV's at this time should be avoided
- Storage provides a way of moving electricity and avoiding Red Zone costs
- Supply of electricity is getting smarter



“Fuel Poor”

- “Fuel Poor” will be hit by Smart Meters (time of use electricity)
- They tend to use lots of electricity at Red Zone times
- Government must prevent high bills to “Fuel Poor”
- Solar and Storage with Smart Controls in all Housing Association / Local Authority stock provides the answer
- Moving spare (cheap) electricity and store to when needed.



Provision for charging EV's

- New houses should be generators and provide EV charging points
- Retrofit program should be undertaken on existing houses with garages / drives
- Buildings should provide standard charging points for all parking spaces
- Fast chargers should be provided at Service areas and Filling stations



Start working out the opportunities

Cornwall's energy future

We will create an energy future that is cleaner and more affordable, retaining the social and economic benefits in Cornwall.



CORNWALL & ISLES OF SCILLY
LOCAL ENTERPRISE PARTNERSHIP



Cornwall has a wealth of renewable energy resources

Best wind resource in Western Europe

Best solar resource in mainland UK

Best geothermal resource in the UK

Huge potential for offshore renewables

32% of our electricity demand met by renewables in 2016

We will exploit this unique opportunity to...

Tackle energy inequalities

Making our homes, businesses and transport greener and more affordable.



Take local control of our energy

Generating, owning and using our energy locally to reduce bills.



Become a world-leading green economy

Retaining benefits in our communities and securing year round jobs.



but Cornwall is not benefiting and we currently spend £1bn a year on our energy

98% of our energy spend leaves the local economy

People are struggling to heat their homes

Public sector budgets and funding are reducing

Our economy is under performing

Our infrastructure is outdated

We will create an energy future that is cleaner and more affordable, retaining benefits in Cornwall

More money for our public services

Improved air quality

Lower bills

Warmer homes

Year round jobs in Cornwall

Thriving communities

Locally owned generation

Exporting our expertise

Reduced impact on climate change

Cleaner transport

2030 outcomes

Reduce fuel poverty to 5%

100% electricity demand met by renewables

30% of energy spend retained in the Cornish economy

50% locally owned generation

20% reduction in fuel bills

4000 green jobs

Thank You

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