

# Battery Storage and Planning Policy

14<sup>th</sup> November

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# Overview

- How can battery storage help tackle peaks in demand?
- The case for inclusion in planning policy
- Future work - energy projects at Merton

# Elon Musk's big battery for South Australia already half complete

Tesla boss said the project is a great example of how to replace fossil fuels with renewables

- [Elon Musk: SpaceX can colonise Mars and build moon base](#)



**Tesla**  
@Tesla



Hospital del Niño is first of many solar+storage projects going live. Grateful to support the recovery of Puerto Rico with

[@ricardorossello](#)

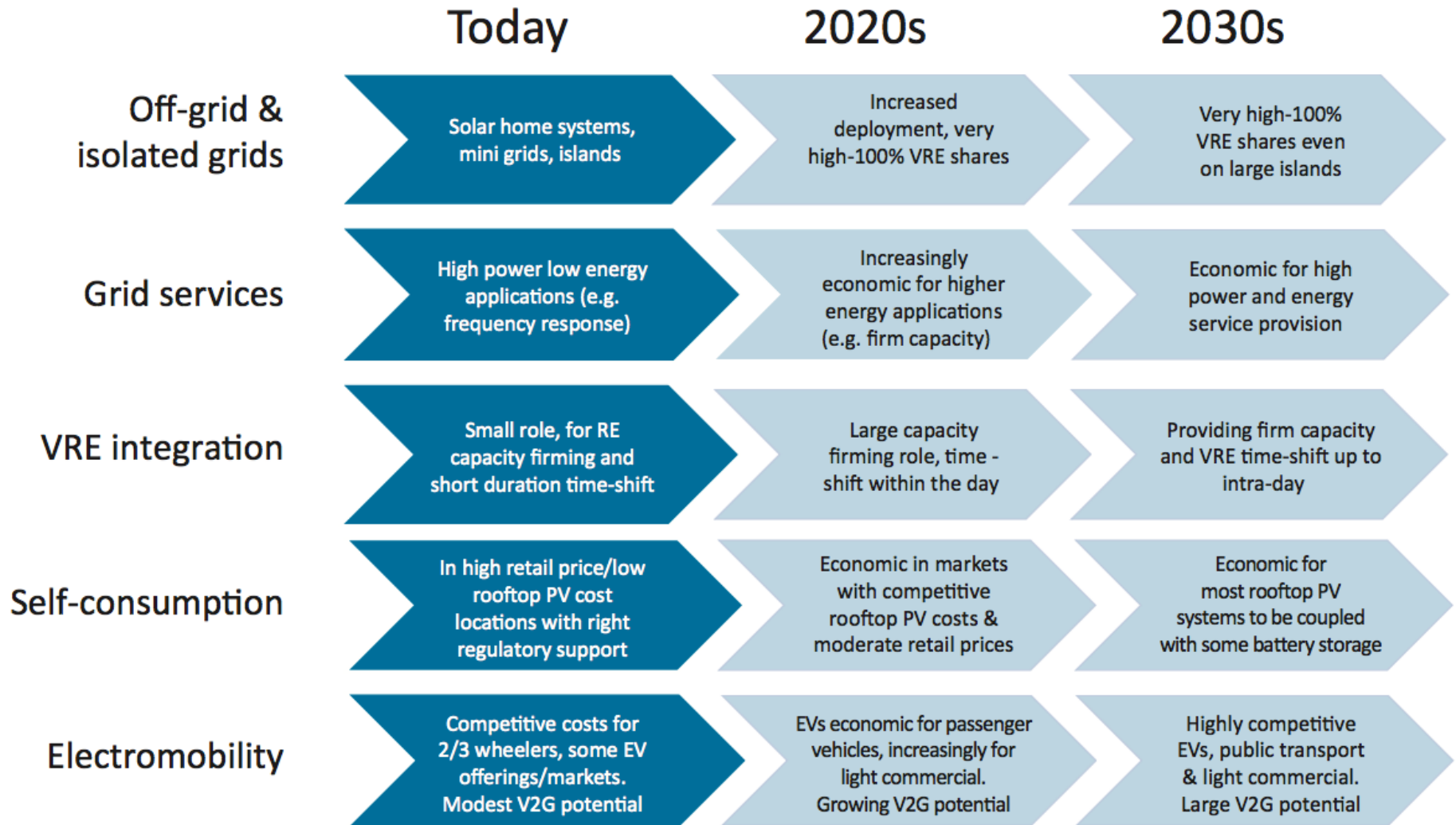
3:00 PM - Oct 24, 2017

1,301 replies 15,308 retweets 41,469 likes

Elon Musk at the Tesla Powerpack launch event at in Adelaide. Photograph: Mark

T E S L A  
POWERWALL  
CERTIFIED INSTALLER

# Battery storage and the clean energy transition



# Functions of battery storage

Figure ES1: The range of services that can be provided by electricity storage

Bulk energy services	Ancillary services	Transmission infrastructure services	Distribution infrastructure services	Customer energy management services	Off-grid	Transport Sector
Electric energy time-shift (arbitrage)	Regulation	Transmission upgrade deferral	Distribution upgrade deferral	Power quality	Solar home systems	Electric 2/3 wheelers, buses, cars and commercial vehicles
Electric supply capacity	Spinning, non-spinning and supplemental reserves	Transmission congestion relief	Voltage Support	Power reliability	Mini-grids: System stability services	
	Voltage support			Retail electric energy time-shift	Mini-grids: Facilitating high share of VRE	
	Black start			Demand charge management		
				Increased self-consumption of Solar PV		

Boxes in red: Energy storage services directly supporting the integration of variable renewable energy

# Gridwatch

Data courtesy of Elexon portal and Sheffield University



**Demand 48.29GW**

**Frequency 50.075Hz**

**Coal 7.62GW  
(15.78%)**

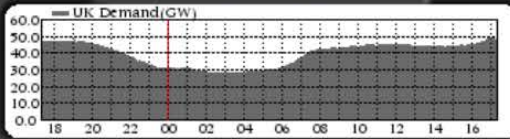
**Nuclear 7.16GW  
(14.83%)**

**CCGT 25.04GW  
(51.85%)**

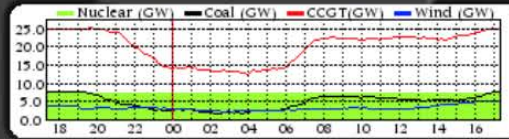
**Wind 5.32GW  
(11.02%)**

**French ICT -2.05GW  
(-4.25%)**

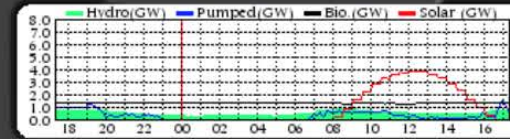
Daily Demand (GW)



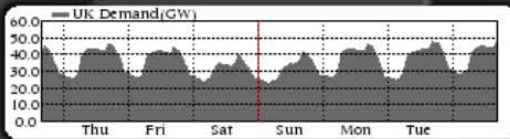
Daily Nuclear/Coal/CCGT/Wind (GW)



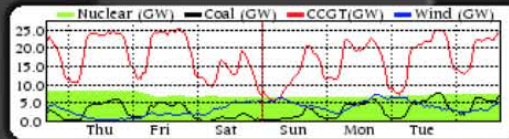
Daily Hydro/Pumped/Bio/Solar (GW)



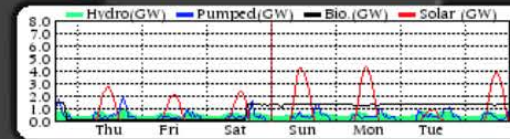
Weekly Demand (GW)



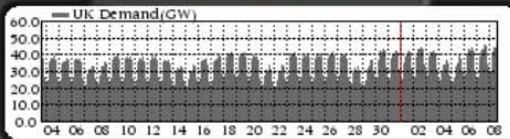
Weekly Nuclear/Coal/CCGT/Wind (GW)



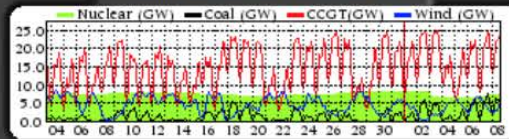
Weekly Hydro/Pumped/Bio/Solar (GW)



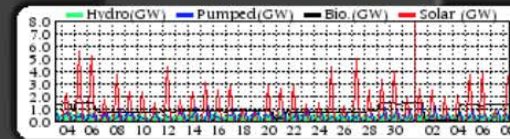
Monthly Demand (GW)



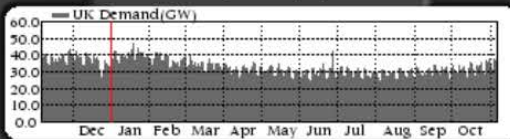
Monthly Nuclear/Coal/CCGT/Wind (GW)



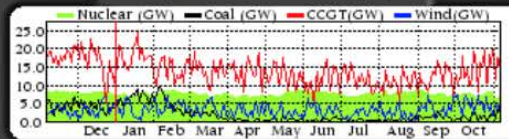
Monthly Hydro/Pumped/Bio/Solar (GW)



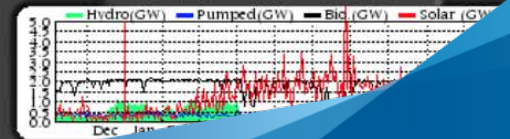
Yearly Demand (GW)



Yearly Nuclear/Coal/CCGT/Wind (GW)

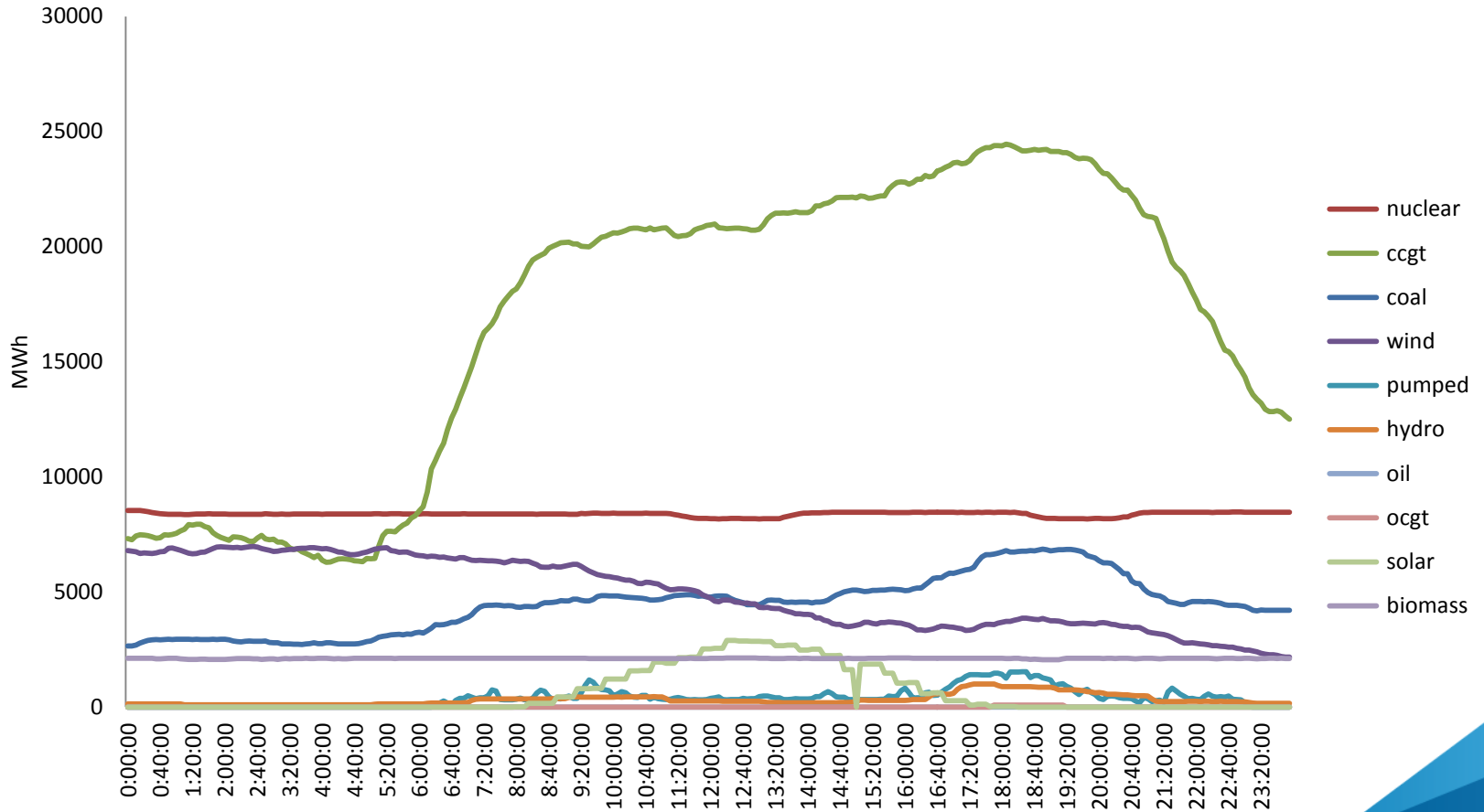


Yearly Hydro/Pumped/Bio/Solar (GW)

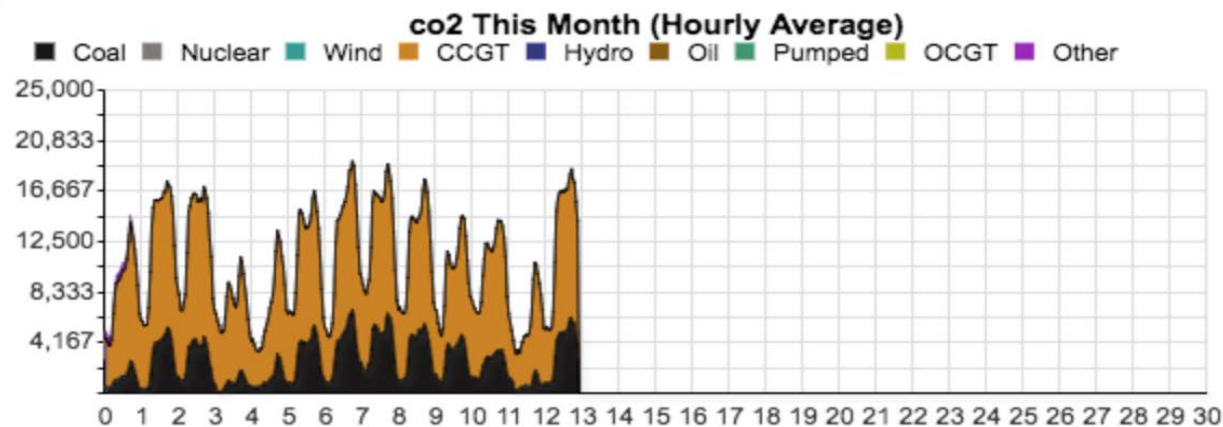
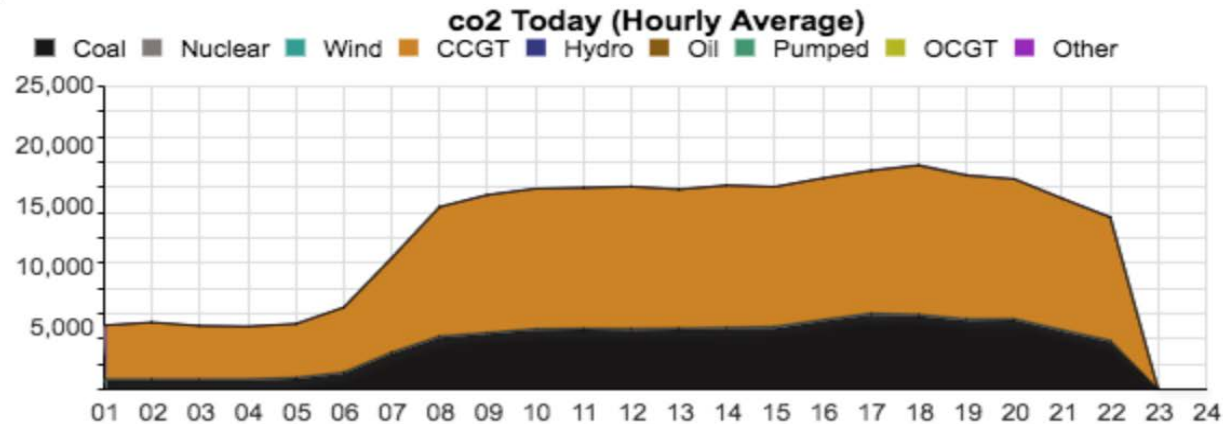


# The UK energy mix

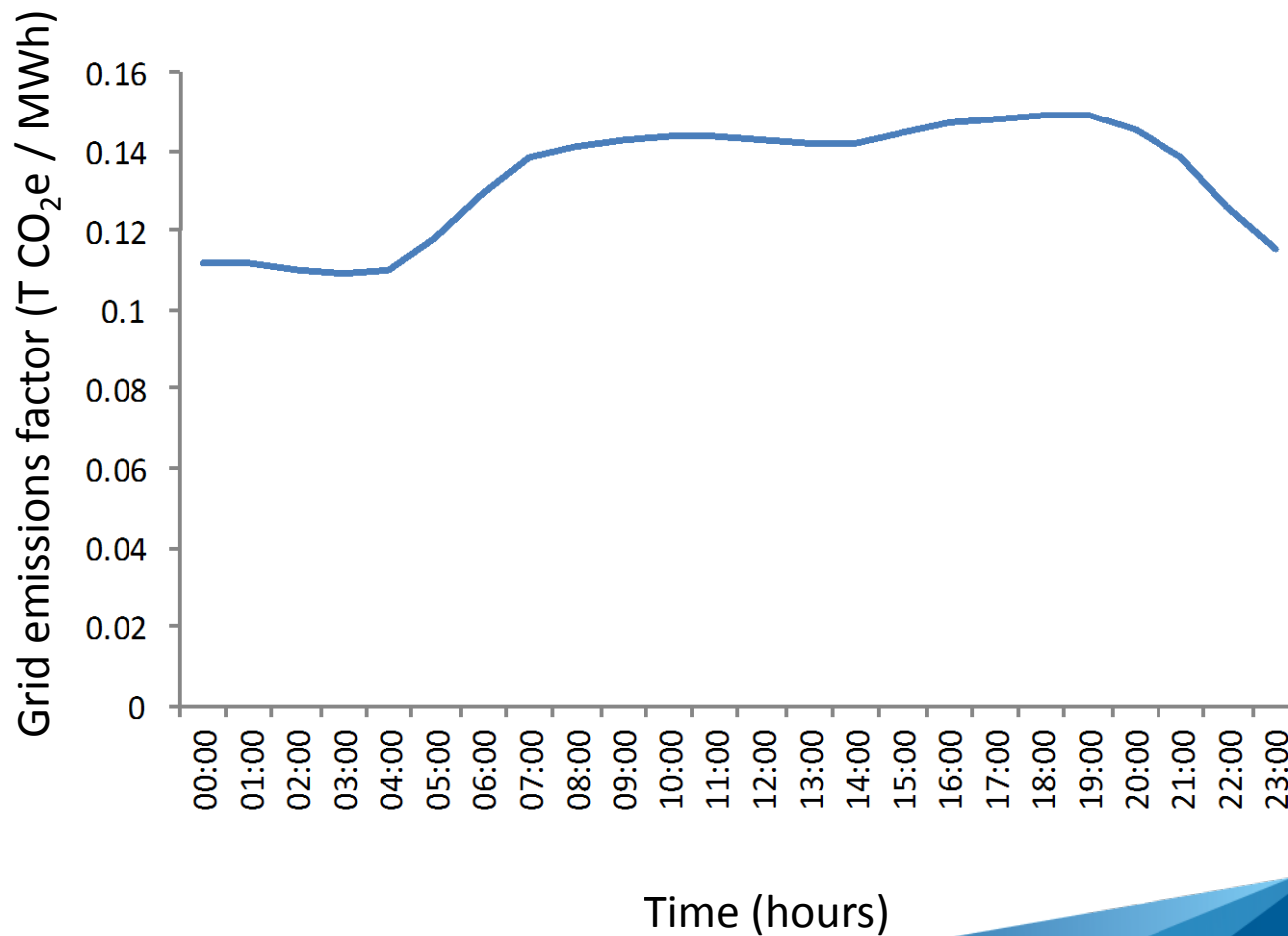
## UK Grid Mix



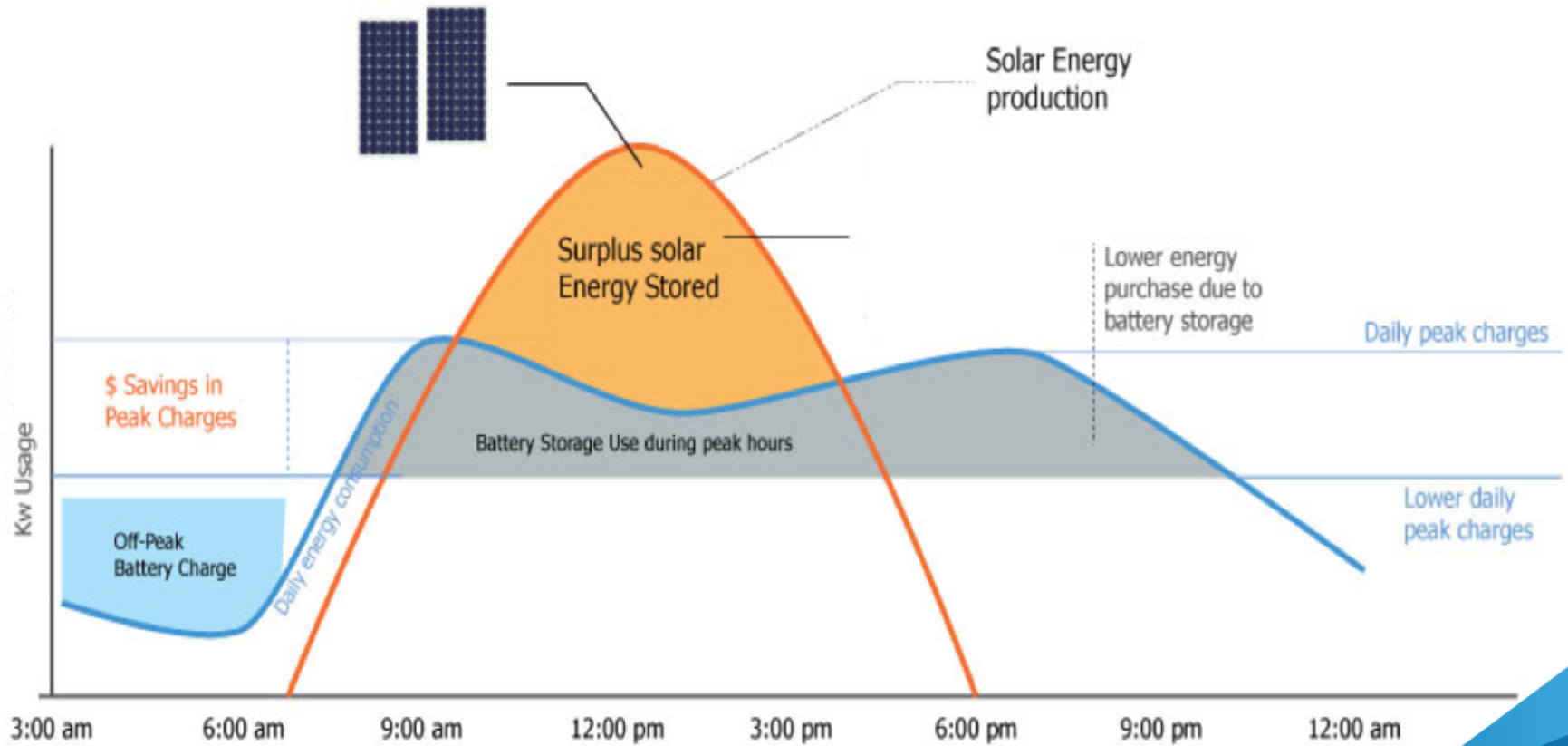
# UK Grid emissions

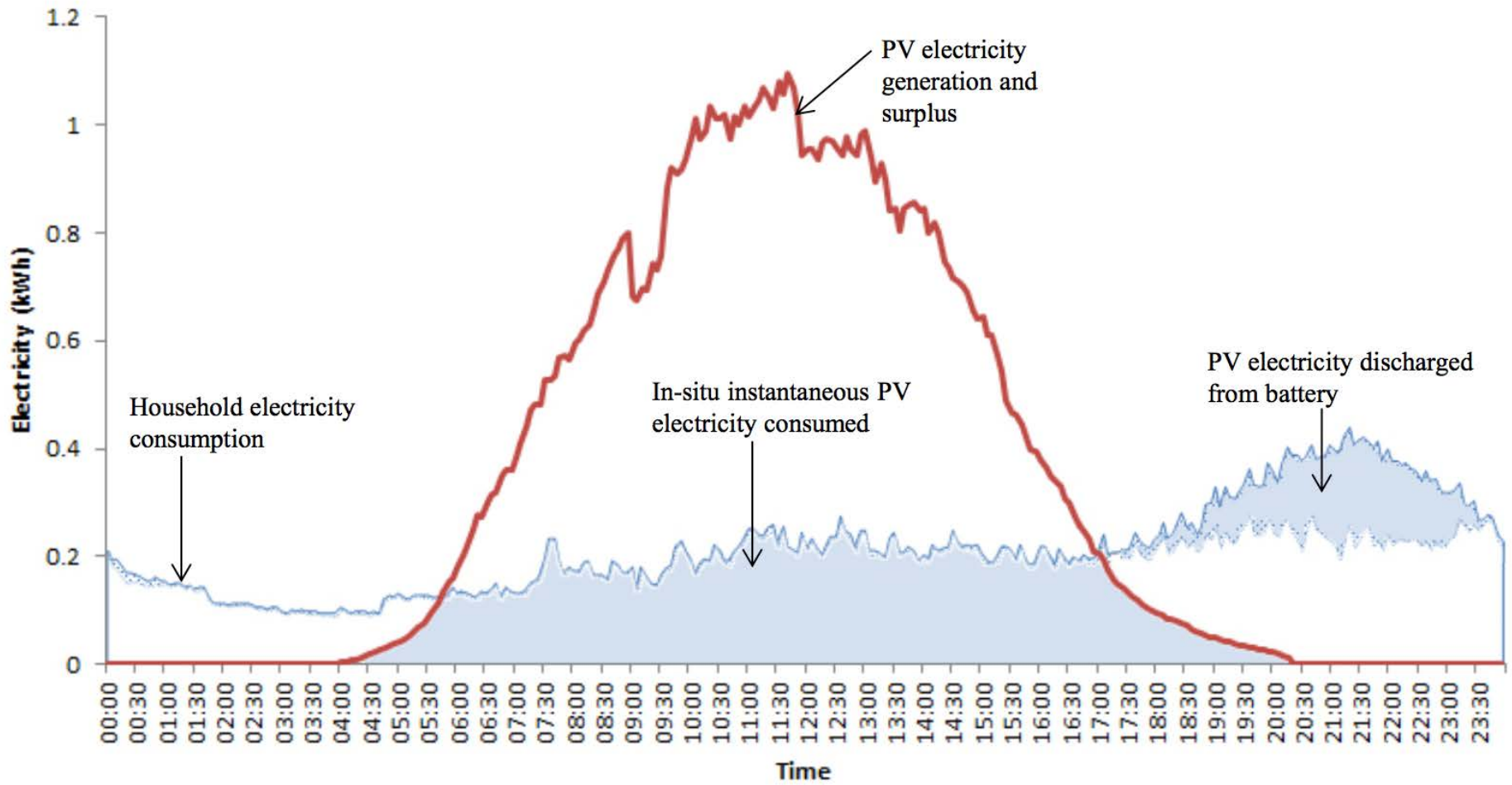


# Grid emissions factor



# Time shift + PV storage





PV Size (kWp)	Average daily generation (kWh)				
	1.5	2.0	2.5	3.0	3.5
Summer	4.1	6.6	8.2	8.7	12.0
Winter	1.6	3.7	4.1	4.8	5.3



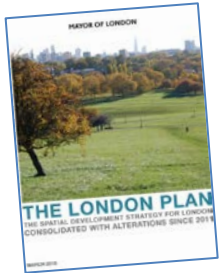
**PROJECT ERIC**  
re-energising communities

# London Plan Policies

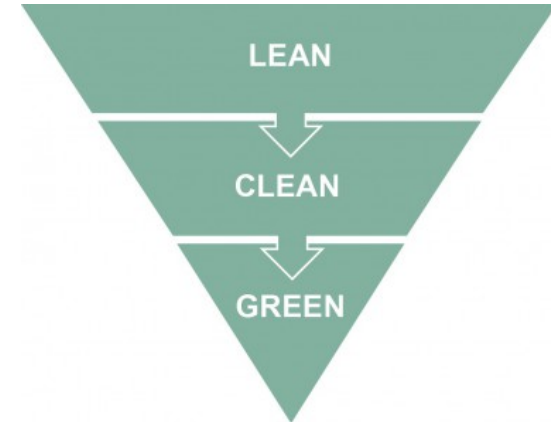
- Policy 5.2 Minimising carbon dioxide emissions

- Energy hierarchy:

1. Be lean: use less energy
2. Be clean: supply energy efficiently
3. Be green: use renewable energy



- Policy 5.4A Electricity and gas supply
- Policy 5.5 Decentralised energy networks
- Policy 5.7 Renewable energy
- Policy 5.8 Innovative energy technologies



# EP E6 Environmental protection

f) All domestic solar PV should be considered in conjunction with on-site battery storage.

The supporting text provides:

- That Battery Storage is considered to be a “Be Clean” technology based on the efficiency of supply
- A methodology for calculating the CO<sub>2</sub> based on SAP

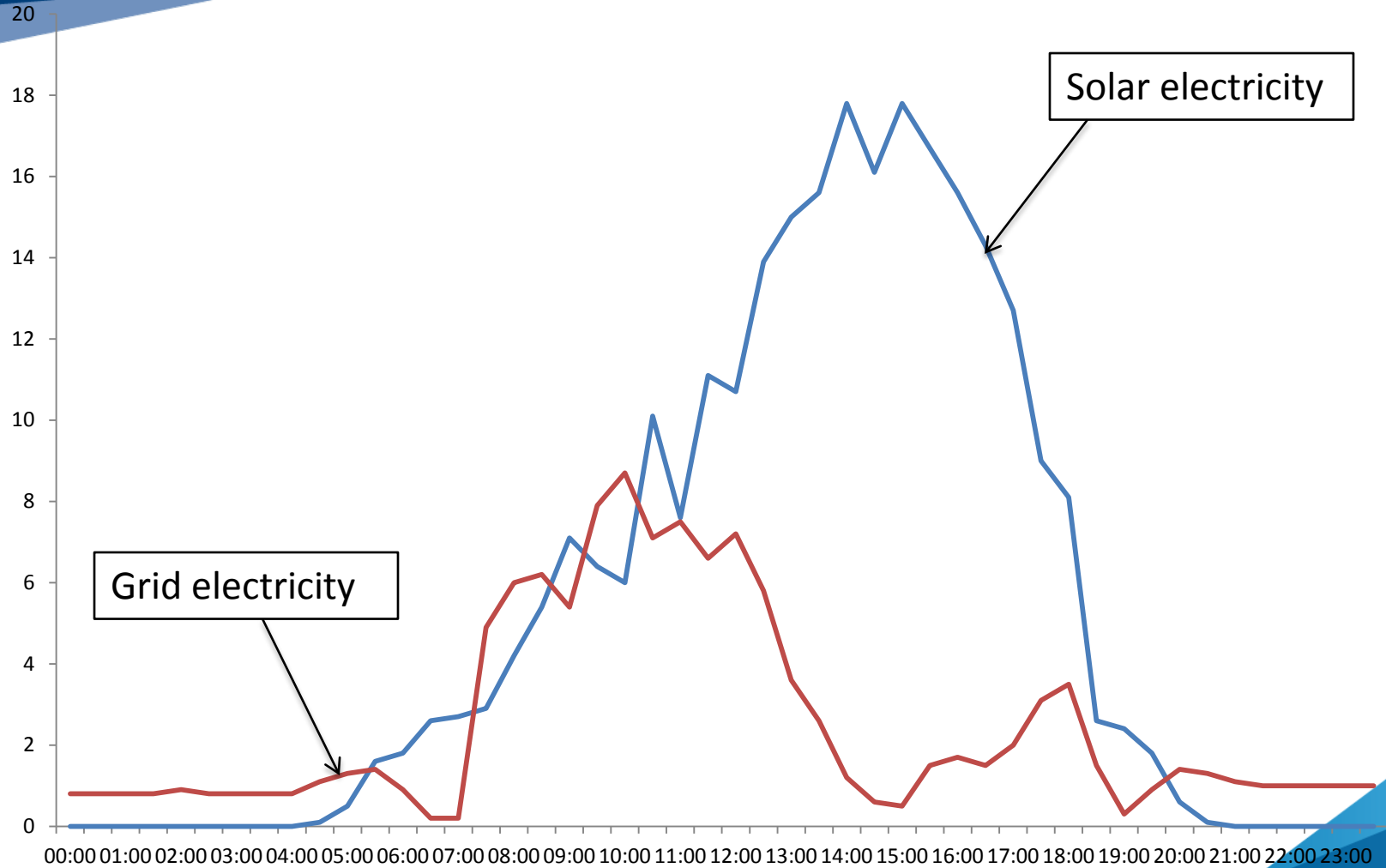
$\text{kWh/year} = \text{kWp} \times S \times \text{ZPV} \times 0.2$  (Carbon savings from battery storage)

kWp – Kilowatt Peak (Size of PV System)

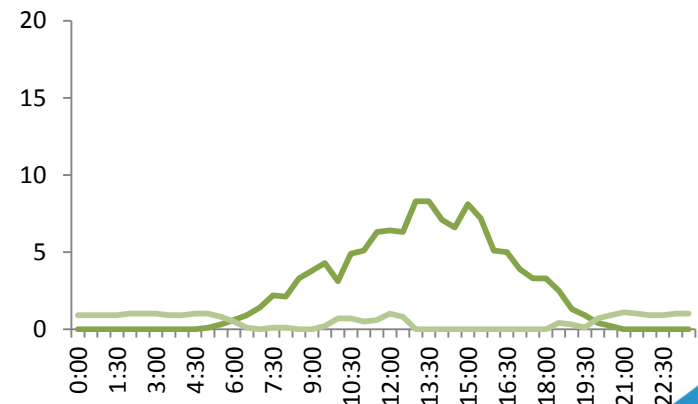
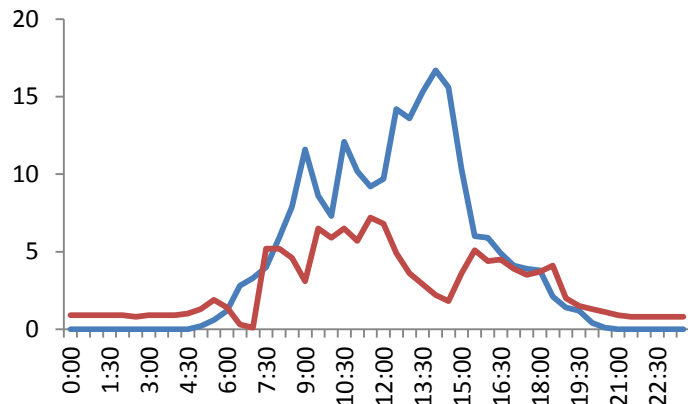
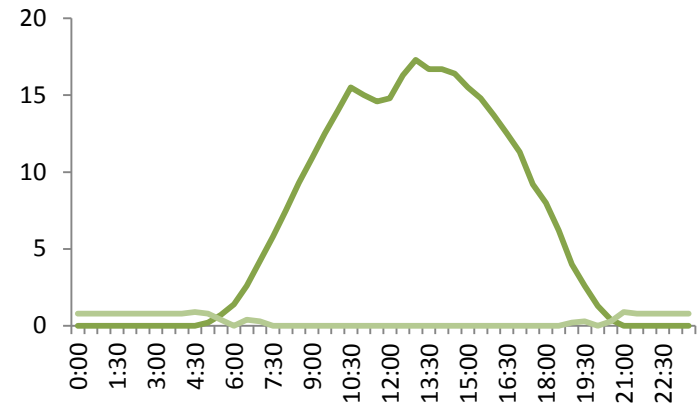
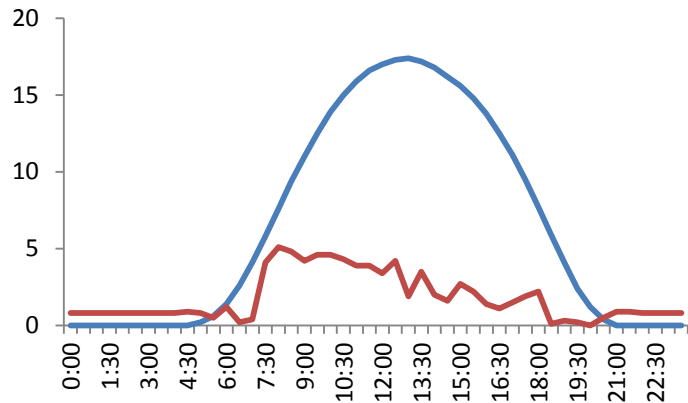
S – Annual Solar Radiation kWh/m<sup>2</sup> (See SAP)

ZPV – Overshading Factor (See SAP)

# Electricity profile – William Morris Primary School



# Battery storage potential for non-domestic sites?



# Conclusions

- Batteries can reduce peak time energy demand and reduce carbon emissions through:
  - Increasing self consumption of energy from PV
  - Time-shifting for low carbon production at night, offsetting gas at peak times
- The introduction of local battery storage policies is supported by policies and targets within the London Plan
- Merton's policies aim to support the delivery of battery storage by:
  - Defining where the technology sits within the energy hierarchy
  - Providing a methodology for quantifying its energy and carbon benefits
  - Linking battery use to the installation of solar PV

Questions?

Thank you!

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