Securing the Future: Energy Storage

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Energy Storage in the UK

The imminent arrival of the Storage
Types of Storage
   Electricity
   Heat
   Other - Hydrogen
Power and duration
Cost and Services
Commercial Operation
Disincentives
Incentives – EFR
It’s Complicated
Approaches
Conclusions
Not new
Energy Storage
Electricity Storage
Electricity Storage
Hydrogen
Greenhouse Gases

The absorption percentage of radiation of gases found in Earth's atmosphere.
Energy vs Electricity Storage

Energy Storage covers a broad range of technologies

Electricity Storage is a specific sub-set of Energy Storage
Also a broad range of technologies

Energy Storage

Electricity in → Conversion & Storage → Non-electricity out

Controllable demand only

Electricity Storage

Electricity in → Conversion & Storage → Re-conversion → Electricity out

Controllable demand and export
Storage in the UK

Key
- Comissioned
- Under construction
- Decommissioned

Kilroot, 10 MW/40 MWh
- Isle of Gigha 1.26MWh
- Darlington 2.5MW/5MWh
  100kW/200kWh
  50kW/100kWh
- Pilsworth, Highview LAES
  5MW/15MWh
- Willenhall 2MW/1MWh
- Chalvey 75kW/75kWh
  (3 units)
- Bristol 90kW/216kWh
  (25 domestic, 5 commercial units)
- Thames Valley 972kW/513kWh
  (25 units)

Shetland 1MW/3MWh
Shetland 1MW/3MWh
Orkney 2MW/500kWh
Nairn 100kW / 150kWh
Wooler 100kW /200kWh
50kW/100kWh
Maltby 50kW/100kWh
Milton Keynes 250kW/500kWh
Hemsby 200kW/200kWh
Leighton Buzzard 6MW/10MWh

Moixa Technology: Being demonstrated in 300 homes nationally
Domestic Electricity Storage

Systems cost £3000-8000 (battery type and capacity)
Avoid costs = £200-500 pa
Services (in the future) = £50-100 pa

Delta-ee European State of the Market Report

BUT
70-80% of domestic energy spend is on heat …
50-70% of I&C energy spend is on heat …
Moixa’s Maslow and GridSTOR

self-consumption and grid sharing benefits

- **annualised cost of maslow system**: £220
- **solar time shift**: £41
- **DC lighting**: £83
- **network services revenue (current)**: £54
- **total annualised benefit**: £63
But what about heat?

70-80% of a householders energy spend is on heat...

14 M system boilers in UK

Electric systems only = 30 GWh of flexibility

What is flexibility worth?

DNO = £50 pa (NPG CLNR)
NG = £25 pa (EV FR)
Moixa GridSTOR = £70 pa

Total energy spend = £1400 pa (DECC)
Industrial and Commercial

A bigger opportunity?

HVAC (heating, ventilation, air conditioning)

Especially with onsite generation (Diesels!)
UKPN Smarter Network Storage

- Third 33kV OHL and 38MVA Primary transformer: £6.2m
- 6MW/10MWh Energy Storage System: £11.2m

Service Hours to Date:
- TRIAD: 168
- Peak Shaving: 495
- STOR: 660
- FFR: 852.5
- Tolling: 3847.5

Future Services:
- DNO owned storage
  - New services
  - Demand Turn-up
  - Enhanced Frequency Response
  - Reactive Power

- 3rd party owned storage
  - Tolling/Arbitrage
  - Reserve
  - Triads
  - Response
  - Reinforcement deferral

DNO flexibility products:
- Demand Turn-up
- Enhanced Frequency Response
- Reactive Power

Portfolio Balancing
- Tolling/Arbitrage
- Reserve
- Triads
- Response

THE ELECTRICITY STORAGE NETWORK
New System Services

Demand Turn Up
Reactive Power
Enhanced Frequency Response (EFR)

Focus on EFR
200 MW, sub-second response
75 parties
7.5 GW bid
20 GW connections (0.5 GW)
37 parties
5 GW (50 MW)
£6.97 to 63.8/MW (£21.7/MW vs £9.78/MW) [£0.5-1M/MW]
8 parties (7 providers)
April 2017
£200 million
Regulations and Commercial

Very active area, but long way from resolution

ESN position: Asset class and licence

Reality of delivering a service:
- DN connected: sharing, priorities, power quality
- Connections: Are there any?!
  Connecting as generation/demand
- Value of service/stacking of services
- Competing with incumbents and diesels
- EU Winter Package (ITRE Report)
- Renewables with storage
- Interim arrangements (?!)
- Network charging
- End User Levies
Summary

• We’ve had energy storage for years
• Domestic and I&C scale storage possible
• Short-term easy, inter-seasonal harder
• Heat easier as unregulated
• Has to be intelligent to maximise benefits
• Various business models possible
• Lots to do on regulation and markets