

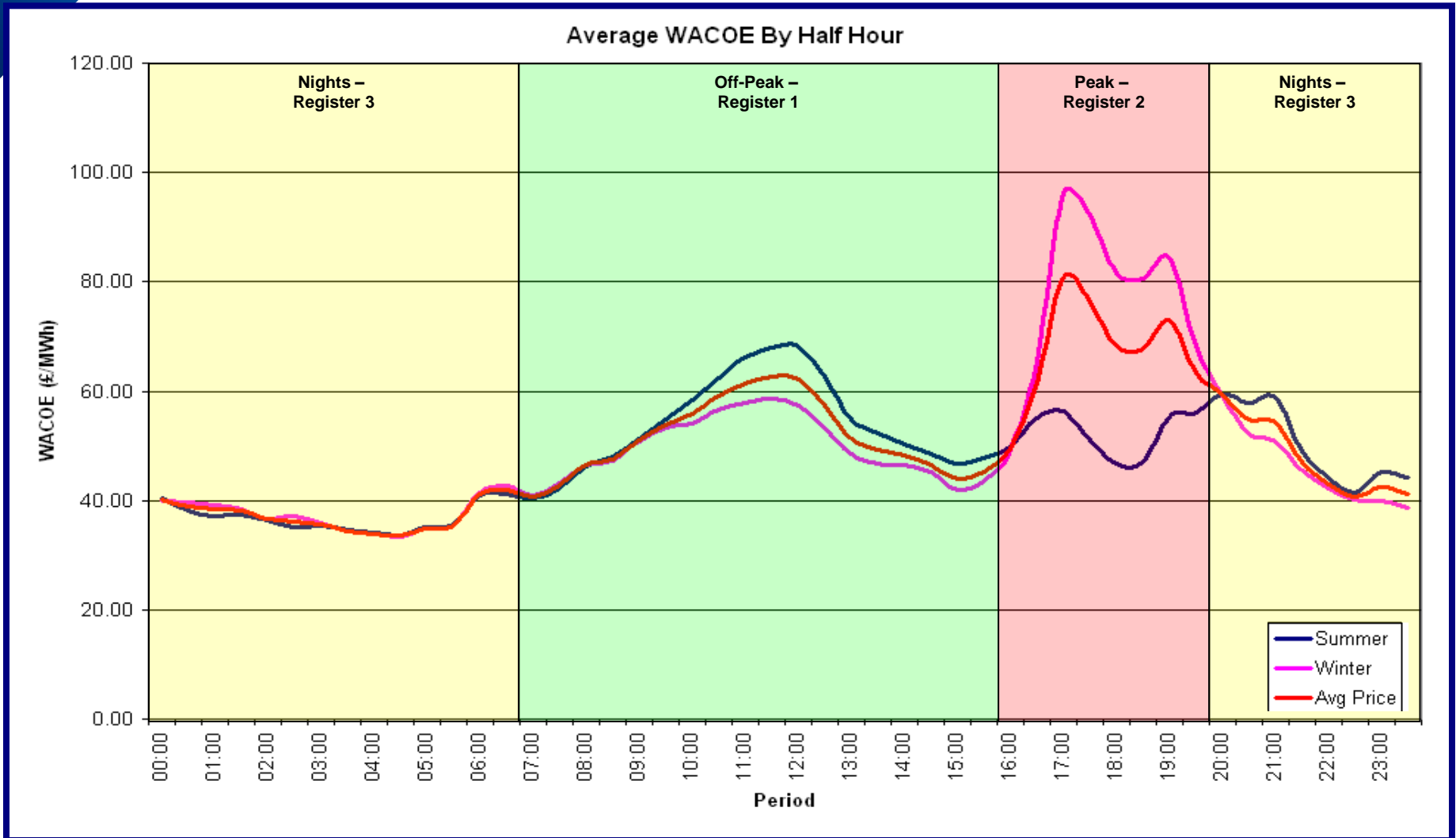
Demand Response – Energy Supplier Perspectives

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We don't have residential DR in the UK – but we do have Smart Meters. What can we learn?



With Smart meter roll-out we are building a detailed picture of household consumption

500 customers over 6 months

The national-level pattern of consumption does not hold at the household level

1 customer over 6 months

And the national pattern is more variable over shorter time periods

500 customers over 1 week

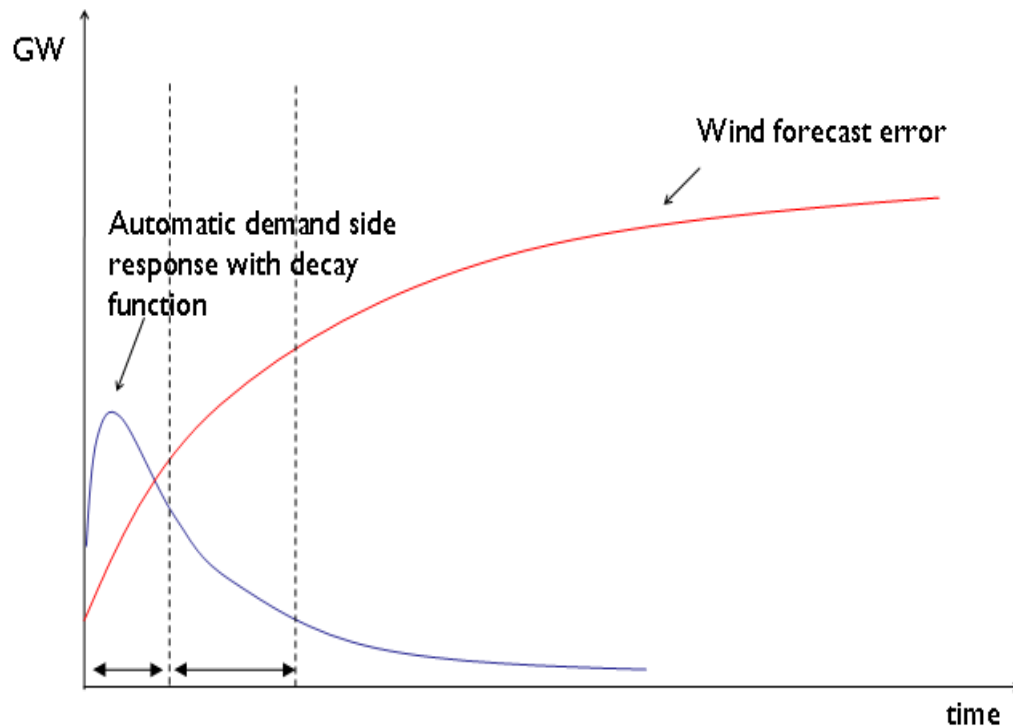
Variability increases hugely at the individual level over short time periods

1 customer over 1 week

Different segments follow the same profile – but the most affluent are more peaky, less affluent are less peaky

**Market Segment Profiles: Insight Research on profiles
3 months of data aggregated (circa 9k customers) at end of 2009**

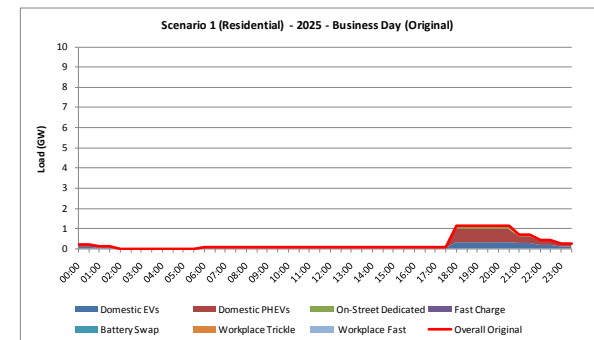
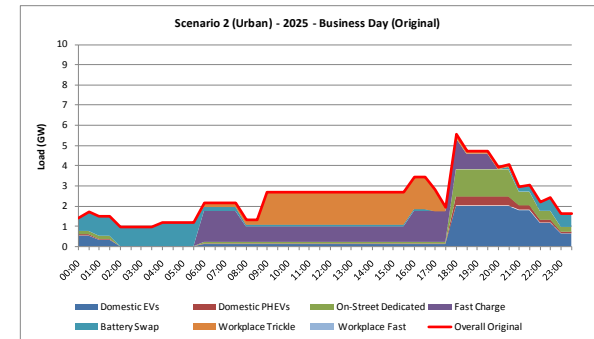
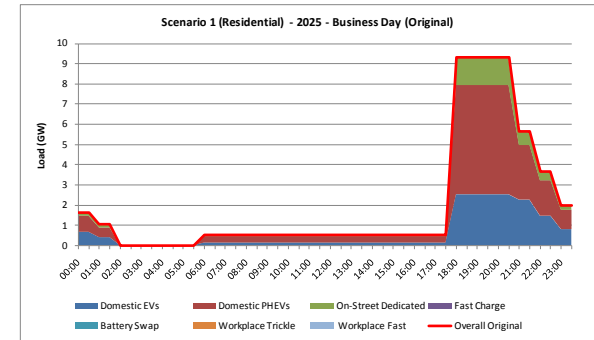
Many scenarios point to the UK requiring DR by around 2020 – e.g. to cope with wind



- By 2020 / 2025 we need to be able to balance sudden shifts in wind generation
- Our modelling shows that automated DR can provide some of the flexibility required
- Further analysis in this area has since been done by Imperial, with similar conclusions

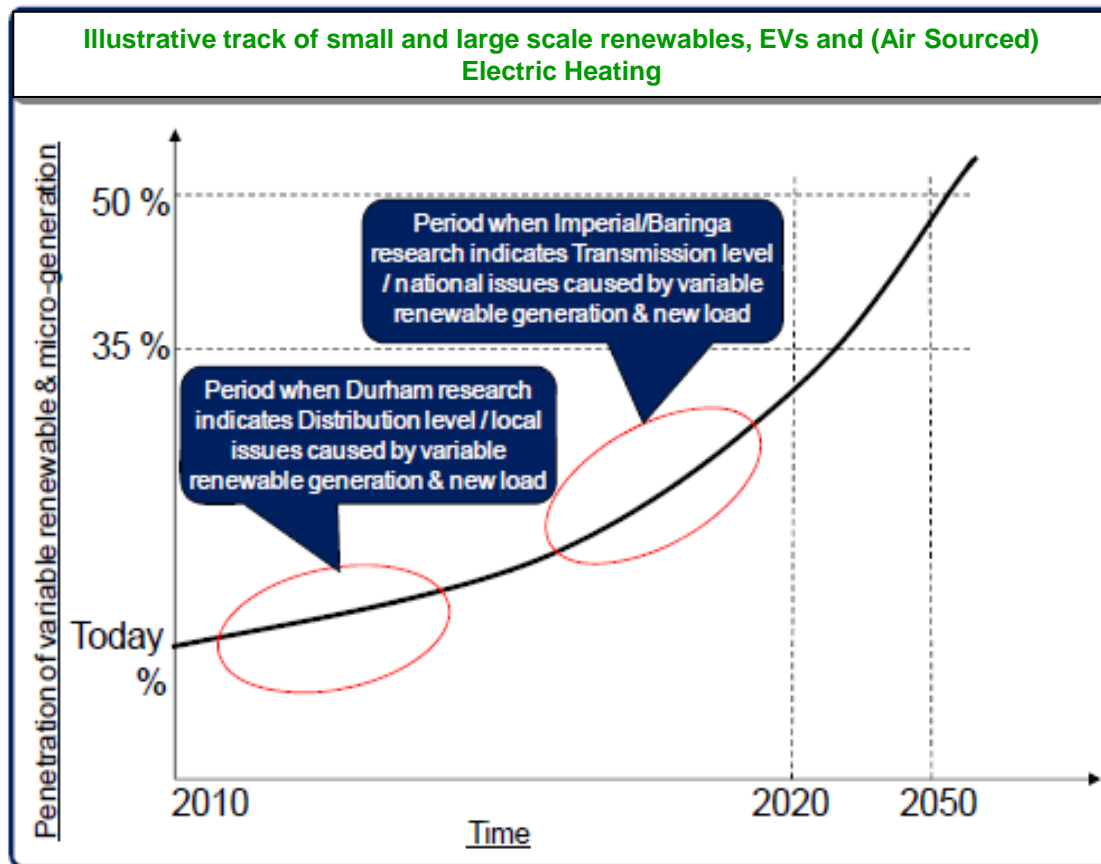
We have used scenario analysis to examine the relationship between Low Carbon Technologies and Renewable Generation

- Scenario 1: High EVs making use of existing network
 - 8m electric vehicles by 2025
 - Predominantly off-street domestic trickle charging
 - High proportion of plug-in hybrids
 - Predominantly sub-urban deployment
- Scenario 2: High EVs with dedicated charging infrastructure
 - 8m electric vehicles by 2025
 - Combination of dedicated on-street charging, work place charging, fast charging points, battery swaps and some off-street trickle charging
 - Low proportion of plug-in hybrids
 - Predominantly urban deployment
- Scenario 3: Low EVs
 - 1m vehicles by 2025



Low Carbon Technologies are likely to drive distribution-level issues much earlier than required to manage wind variability

- DNOs' capacity is planned with 40+ year asset life
- Our rate of change of load profiles is moving far faster than historic rates of replacement
- Housing estates and remote / rural communities are already driving re-enforcement through adoption of Low Carbon Technologies



Our conclusion is we should be developing DR today

- We are likely to need DR at a national level by the end of the decade
- We are likely to need DR at local level before then to enable the deployment of Low Carbon Technologies
- DR is likely to be a more cost-effective and certainly a faster approach to creating capacity for Low Carbon Technologies at the regional/local level
- Developing DR services will take time, requiring development of:
 - technology
 - commercial frameworks
 - consumer engagement

Our LCNF project is/was designed to help develop the technologies and commercial models for regional DR

Our joint project with CE- Electric, Durham and EA TEchnology:

- 14,000 homes and businesses
- A full range of network and customer technologies:
 - PV, ASHP, Smart appliances, EVs, Smart meter tariffs
 - Large scale storage, Dynamic Thermal response, Enhanced Voltage Control
- Clearly defined learning objectives supporting the application of DR to UK networks
- Durham Energy Institute supervised research, peer reviewed conclusions

Illustration: The opportunity for value-sharing in Energy Distribution

