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Session 5.3
BAU Adoption

CLASS

Customer Load Active System Services

LCNI Conference

Thursday 13 October 2016

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Agenda

CLASS
Customer Load Active System Services

- Background & recap
- Project extension
- BAU – developing the business case
- BAU Design
- Procurement
- Securing the Benefits
- Next steps

Our smart grid development

Leading work on developing smart solutions

Deliver value from existing assets

Customer choice

LCN Fund Low Carbon Networks

Five flagship products (second tier/NIC) £42 million

C2C

SMART STREET

Celsius

CLASS

RESPOND

Background and recap

> *Sought to demonstrate that electricity demand can be managed by controlling voltage…*
>
> …without any discernible impacts on customers

CLASS
Customer Load Active System Services

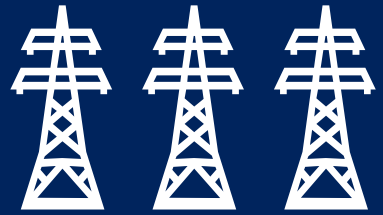
Customer Load Active Systems Services

CLASS project overview

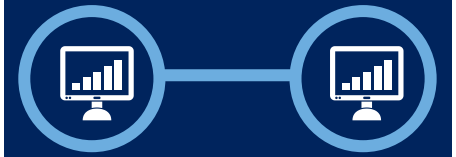
Objectives	Reduction of peak demand	Frequency response and voltage support	Voltage and demand relationship	No effect on customers
What?	Baseline measure: Spring 2014 Monitoring waves: Summer 2014 to Spring 2015 All **485 000** customers in test area received letter **696** customers recruited at **baseline** **1,357 monitoring** interviews			
Customer hypothesis	**"CLASS will be indiscernible to customers"** Customers will not see / observe / notice an impact on their supply quality when these innovative techniques are applied			

Results summary

Statistical findings are that domestic customers did not notice the CLASS functions



Lessons have been learned during the installation phase, that can be integrated into any future ‘rollout’



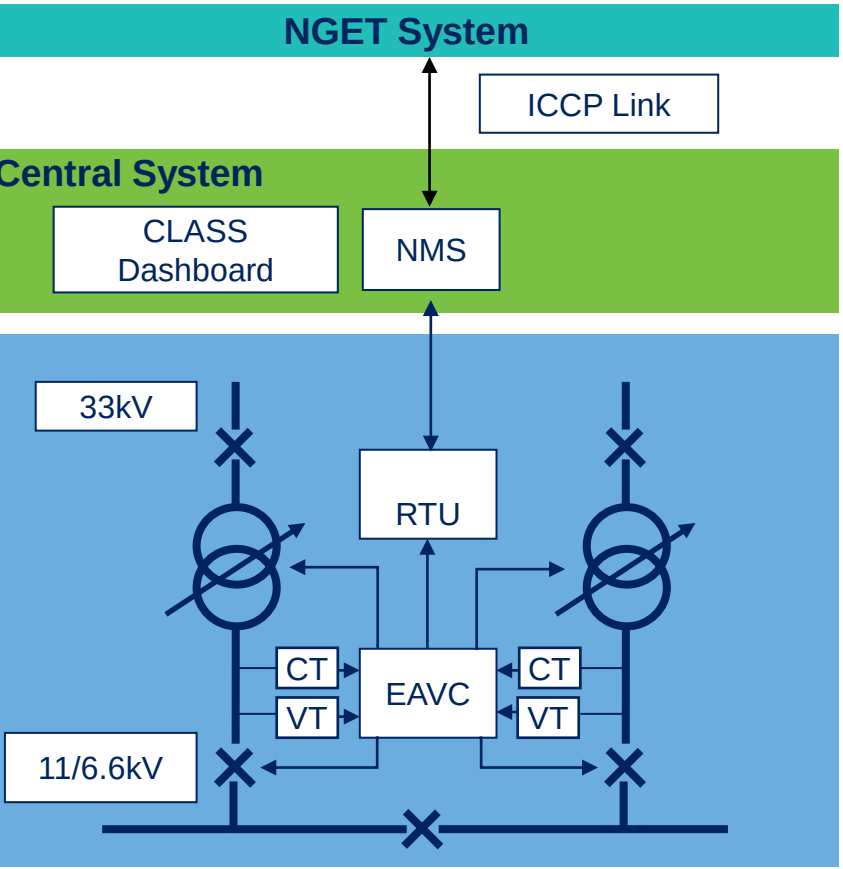
CLASS has provided National Grid with the ability to use an ICCP link which provides them with a demand response during a system frequency event

CLASS has shown an approximately linear relationship between voltage and demand

High level benefits

- Low cost high speed frequency support
- 3GW demand reduction or boost
- 2GVAr National Grid voltage control
- Reinforcement deferral
- 24/7 voltage/demand relationship matrix

CLASS system overview



NGET System	ICCP link will provide future capability for National Grid to access the CLASS functionality directly for flexible whole system response
Central System (Dashboard)	Facility to specify service requirements Monitors the status of each CLASS substation and which should be armed or disarmed Monitor performance
Enhanced Automatic Voltage Controller	Measure performance. voltage, current, power, frequency etc Hold arm/ disarm flags for each of the CLASS services Trip or close circuit breakers or operate tap changers to implement CLASS services

CLASS extension objectives

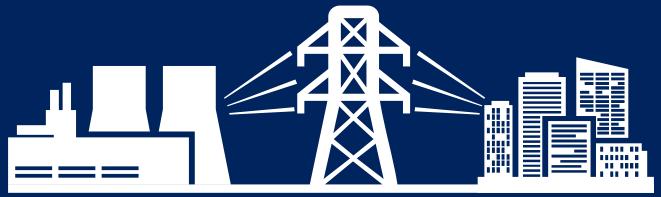
Assess the market for each CLASS service	Assess the impact for each CLASS service	Determine benefits for GB customers
		
Market structure, entry qualifications and price Size of market in 2015 and potential size to 2027 Current and potential future competitors – no, type and size of players	Market structure and service price Competitors – number, type and size of players	Costs and benefits for GB customers Potential winners and losers in each market Whole market impact Sharing of DNO revenues with customers

Regulatory treatment clarified

£		
Revenue and costs classified as Value Added Services (DRS8)	Services described generically as: ‘distribution network voltage control and network management services procured from the licensee by National Grid for the purposes of its system operator residual balancing activity’.	The reasons for this decision: These services utilise DNO assets Licensees incentivised to provide services to National Grid: should benefit consumers by more efficient procurement of system balancing requirements; Consumers should benefit by sharing any net revenue received by the licensee

Potential markets identified

What are Balancing Services?	Who provides Balancing Services?



Range of energy and capacity products designed by National Grid – the System Operator

Used to maintain the balance of supply and demand after gate closure, to maintain stability, and ultimately ensure security of supply

Balancing Mechanism (BM) providers – large, often transmission-connected generators

Non-BM (distributed resources)

Demand side response

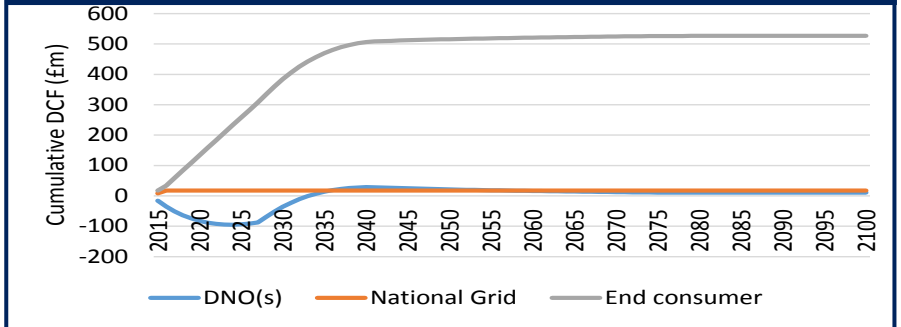
Other TSOs (via interconnectors)

Is CLASS eligible?

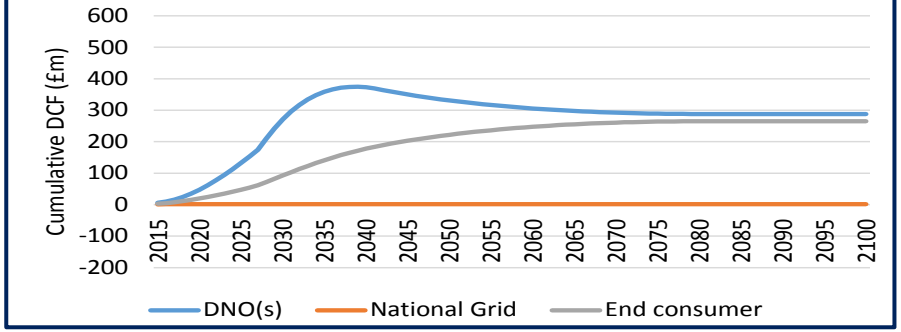
Product	CLASS eligibility (indicative)	Notes
Frequency Response Primary	Yes	• Through switching out a single transformer • **Dynamic/static treatment still tbc – affects size of market**
Frequency Response Secondary	Yes	• Through tap changes • Dynamic/static treatment still tbc – affects size of market
Frequency Response High	Under review	• Potential to use tap stagger to provide High when switched out • Dynamic/static treatment still tbc – affects size of market
Fast Reserve	Yes	• Through tap changes • 50MW de minimis appears deliverable through aggregation
STOR	Yes	• Through tap changes • Though duration of service could make consistent profile of performance difficult on full capability
Reactive Power	Yes	• Through use of tap stagger

Potential benefits

Cumulative discounted cash flow by stakeholder (LRMC pricing)



Cumulative discounted cash flow by stakeholder (Shadow marginal pricing)



CLASS deployment
354 substations (180MW) 2014-15
5,900 substations (3GW) 2027
Linear growth between

DNOs incurring capex until 2027

Totex capitalisation means net revenues are shared over 45 years

DNOs under LRMC break even in long run but not until 2035

Stakeholder	LRMC NPV	Marginal NPV
DNO(s)	£10.3m	£287.8m
National Grid	£17.2m	£1.3m
Consumers	£526.8m	£265.2m
Total	**£554.3m**	**£554.3m**

Conclusions

There is significant scope for CLASS to reduce consumer costs	The DUoS sharing factor allows consumers to benefit under a range of pricing strategies	Future benefits and revenues from CLASS less certain
Most valuable if CLASS treated as capable of providing dynamic and high response If not, deployment of CLASS will be constrained by 2027, reducing its potential to benefit consumers	More consumer benefit if CLASS is priced at cost, manifesting as reduced BSUoS Under shadow marginal price, all revenues, costs and risks shared between DNO and consumers Note that CLASS deployment levels could vary as a function of pricing rules	NPV horizon does not necessarily reflect DNO business decision-making Competitive technologies expected to drive prices down Growth in market requirement not enough to offset this

Business case

Estimating roll-out costs

What are the cost of rolling out a new service?

To what extent are the project costs an indicator of BAU costs?

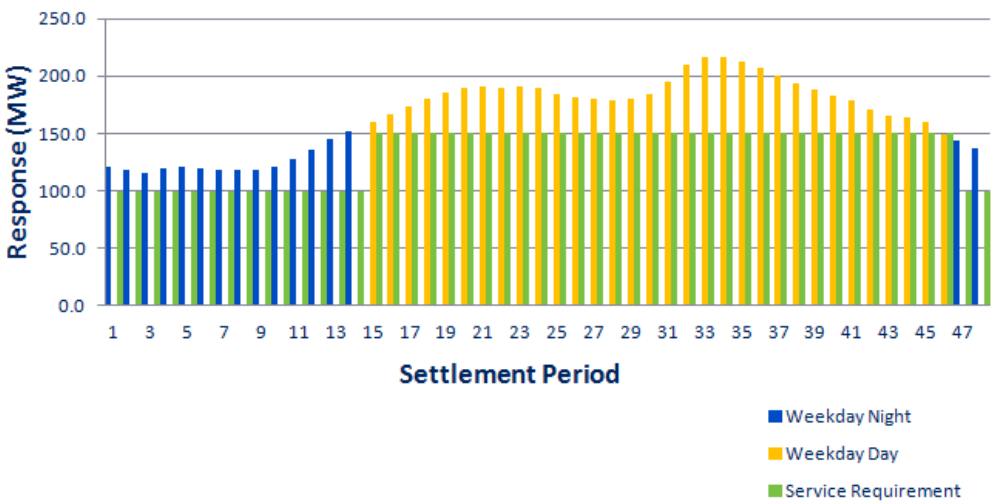
To what extent are current approaches similar to BAU costs?

Firming up the benefits

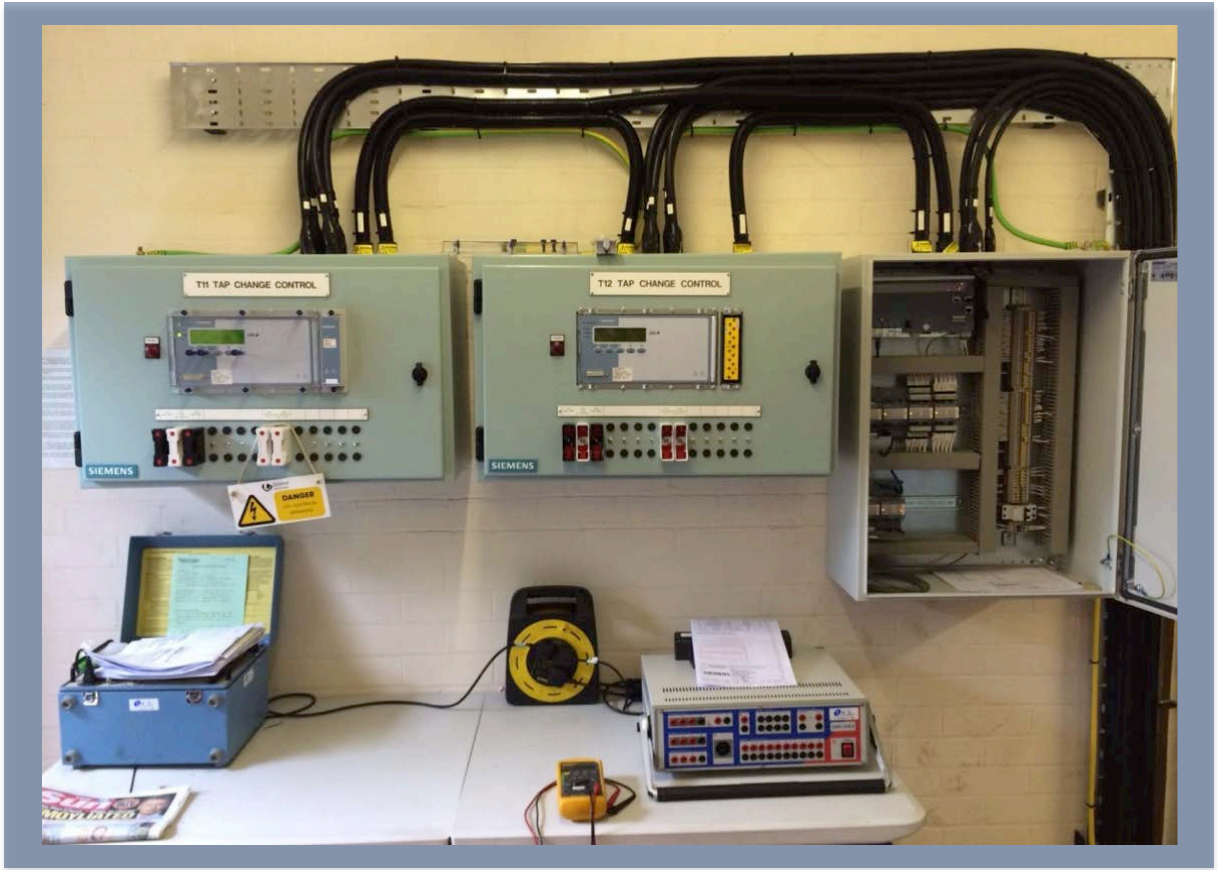
Estimating service volumes

Estimating prices

CLASS Response – daily profile: winter



CLASS trial equipment



Considerations for delivery strategy

Installation work: safety and system risk priorities

Not all required functionality in trial system

New NMS system to incorporate smart meter benefits: need to integrate CLASS functionality

Maintain Grid Code OC6 compliance

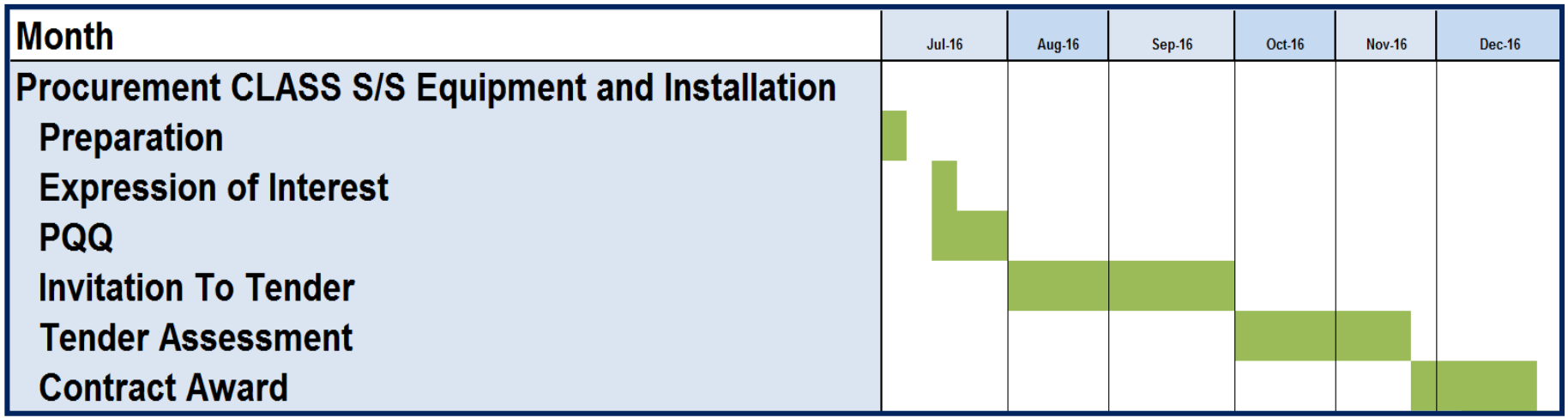
Considered using trial equipment and extending trial sites for quicker deployment ● Adds significant risk and cost for minimal benefits

Procurement

Transitioning from project to BAU likely to need significant procurement phase

Scale of procurement may require EU compliant procurement process

Likely to add significant time to deployment timescales



Securing the benefits

A key aspect for most projects is to ensure that the forecast benefits are delivered

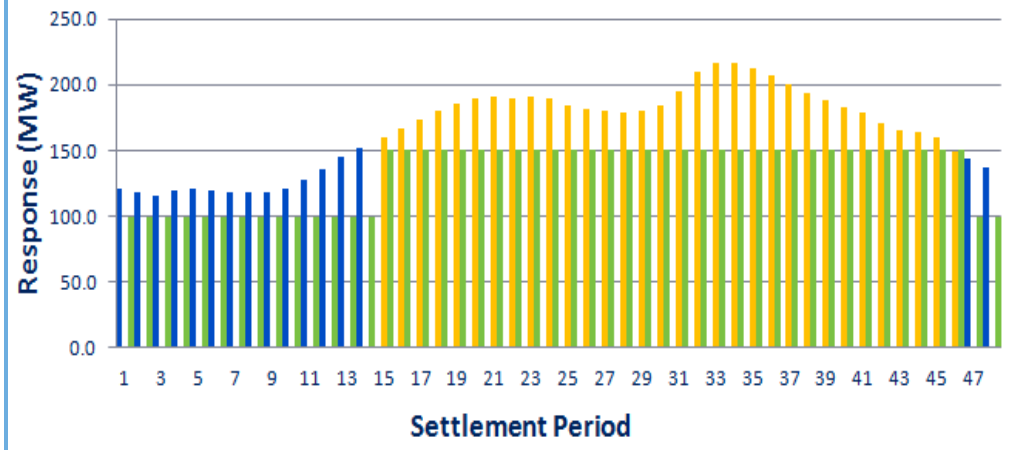
For CLASS, the main benefits to support the investment are revenues for Balancing Services

Revenues are not guaranteed. Contracts must be won in the established markets for balancing services

Service requirements are specified by National Grid

The CLASS services must be configured to deliver these services

CLASS Response – daily profile: winter

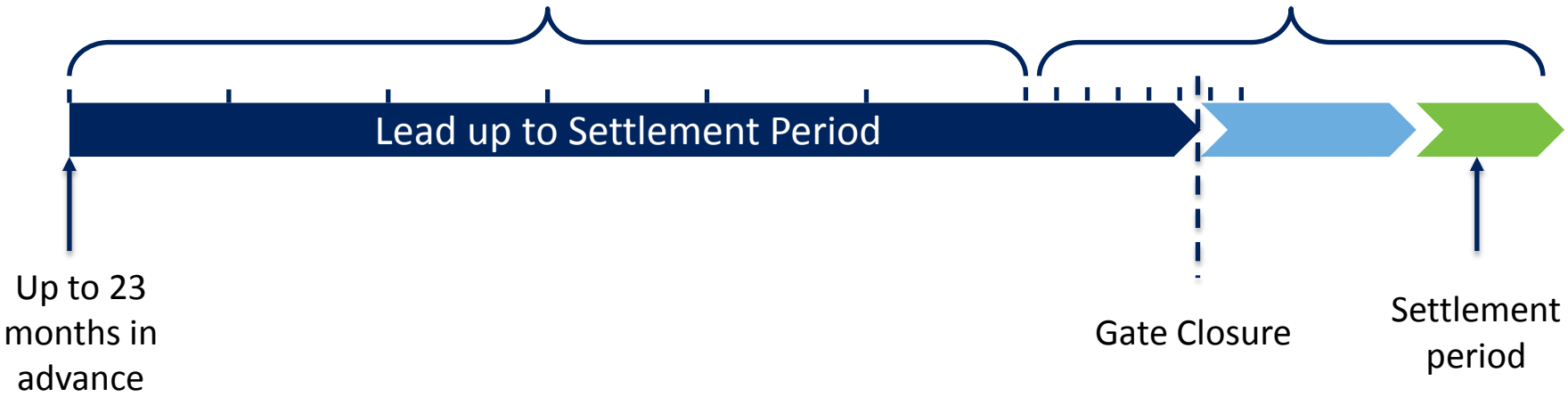


How are Services procured?

When does National Grid buy Balancing Services, and how long for?

Forward contracts procured at regular intervals (e.g. monthly to quarterly) – open to all providers

Remainder of requirement is procured through the Balancing Mechanism up to a few hours ahead



How does payment work?

How are providers paid for Balancing Services?

Forward-procured Balancing Services are structured as availability fees and energy fees

Successful providers are paid the availability fee for their 'window' and energy fee for any utilisation

Balancing Services procured in the Balancing Mechanism are paid according to bids and offers for energy utilised

Next steps

Procurement	Commercial terms	Investment decision	Implement	Optimise
Conclude the procurement process by identifying preferred suppliers	Conclude Framework agreements with National Grid for Balancing Services	Update business case and make investment decision	Commence installation and testing and provision of services to National Grid	Identify the best way to utilise CLASS characteristics for future services

For more information

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