

Operating in 2020

Industry Consultation, Graham Stein

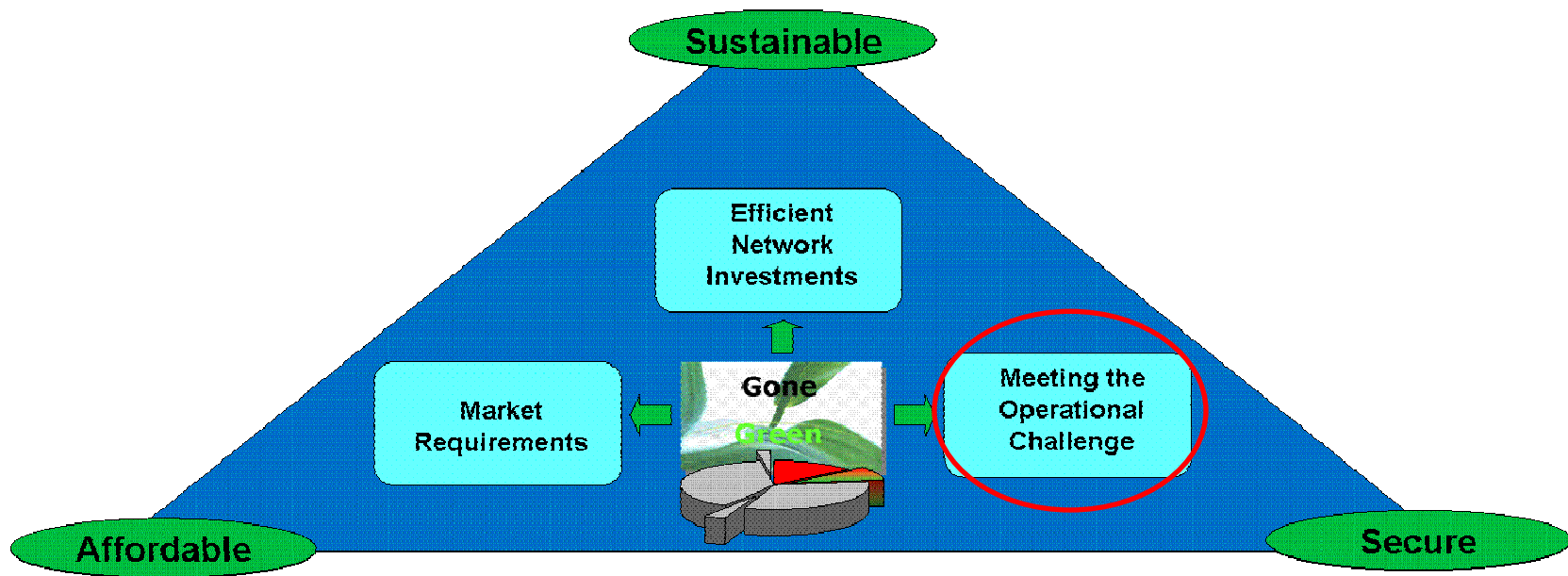
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Introduction

The 'Operating the Electricity Transmission Networks in 2020' consultation will be published on 19th June

- ◆ Designed to complement network investment work (ENSG)
- ◆ And to feed into wider debates on energy markets and security of supply



What is it?

An informal consultation, intended to

- ◆ Set out National Grid's broad view of short term operating issues in electricity in the future
- ◆ Seek views of interested parties

Focussed on

- ◆ A 10 year horizon (2020)
- ◆ Operational issues in the period mainly 4 hours ahead to real-time

Based on the 'Gone Green' generation and demand scenario

- ◆ Used by the ENSG in developing the proposals outlined in the report "Our Electricity Transmission Network: A Vision For 2020"

Issues Covered

Summary of existing arrangements

- ◆ National Grid's electricity System Operator role

Developments in Electricity Generation and Demand

Reserve and Operating Margin

- ◆ Short term reserve, operating margin at peak demands, and operating at minimum demands

Network Operation

- ◆ Physical operation

Balancing Services Development

- ▲ Potential new sources of new services

Developments in Electricity Generation and Demand

Our discussion and analysis is based on the 'Gone Green' demand and generation scenario

- ◆ 'Gone Green' is useful in setting out issues in a plausible timeline which meets emissions and renewables targets
- ◆ Other scenarios could be equally valid

'Gone Green' generation in 2020

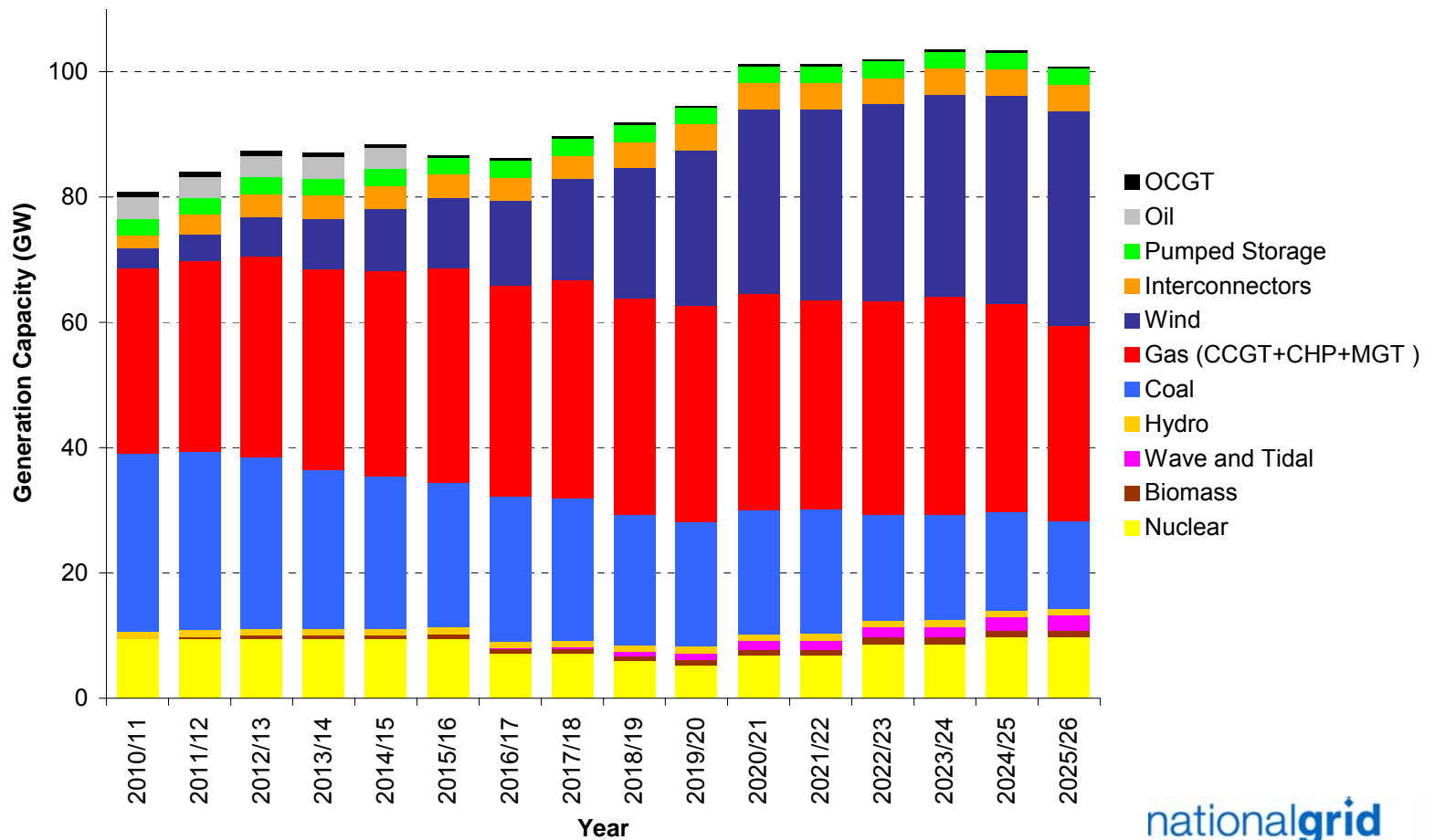
- ◆ Wind Capacity at 29.5GW
- ◆ Gas Fired Generation at 34.3GW
- ◆ Coal Fired Generation at 19.8GW
- ◆ Nuclear Generation capacity at 6.9GW
- ◆ Some 15GW of embedded generation (including on-site CHP)

'Gone Green' demand in 2020

- ◆ Trend for peak demands is flat
 - Economic growth, transport and new applications drive demand up
 - Energy efficiency and embedded generation have the effect of reducing peak demand

Developments in Electricity Generation and Demand

Generation under 'Gone Green'



Developments in Electricity Generation and Demand

Discussion of 'new' generation technologies

- ◆ Wind
 - controllable but more difficult to forecast than other forms
- ◆ Gas
 - expansion of capacity under 'Gone Green'
 - offers flexibility
 - increased reliance on single fuel source
 - change in load factors changes economics
 - further work underway to assess impact on Gas networks
- ◆ Supercritical Coal
 - controllable?
 - how will it interact with CCS?
- ◆ New Nuclear
 - larger units
 - focussed on base-load operation?
- ◆ Tidal
 - predictable but limited scope for flexibility?

Please provide feedback on our assumptions

Developments in Electricity Generation and Demand

Discussion of 'new' demand side technologies

- ◆ Overall trend
 - 'Gone Green' trend is essentially flat for net peak demand

- ◆ 'SMART'
 - the smart meter
 - active demand management
 - Smart Grid

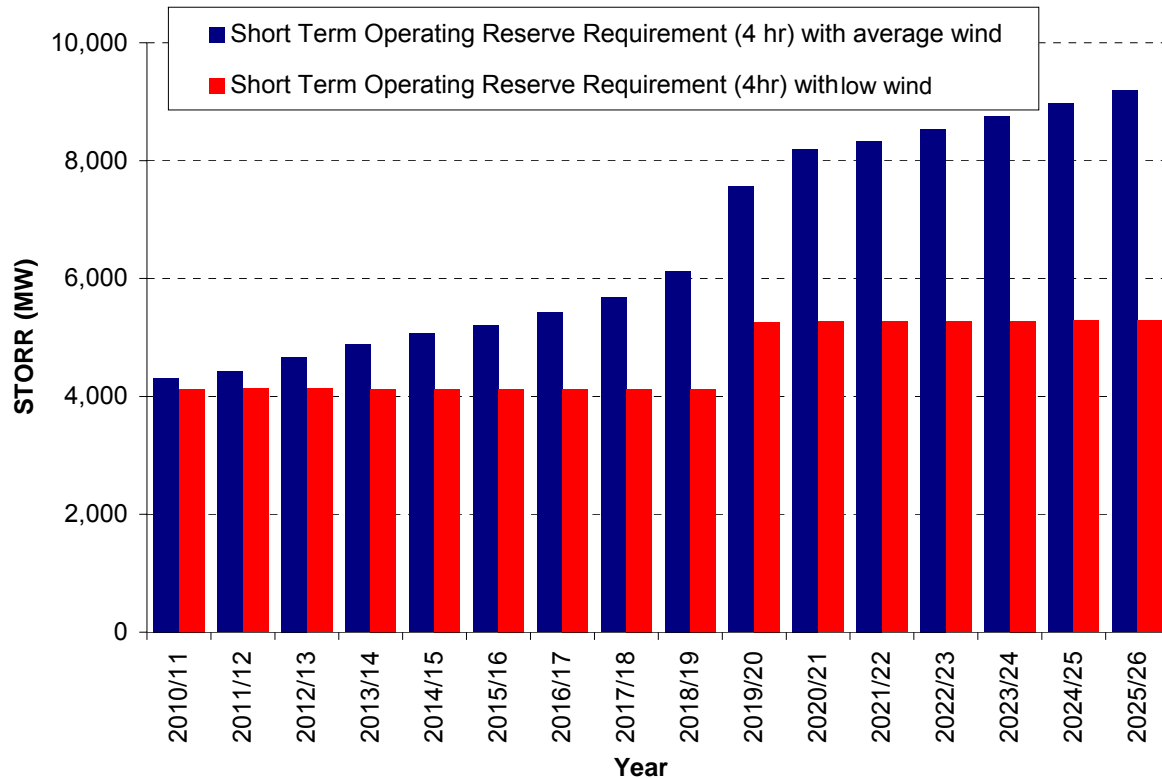
- ◆ Electric Vehicles
 - charging period

- ◆ Embedded or Distributed Generation

Reserve and Operating Margin

Reserve requirement under 'Gone Green'

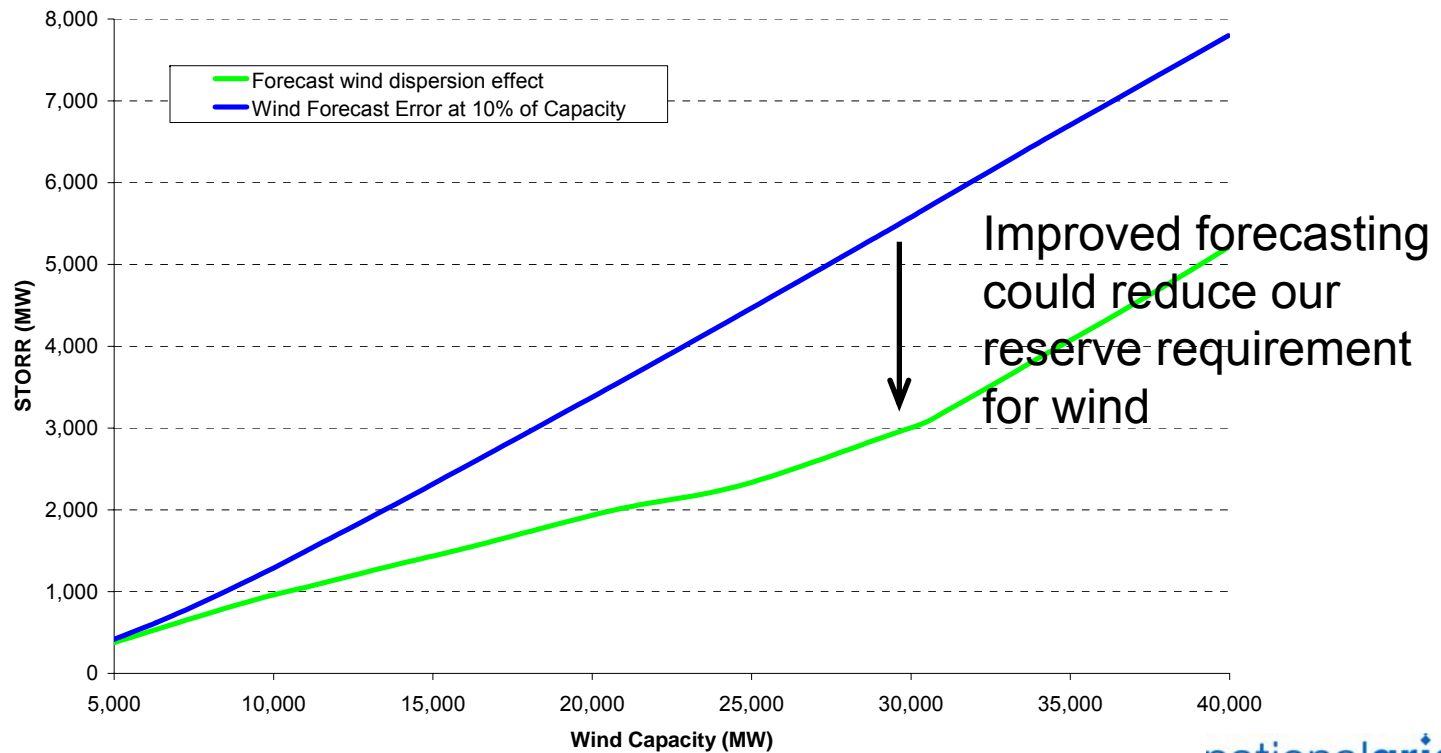
— Short Term Operating Reserve for average wind and low wind conditions



Reserve and Operating Margin

Our analysis incorporates the effect of improved wind forecasting

- ◆ Chart shows the component of Short Term Operating Reserve required for to cater for wind generation output forecasting error



Reserve and Operating Margin

Reserve costs in 2020

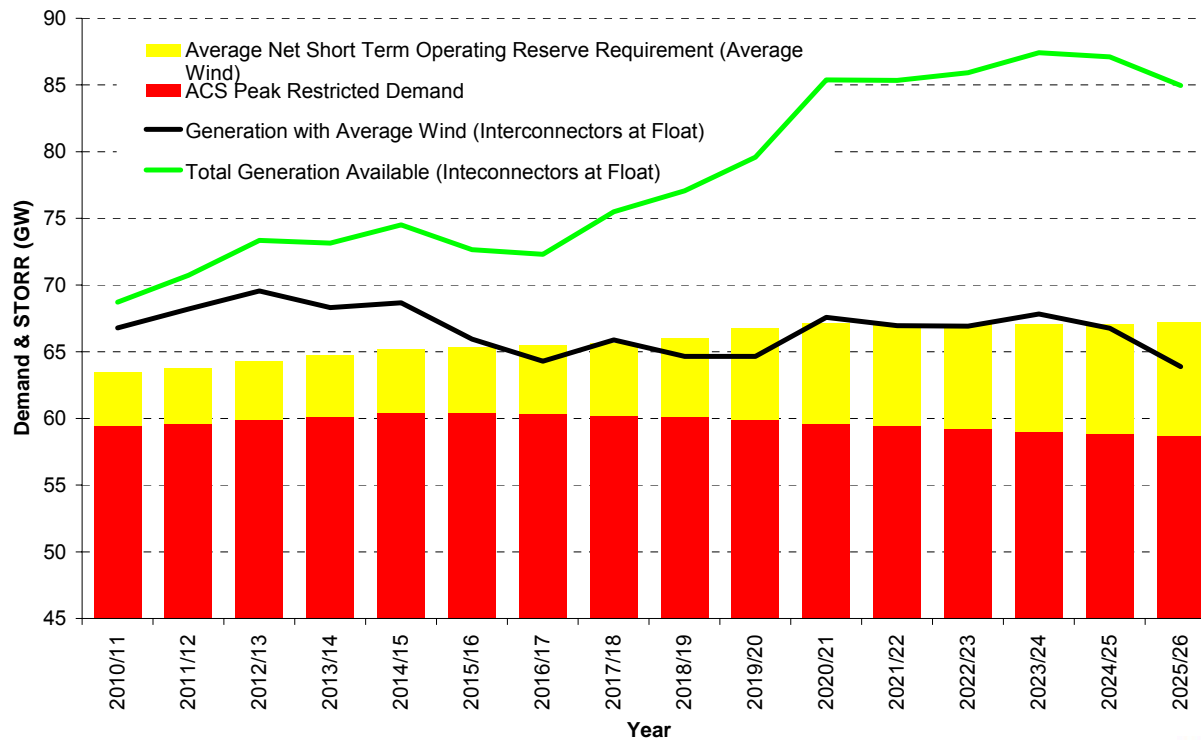
- ◆ Under 'Gone Green' and assuming improved wind forecasting
 - total of £566m per year
 - £229m per year for wind
 - £418m if wind forecasting does not improve
 - £88m per year for larger units
 - Assuming a 1,800MW infeed loss
 - Does not include response holding costs

- ◆ Costs quoted are costs of reserve at 4 hours ahead in today's prices

Reserve and Operating Margin

Operating Margins under 'Gone Green'

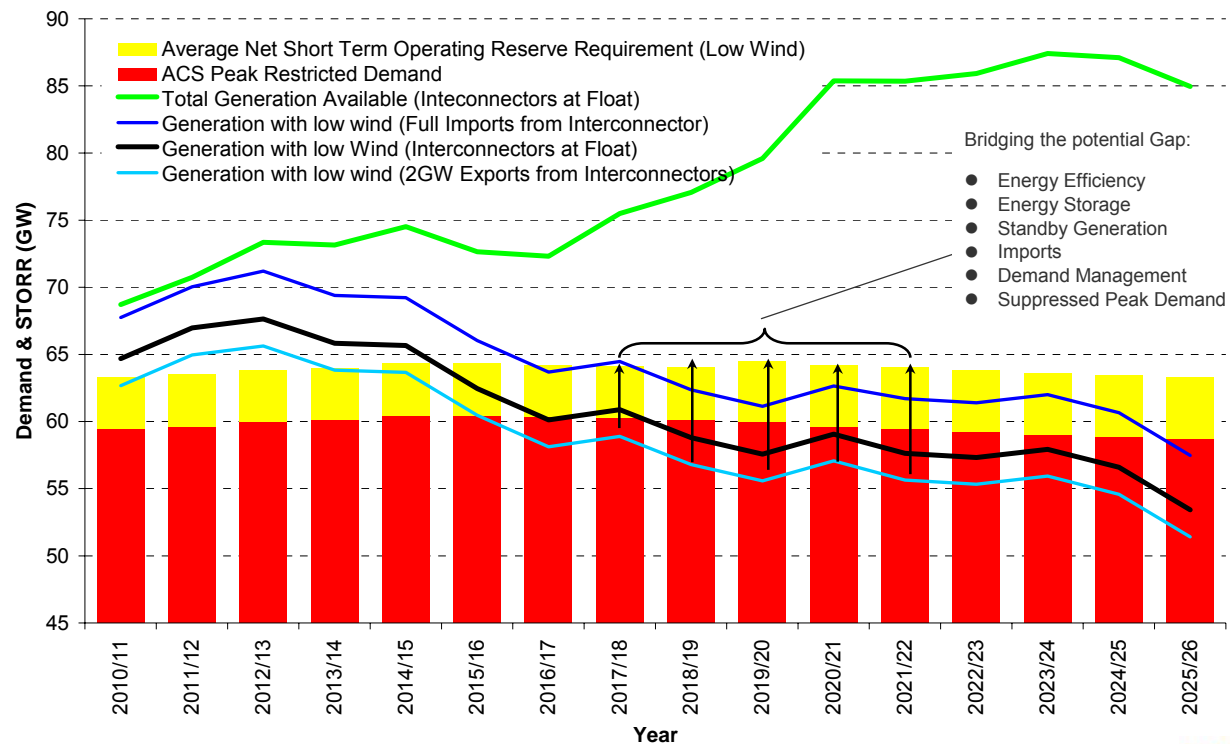
- ◆ Presented in a 'Winter Outlook' style
- ◆ Firstly, looking at average wind conditions



Reserve and Operating Margin

Operating Margins under 'Gone Green'

- ◆ However, average conditions become less meaningful as wind capacity grows
- ◆ Experience suggests that the System Operator needs to plan for low wind conditions



Reserve and Operating Margin

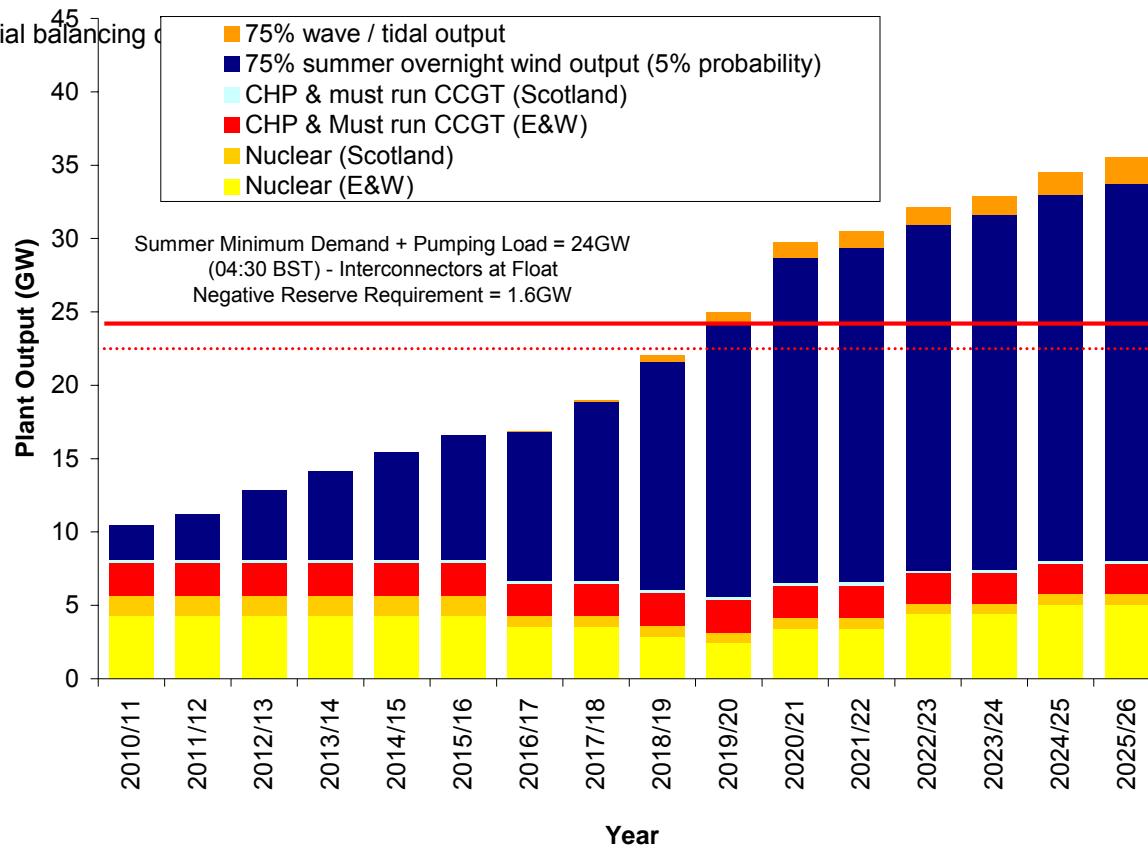
Key Points from our 'Gone Green' view of Operating Margin

- ◆ In our role as System Operator we need to consider 'low wind' events
 - Infrequent but significant when they occur
 - Further operational experience will help us define what 'low wind' means in capacity terms
- ◆ There are a number of ways that any gap between generation and forecast peak demand could be bridged by 2020
 - Demand management, interconnectors, standby generation, storage, energy efficiency, and other sources can all contribute
- ◆ We need to take a view on energy markets' impact on interconnector flows
 - Understanding of European issues is critical
- ◆ We need to take a view on
 - Demand sensitivity to prices
 - Impact of specific efficiency measures

Reserve and Operating Margin

Summer Minimum Demands under 'Gone Green'

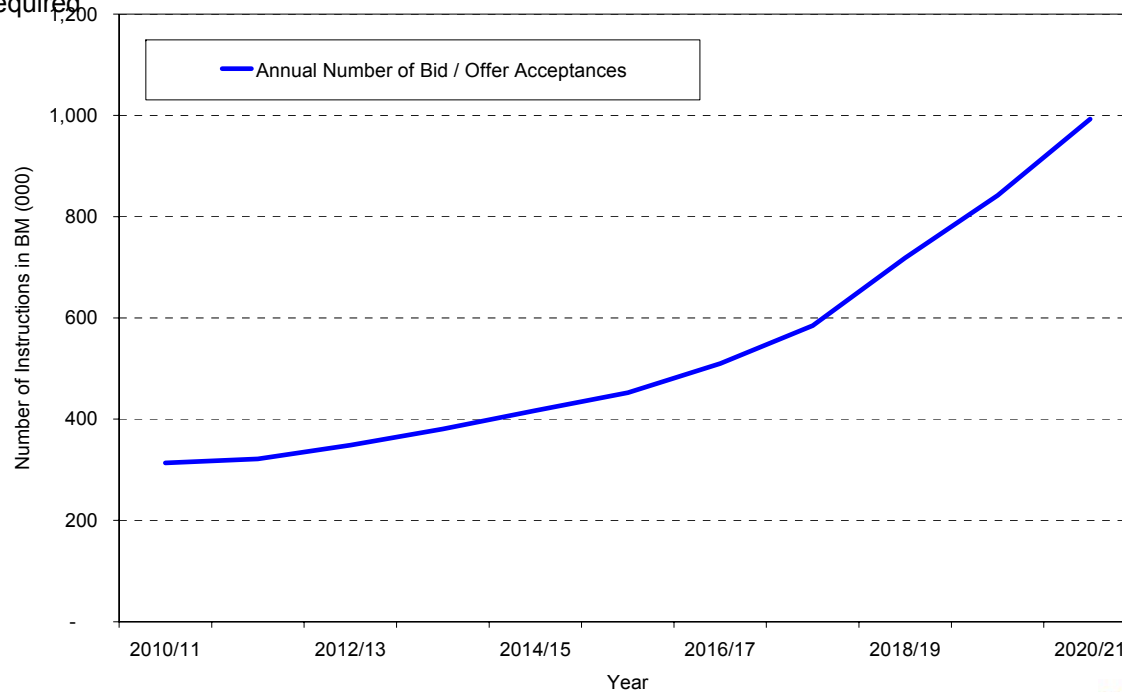
- ◆ Analysis based on occasions of 'High' renewable output (75% - 6 nights per year)
- ◆ Network reinforcements assumed to be in place
- ◆ Potential balancing capacity



Operating the Networks

We expect all market players to be busier

- ◆ We've started to look at specific activity drivers in our control room
- ◆ The chart below shows our view of the number of instructions we will need to issue
- ◆ Effects like this will impact on our investment programme for control systems, starting with BM replacement - more automation is likely to be required



Operating the Networks

Resilience

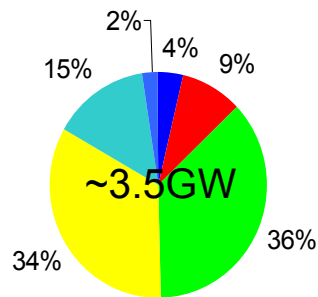
- ◆ Black Start
 - Current portfolio of service providers comprises 23 stations
 - 5 stations expected to close
 - New providers required
 - New technologies under consideration
 - Interconnectors
 - Wind
 - Storage
 - Are there alternatives?
- ◆ Distributed Generation
 - Highlighting the need to be robust to changes in frequency

Balancing Services Development

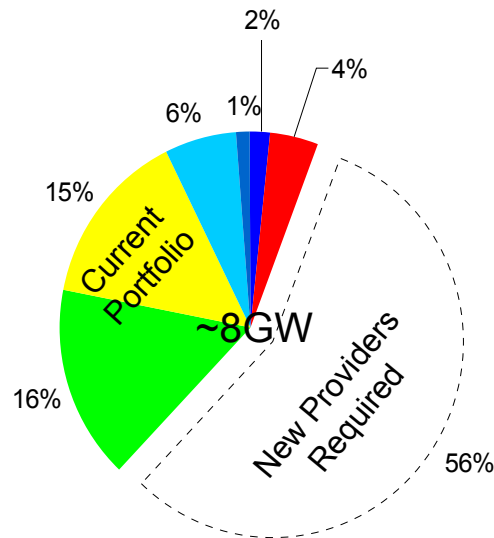
There are clear opportunities to provide Balancing Services

- ◆ The consultation document discusses and seeks views on the provision of services from demand side, storage and interconnectors amongst others

Typical Current Winter Reserve Provider Breakdown



Potential Opportunity for New Reserve Providers in 2020

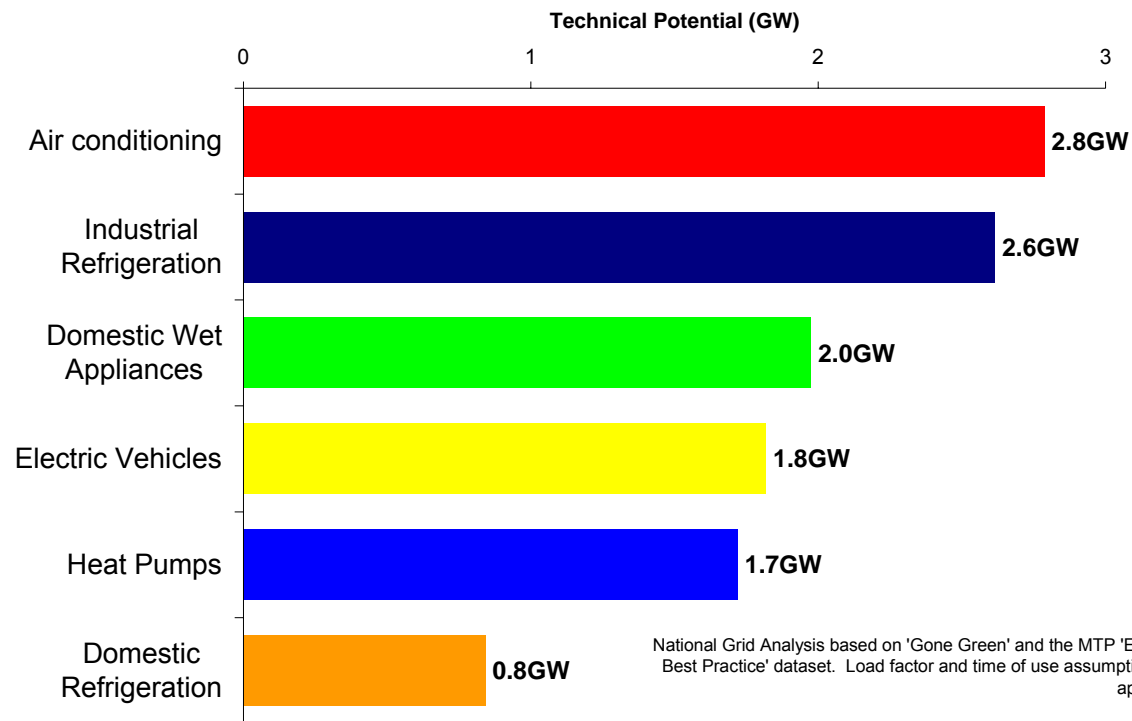


- Small Demand sites
- Large Demand sites
- BM STOR
- Non-BM STOR
- Pumped Storage
- Interconnectors

Balancing Services Development

For example – estimate of new demand side potential in 2020 based on ‘Gone Green’ and the ‘Market Transformation Programme’ dataset

- ◆ Reliant on ‘Smart’ type infrastructure to access domestic services
- ◆ Better appliance efficiency assumptions reduce potential service volume
- ◆ Who else is interested in these services?



Balancing Services Development

Meeting the future requirements

- ◆ Balancing Service Requirement Statement
 - Would this be useful?
 - What period should this cover?
 - Interactions?

- ◆ How should our services develop?
 - How do these interact with an efficient energy market?

What's next?

Follow up report issued in the Autumn

- ◆ Incorporating responses and feedback
- ◆ Any necessary updates

Intended to inform

- ◆ National Grid's development of processes and systems
- ◆ Energy Market Developments
- ◆ Future thinking on Security of Supply assessment

Responding

Formal or informal responses can be sent to

- ◆ Operating.2020@uk.ngrid.com

Responses can also be made online

Please respond by

- ◆ 14th August 2009