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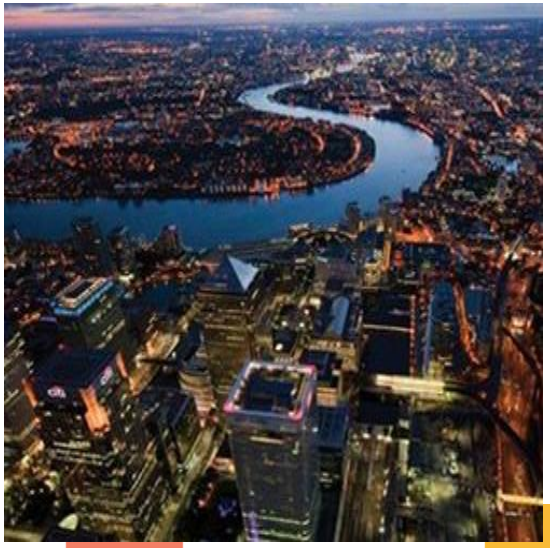
Network Innovation Competition: Enhanced Frequency Control Capability



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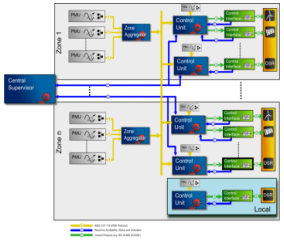
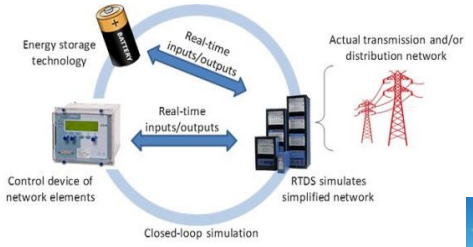
NIC EFCC Project

University of Strathclyde Glasgow



GE Grid Solutions
(Formerly Alstom)

MANCHESTER 1824
The University of Manchester



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centrica

Flexitricity

BELECTRIC

investigating how new and established technologies can play an increased role in maintaining system frequency

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Changing energy landscape

Changing energy landscape requires increased system flexibility

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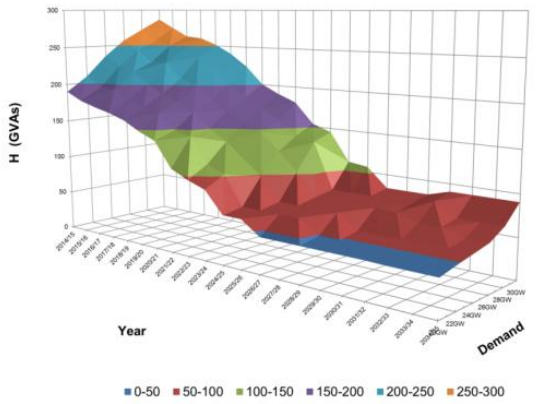

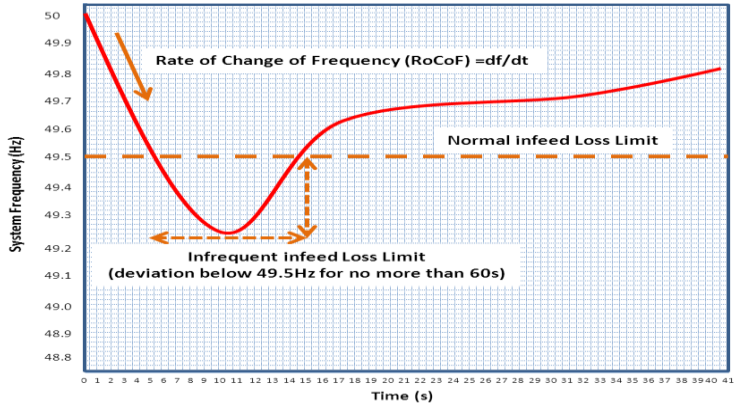

New Services	Solution
	Enhanced Frequency Control (Fast Response)
	Low Load Operation of Thermal Plants
	Synchronous Compensator

due to changing generation and demand profiles

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EFCC: What is it all about?

EFCC: focusing a potential solution

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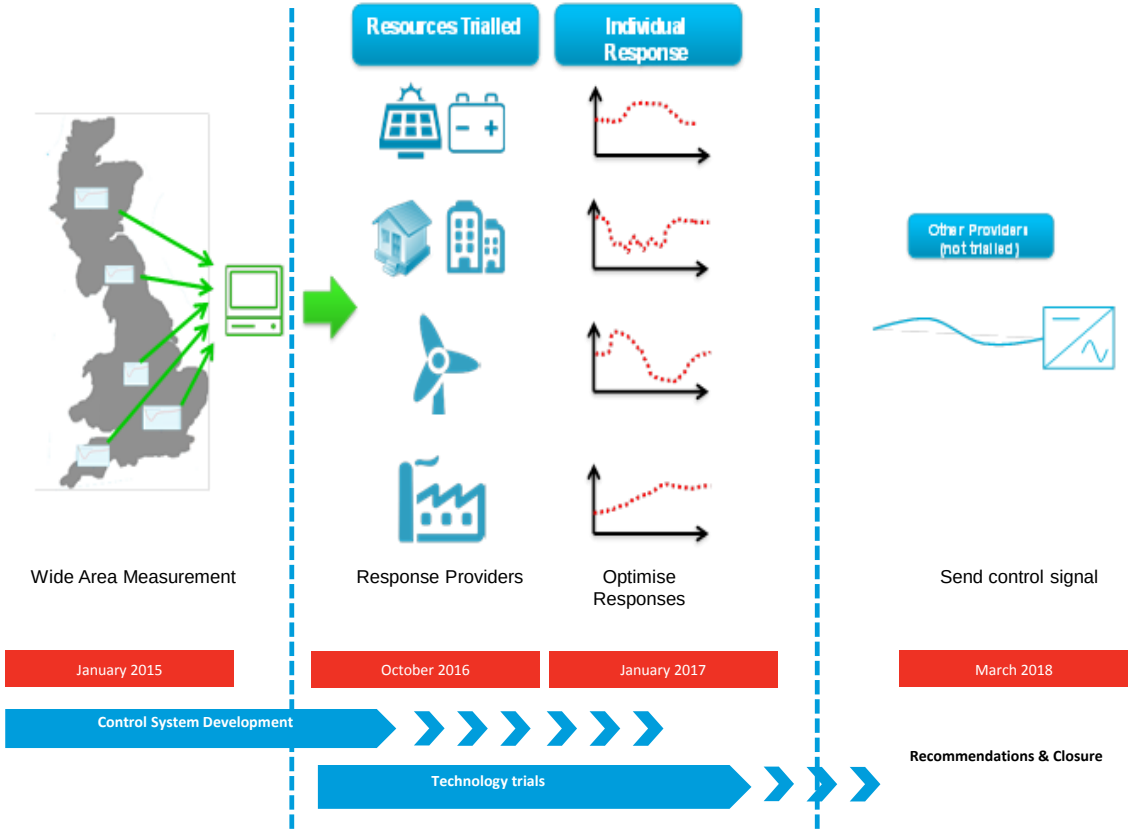
- Develop and demonstrate a new monitoring and control system
- Frequency data at regional level, calculate the required rate and volume of fast frequency response required
- Enable the initiation of required response by coordinating the different output characteristics of different technologies



for provision of rapid frequency response

Provision of rapid frequency response

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- Assess the viability of obtaining rapid response from new and established technologies:
  - solar PV – response by reducing output within 0.5 seconds
  - offshore wind farms – provision of additional power (10% output) within 0.2 to 0.5 seconds
  - demand side resources – response within 5 seconds
  - thermal power plant (fast start up)

for a wide range of technologies

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EFCC: How will it work?

How will it work?
Wide area monitoring

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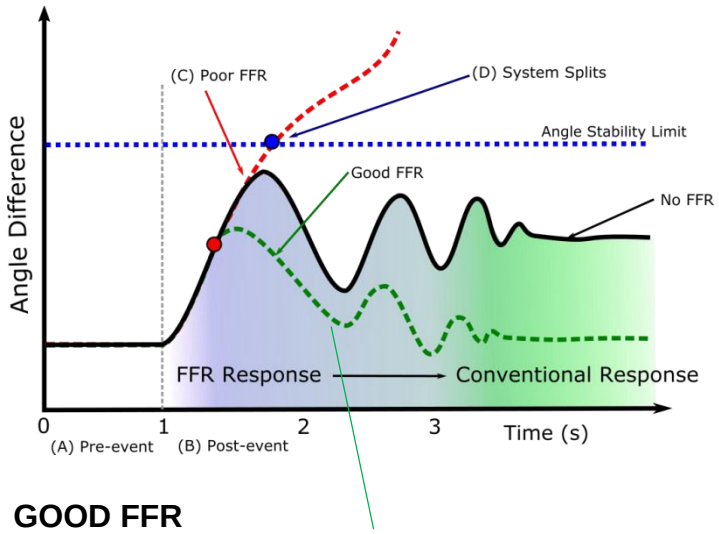
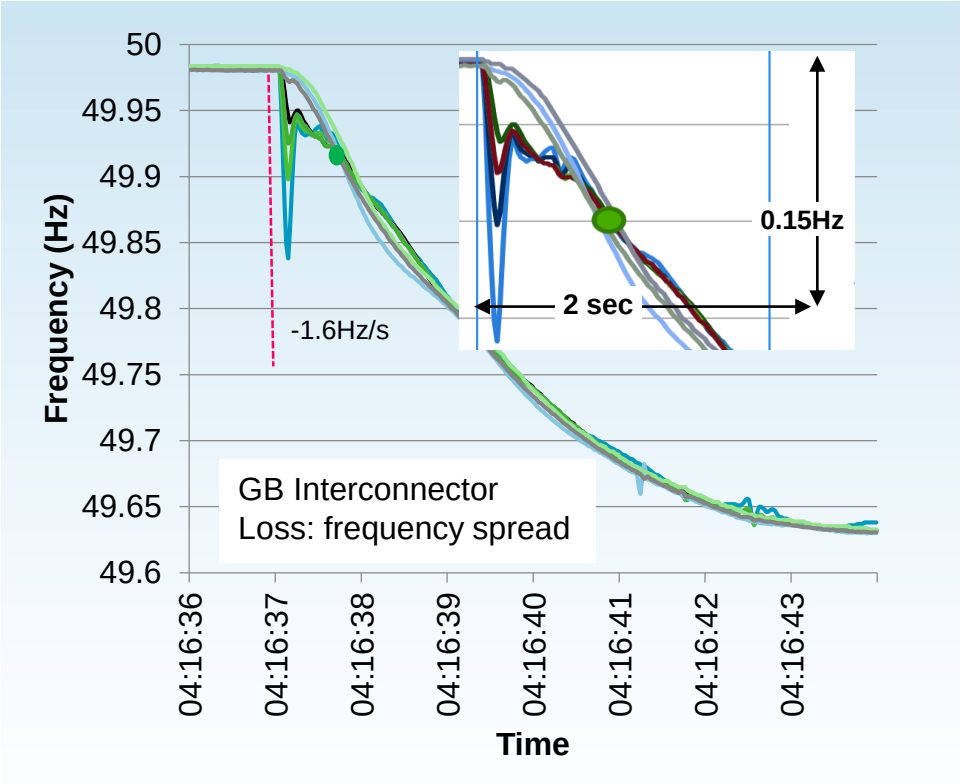
response location influences transfer limits & islanding risk

POOR FFR
Fast frequency response far from disturbance increases angle separation



GOOD FFR
Fast frequency response near disturbance reduces grid angle separation



How will it work?
Wide area monitoring

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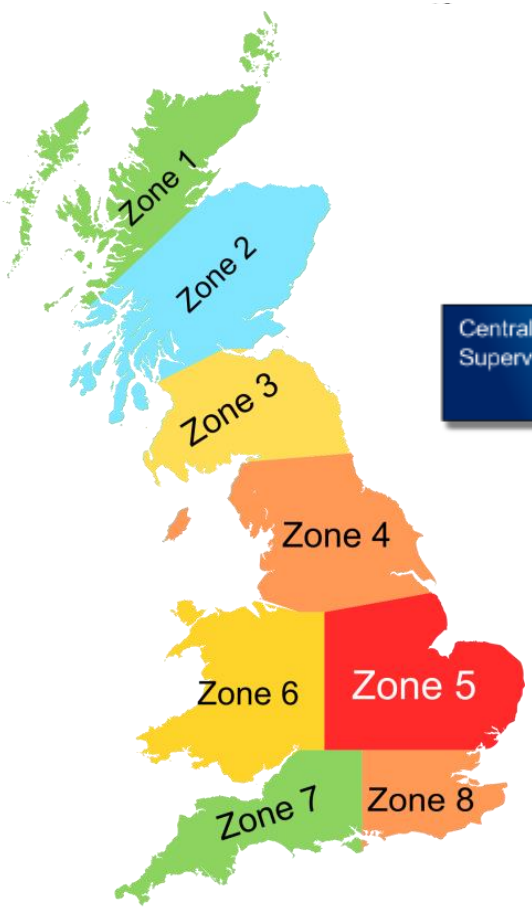

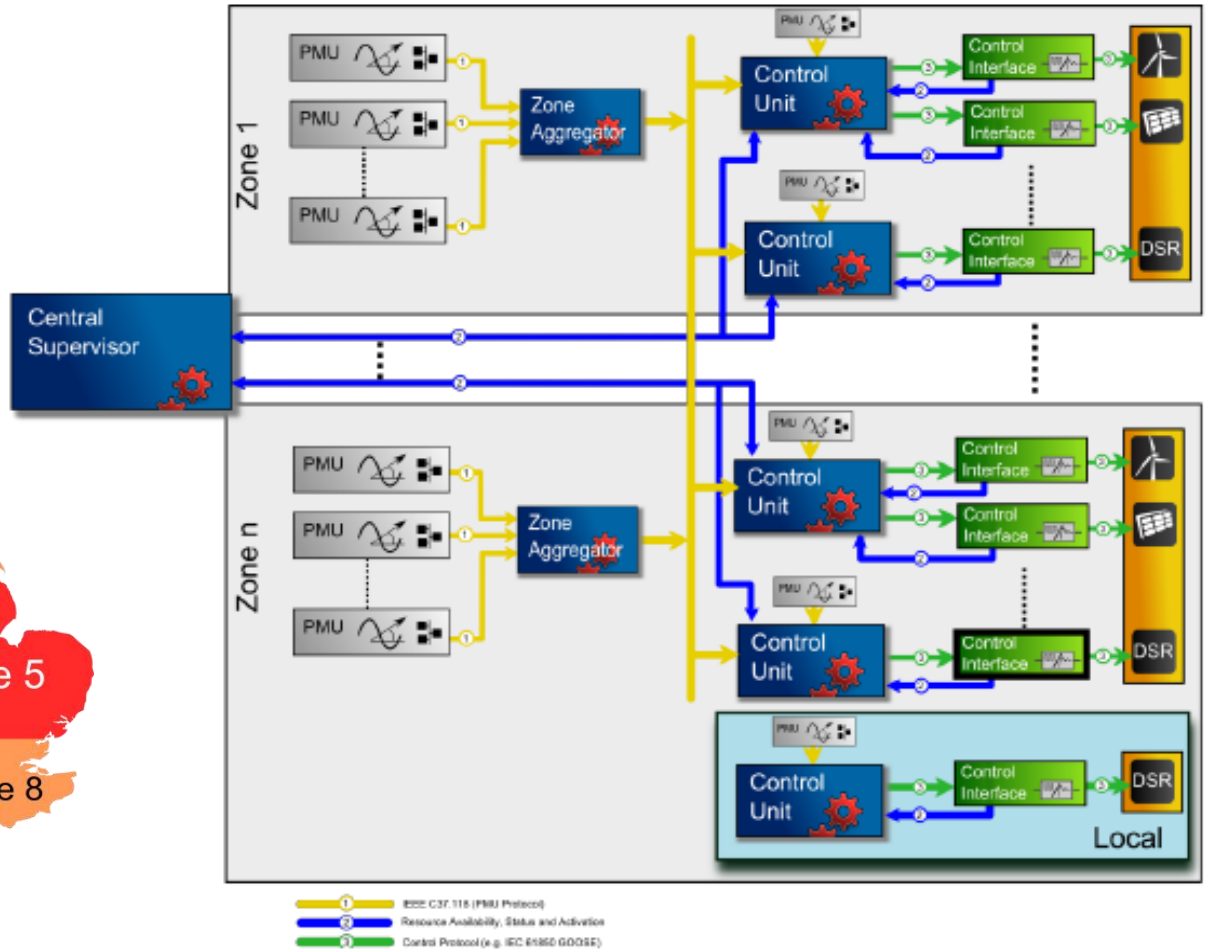

How will it work?
PhasorController

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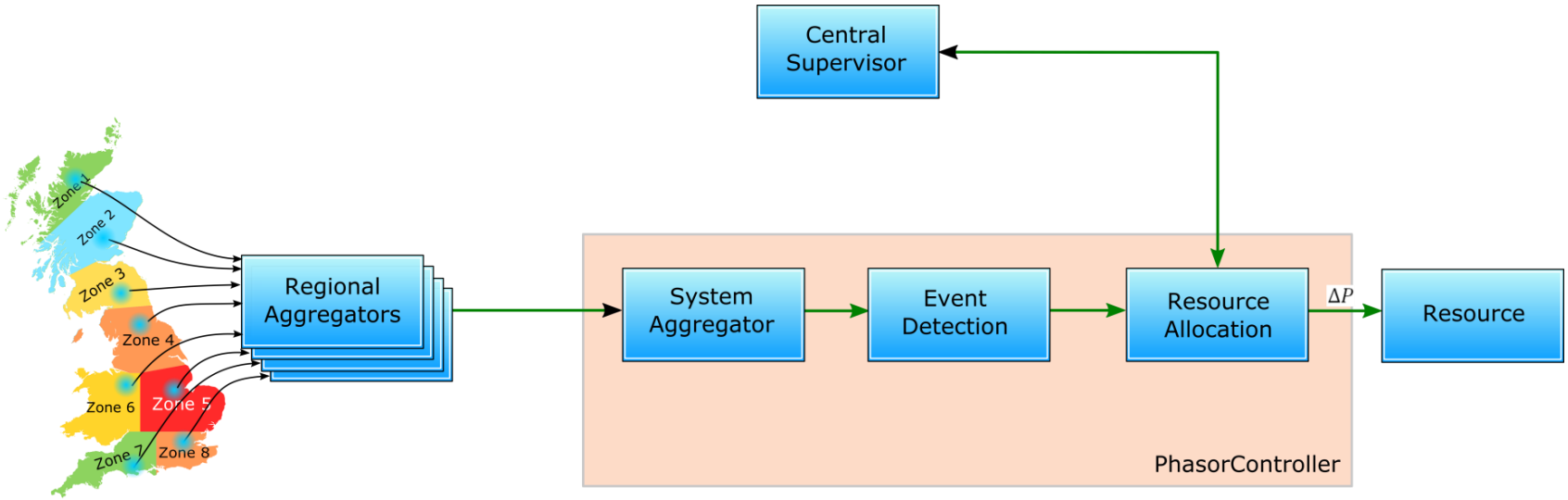

- System aggregator – confirmation of a true frequency event
- Event detection – measures Rate of Change of Frequency
- Resource allocation
  - Availability, capacity and ramp rates of resource
  - Optimise response requirement (speed vs cost)
  - Resources initiated to respond to specific event
- Activates response output

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EFCC: What Next?

EFCC: Entering an important stage

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So Far

- Development of monitoring and control system
- Simulated fast frequency response – CCGT
- Successful knowledge dissemination and stakeholder engagement event

Focus on

- Demonstration trials: simulation and real
- Support development of commercial framework
- Integration into business as usual activities
- Knowledge sharing events and lessons learnt

increased market participation, facilitate system management and deliver value to customers

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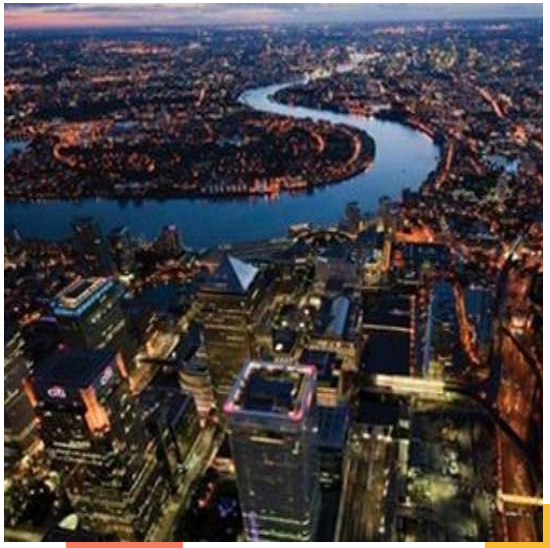

NIC EFCC website:
http://www.nationalgridconnecting.com/The_balance_of_power

2016 LCNI:
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