Achieving a Sustainable Energy Infrastructure

Delivering 21st Century Construction

15 January 2013

Institution of Civil Engineers

Nirmal Kotecha

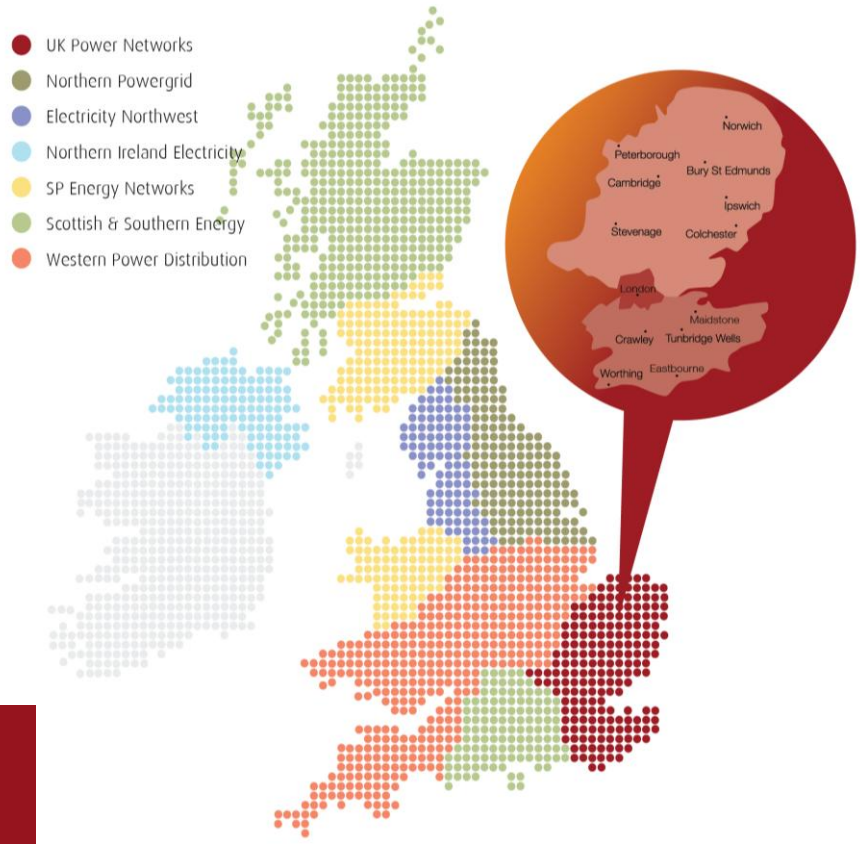
Director of Capital Programme & Procurement

UK Power Networks

About UK Power Networks

- If you live in London, the East of England or the South East of England you are probably one of more than 8 million customers to whom we distribute electricity.

- We own and operate the network of cables and power lines that bring the electricity to your door.
- We distribute c. 27% of the UK's electricity



- **170,000 kilometres of underground cables and overhead lines**
- **135,000 substations**
- **122,000 transformers**

The Challenge

Innovation

Smart Delivery

Next Steps

Summary

UK Energy Policy and ‘The Carbon Plan’ are shaping the sustainability agenda

Reduction of UK’s green house gas emissions

- 30% energy from renewable resources by 2020
- Decarbonisation of electricity production (longer term)
- Electrification of heat and transport

UK Energy Policy and ‘The Carbon Plan’ are shaping the sustainability agenda

Reduction of UK’s green house gas emissions

Security of UK’s energy supply

- Increasing electricity generation from low carbon and renewable sources
- Reducing reliance on imported fossil fuels
- Ensuring security and stability of energy resources

UK Energy Policy and ‘The Carbon Plan’ are shaping the sustainability agenda

Reduction of UK’s green house gas emissions

Security of UK’s energy supply

Strong UK Low Carbon Economy

- Becoming a low carbon technology world leader
- Generating ‘green’ jobs
- Exportable expertise

UK Energy Policy and ‘The Carbon Plan’

Reduction of UK’s green house gas emissions

Security of UK’s energy supply

Strong UK Low Carbon Economy

Affordability of UK Low Carbon Transition

- Depends critically on developing an efficient end-to-end electricity supply system
- Optimising investment in new transmission and distribution network capacity
- Minimising need for additional generation capacity (esp. low efficiency peaking plant)

The challenge for the electricity industry

Variable and decentralised low carbon electricity generation
Electrification of heat and transport

Variability of wind and solar generation output

Challenges

Increasing electricity usage to power electric vehicles and heat pumps

Distribution networks will require significant adaptation to accommodate local renewable generation, heat pumps and electric vehicles

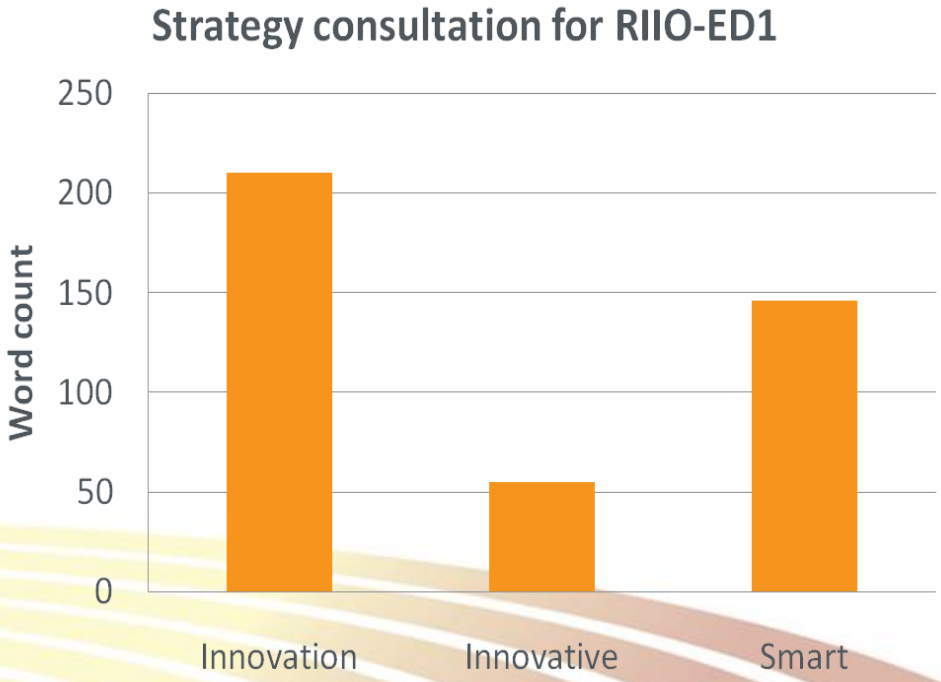
£ £

Innovation has to accompany this investment

“Innovation to play a key part in the DNOs delivering at **efficient cost and dealing with uncertainty”**

“Innovation can provide DNOs with the **flexibility** required to respond across a range of scenarios which could emerge in ED1”

“DNOs will **need to innovate** to explore smarter ways to integrate low carbon technologies.”



…on 17 December 2012, OFGEM put a price tag on the future investment needed in the UK Energy Infrastructure at £38 Billion up to 2021

Ofgem has today announced up to £24.2bn to deliver new and upgraded infrastructure for Britain's gas and electricity networks. ... The cost of running and maintaining Britain's energy networks up to 2021 brings the total package to £38.2bn.

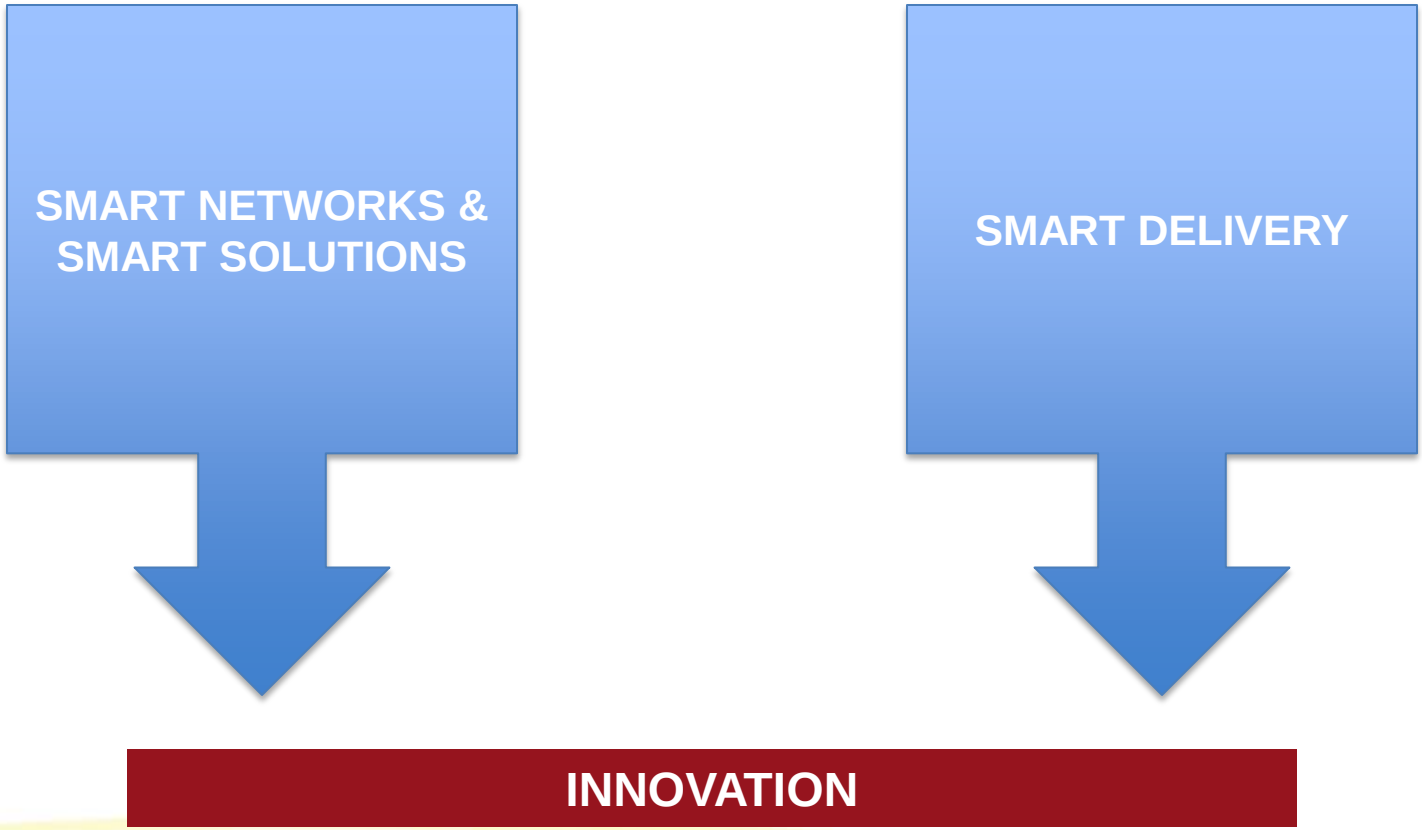
Source: OFGEM

OFGEM is using the RIIO Price Control Framework to incentivise energy companies to innovate in a cost effective way

"Ofgem's new and innovative price control – RIIO – delivers a sound regulatory environment that protects consumers by attracting the energy infrastructure investment that Britain needs at a fair price. **This provides a framework of strong incentives and penalties to stimulate the innovative and efficient operations of Britain's energy companies**."

Source: Lord Mogg - Ofgem Chairman

Innovation will come in many forms



The Challenge

Innovation

Smart Delivery

Next Steps

Summary

£6.7m awarded to Flexible Plug and Play (Tier 2)

2005 UK power Networks starts its innovation journey

Knowledge will be shared with 150,000 engineers worldwide

Portfolio of more than 40 IFI projects

£22.2 m in IFI investment to date

£3.7m registered Tier 1 investment to date

Four Tier 1 projects registered with Ofgem

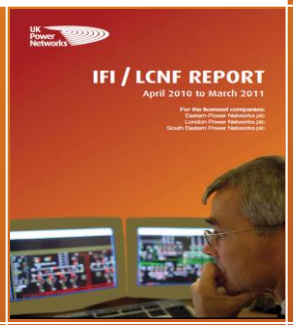
INNOVATION IN NUMBERS

£24.3m awarded to flagship project Low Carbon London (Tier 2)

Nine operational windfarms with a capacity of 100MW in the FPP trial area

LV Current Sensor Technology Evaluation will evaluate 7 different LV monitoring solutions

More than 50 project partners



More than 10 technical papers and one book

1,621 smart meters installed through the Low Carbon London

Flexible Plug and Play trial area is around 700km2 in the East of England

35,509 Distribution substation inspections

UK Power Networks

The Challenge

Innovation

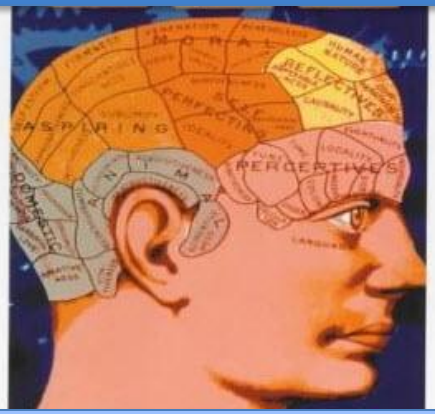
Smart Delivery

Next Steps

Summary

Smart Delivery comes through Intelligence

Becoming

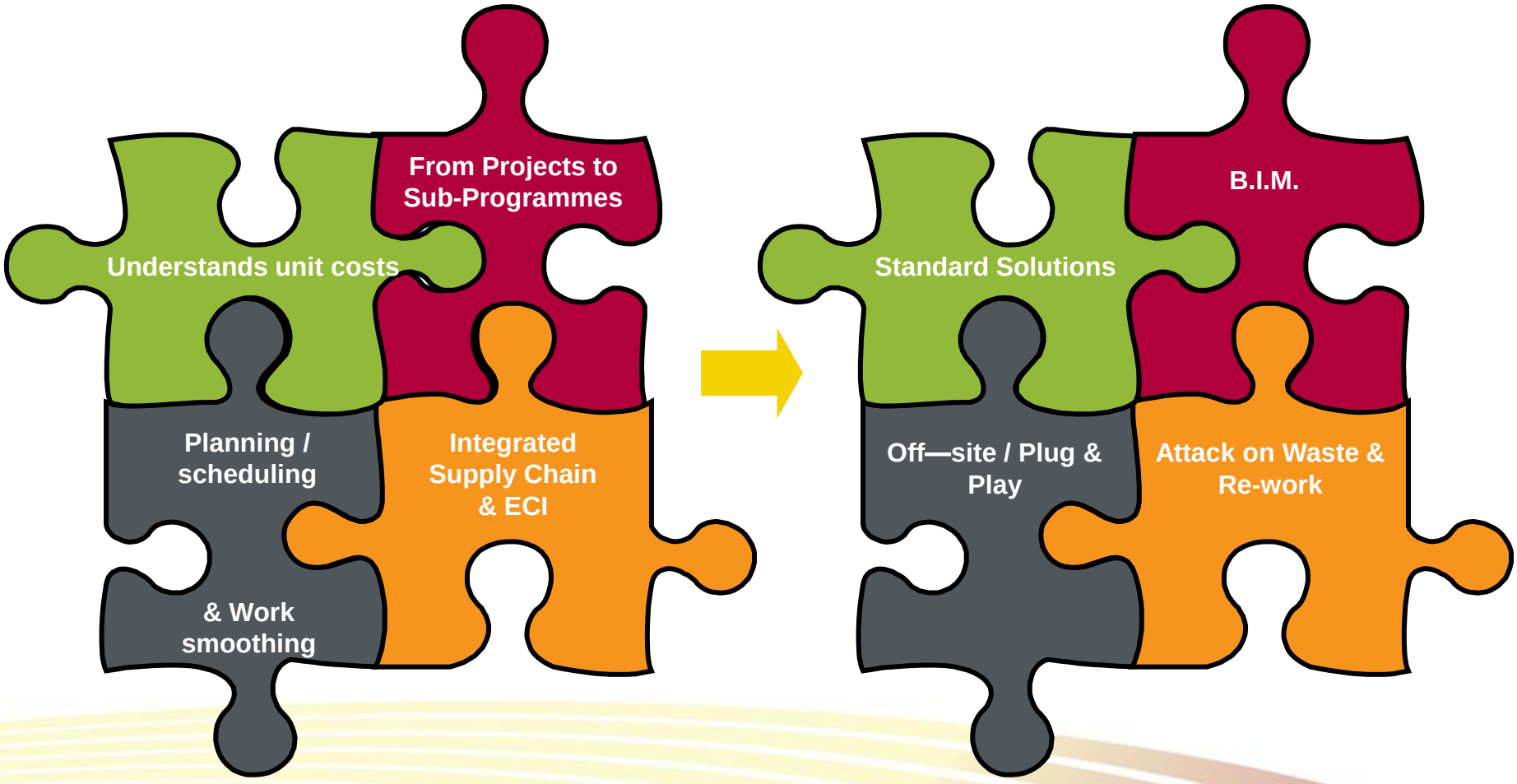


an Intelligent Client

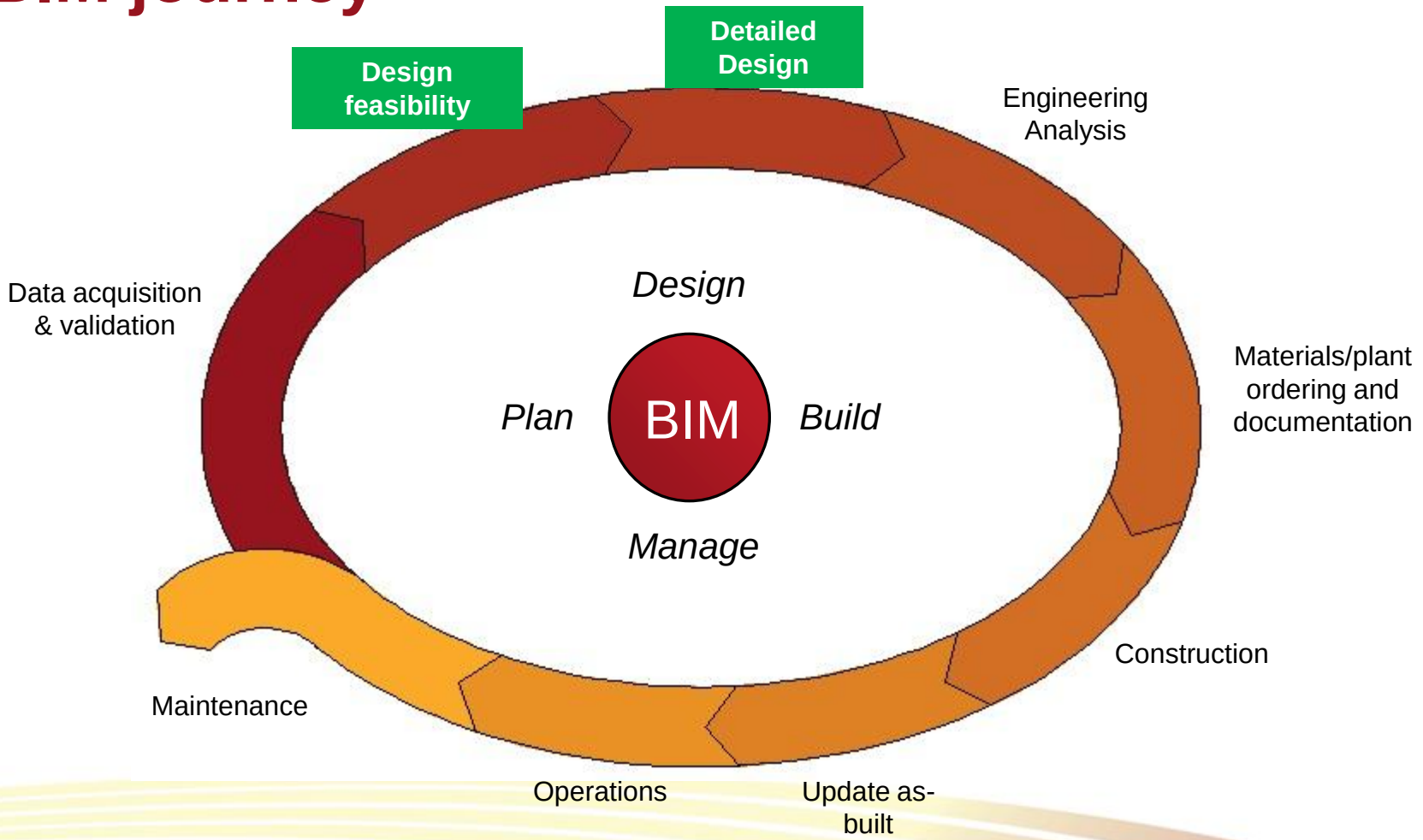
The Intelligent Client

- Understands its assets and makes optimum interventions
- Knows what good looks through a detailed understanding of unit costs
- Can reliably estimate and set target costs
- Understands the supply chain; key cost & waste drivers and key performance levers
- Has the maturity to work collaboratively with integrated supply chains
- Delivers predictable and consistent performance

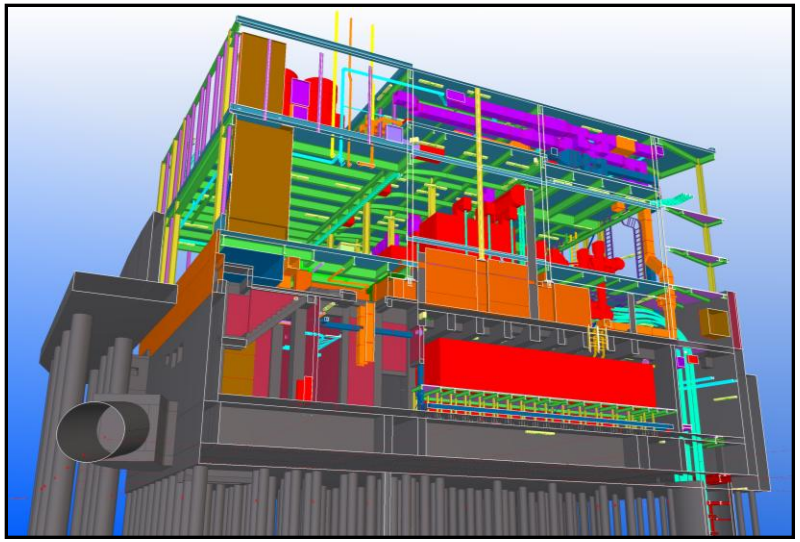
The Survival Strategy for the 21st Century Intelligent Client



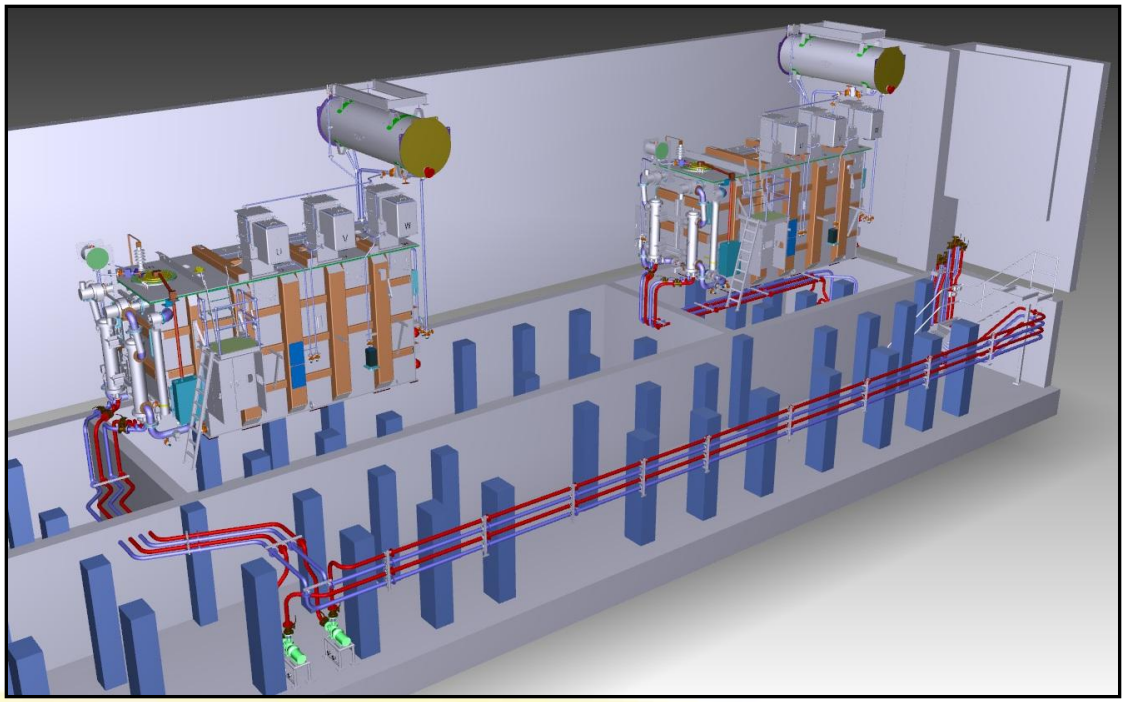
We are very much at the beginning of the BIM journey



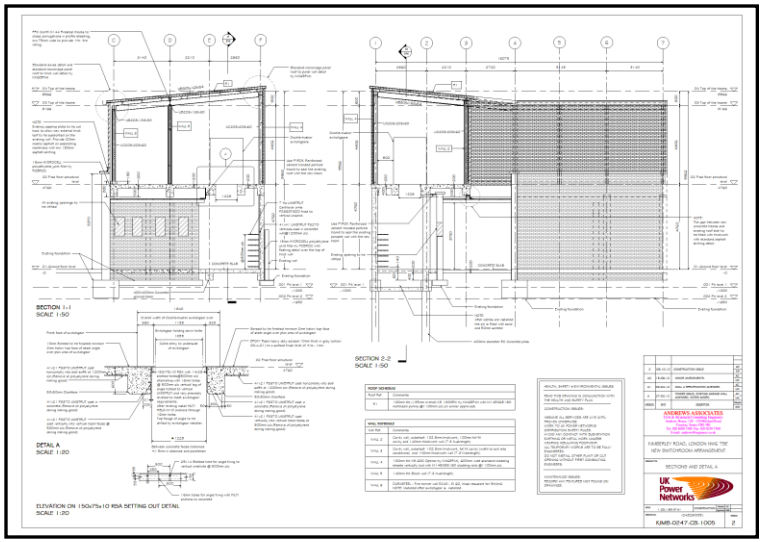
Limeburner Lane S/S (under construction)

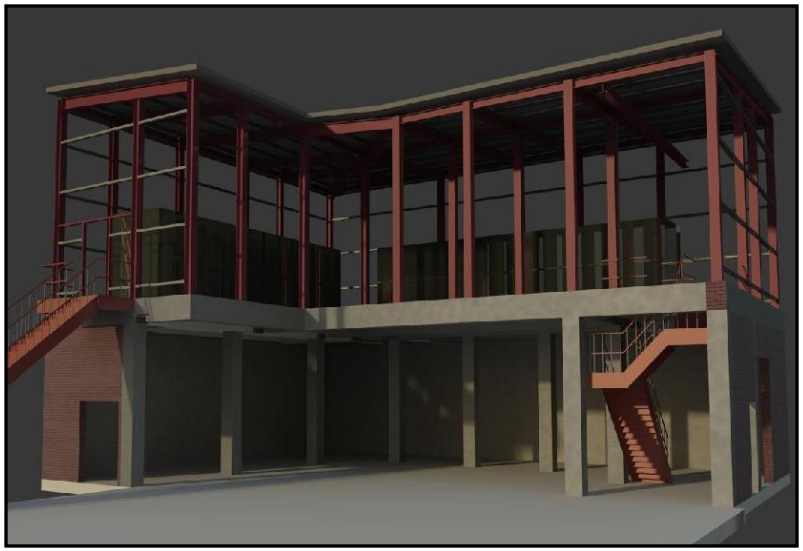


Moreton Street S/S Reinforcement (under construction) – Pipework design for transformer with oil/water heat exchanger.

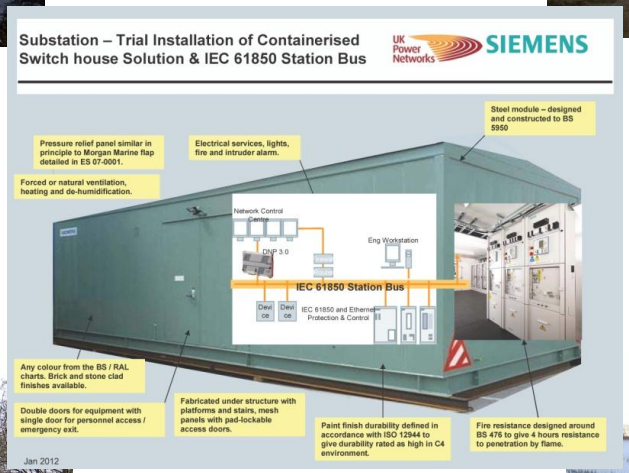


Kimberley Road S/S Reinforcement





We are trialling containerised sub-stations…



…as a small step on the road towards standardisation and BOS solutions

The Challenge

Innovation

Smart Delivery

Next Steps

Summary

Next Steps

1. Submit the RIIO Business Case for OFGEM
2. Continue to innovate and drive the smart networks agenda
3. Keep developing as an Intelligent Client
4. Become more demanding of the supply chain

The Challenge

Innovation

Smart Delivery

Next Steps

Summary

Summary

1. A sustainable energy infrastructure has to:
   - support the Government's Low Carbon agenda
   - be flexible to accommodate varying low carbon scenarios
   - be affordable
2. OFGEM is using RIIO to drive innovation as a means of supporting the Government agenda
3. The Energy Sector (Clients and Supply Chain) will need to rise to the innovation challenge
4. There will be winners and losers