Kent Active System Management (KASM)

Oct 2015 / Matthieu Michel
Project Background (update):

DG Heat Map:

SPN DG Connection Offers Accepted (Cumulative)

DG Heat map (June 2015)

SPN DG Connection Offers accepted (May 14 – June 15)

1GW

250MW (SPN Area) / 15MW (KASM Area)
Increasingly Dynamic DNO Network (East Kent Area):

1GW export to Netherlands

88 MVA load

112MW of additional offered generation

80 MVA load

36MW of additional offered generation

20MW of additional offered generation

50MW of additional offered generation

25MW of additional offered generation

45 MVA load

42 MVA load

50MVA load

25MW of additional offered generation

20MW of additional offered generation

315MW from Thanet Wind Farm

48 MW various DG

99 MVA load

80 MVA load

45 MVA load

132kV single circuit

132kV single circuit

132kV dual circuit

132kV single circuit

132kV dual circuit

55MW of additional offered generation

90MW from Kentish Flats

4S MVA load

50MW of additional offered generation

50MVA load

25MW of additional offered generation

50MW of additional offered generation

36MW of additional offered generation

50MVA load

132kV single circuit

132kV dual circuit

132kV dual circuit

132kV single circuit

300 MW of accepted Generation (Mostly solar)

650 MW of connected generation (Mostly wind)

2 GSP (> 350 in UK)

2 Interconnectors

(Third 1GW with Belgium by 18/19)

(Fourth 1GW with France)
## Summary of Issues:

- **Increasing wind / solar farms connected**  
  (Unpredictable power flows)

- **Parts of the network reaching Reverse Power Flows limits**  
  (Export to Transmission Network)

- **East Kent network requires 34 Contingency scenarios to be analysed**

- **No longer “day” of highest winter and lowest summer demand**

- **Worst case operational and planning practices**  
  (Min Demand, Max Generation / No diversity)

- **Long lead times and high cost for generation to connect**  
  (£11m / Post 2020)

- **Existing generators can be constrained up to 30% during outages**  
  (90MW for some generators)

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**Greater need for monitoring and real-time analysis (KASM)**
Investigate whether contingency analysis software can be used to safely run the high voltage network closer to its limits, by moving away from conservative, ‘worst case’ assumptions.

**New capabilities**: Real-time and automated contingency analysis

**Benefits**:  
- Reduce constraints on renewable generators  
- Release network capacity  
- Defer costly network reinforcements

**Project partners**:  

**Supplier (Bigwood)**:
Contingency Analysis – Draft architecture and data flows

National Grid

Secure ICCP Link

Generation and Load forecasting modules

Network Models

Contingency Analysis Tool

Third Party Data

UK Power Networks Control System

(EH V Metering (ICCP))

Network Models

Secure ICCP Link

Third Party Data

Network Models

Contingency Analysis Tool

(Automated multiple scenarios analysis based on historical data)

Dashbaord (Every 15 mins)
Main project activities:

**Build**

1. Establish a link between the UK Power Networks and the National Grid control rooms
   - To enable real-time data exchange

2. Install Contingency Analysis (CA) software
   - Model the East Kent (SPN)

3. Develop and integrate the forecasting modules in the CA software
   - For DG and demand in the network

**Trial / Use Cases**

1. Reliability management (Control)
   - Pro-actively identify and mitigate harmful contingencies in Real-time

2. Outage Management
   - Reduce outage constraints on generators
   - Reduced future labour cost

3. Network Capacity Management
   - Allow new generators to join the network
   - Avoid Network Reinforcement

**Work streams**

1. Work stream 1
2. Work stream 2
3. Work stream 3
4. Work stream 4
KAS: Successful Delivery Reward Criteria

<table>
<thead>
<tr>
<th>WS1</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
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<tbody>
<tr>
<td></td>
<td>Q1</td>
<td>Q2</td>
<td>Q3</td>
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<tr>
<td>Develop Business Process for NG link</td>
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<td>SDRC 9.1: Development of the strategy for inter-control room communication protocol</td>
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<td>Establish NG link</td>
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<td>Functional Design</td>
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<td>Data extract and scenario creation</td>
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<td>Software development</td>
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<td>Pre - Design</td>
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<tr>
<td>Design, data collection, testing</td>
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<td>Trial Design</td>
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<tr>
<th>WS2</th>
<th>2015</th>
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<tr>
<td></td>
<td>Q1</td>
<td>Q2</td>
<td>Q3</td>
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<tr>
<td>Contingency Analysis tool development and integration</td>
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<tr>
<td>SDRC 9.2 System integration of (CA) software into UKPN, excluding a real-time link to National Grid</td>
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<tr>
<td></td>
<td>Q1</td>
<td>Q2</td>
<td>Q3</td>
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<tr>
<td>Load and Generation Forecasting</td>
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<tr>
<td>SDRC 9.3: Installation of forecasting modules that will link the DNO control room with other data sources</td>
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<tr>
<td></td>
<td>Q1</td>
<td>Q2</td>
<td>Q3</td>
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<tr>
<td>Value Streams and business process impact</td>
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<td>SDRC 9.4 Demonstration of use of real-time contingency analysis in the control room</td>
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<tr>
<th>What is it?</th>
<th>How we do it today?</th>
<th>How KASM will deliver?</th>
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<tbody>
<tr>
<td><strong>Reliability Management (Control Engineers)</strong></td>
<td>Real-time monitoring of the network operation and mitigation of the effects of faults</td>
<td>Preventative Constantly analysing potential contingencies before they occur, alerting control room engineers, and recommending preventative actions</td>
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<td><strong>Outage Management (Outage Planners)</strong></td>
<td>Assessing short-term operating conditions for the network based on planned maintenance and forecasted generation and demand</td>
<td>Automated Automate the analysis of all possible contingencies. Forecasting capability will allow outage planners to use hourly (or sub-hourly) estimates of demand and generation</td>
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<td><strong>Network Capacity Management (Infrastructure Planners)</strong></td>
<td>Assessing network capacity, and determining timely reinforcement to ensure reliable operation</td>
<td>Actual Archiving capability will enable infrastructure planners to incorporate actual diversity of generation and coincidence with demand</td>
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**Case Studies:**
Stakeholder Engagement:

We are interested in views and considerations relating to:

- Inter-Control Centre Communications Protocol (ICCP) Link design and management.
- Generation and Load forecasting.

Please get in touch with us if you have any views relating to the above topics or have any other query about the project.

innovation@ukpowernetworks.co.uk
Thank you