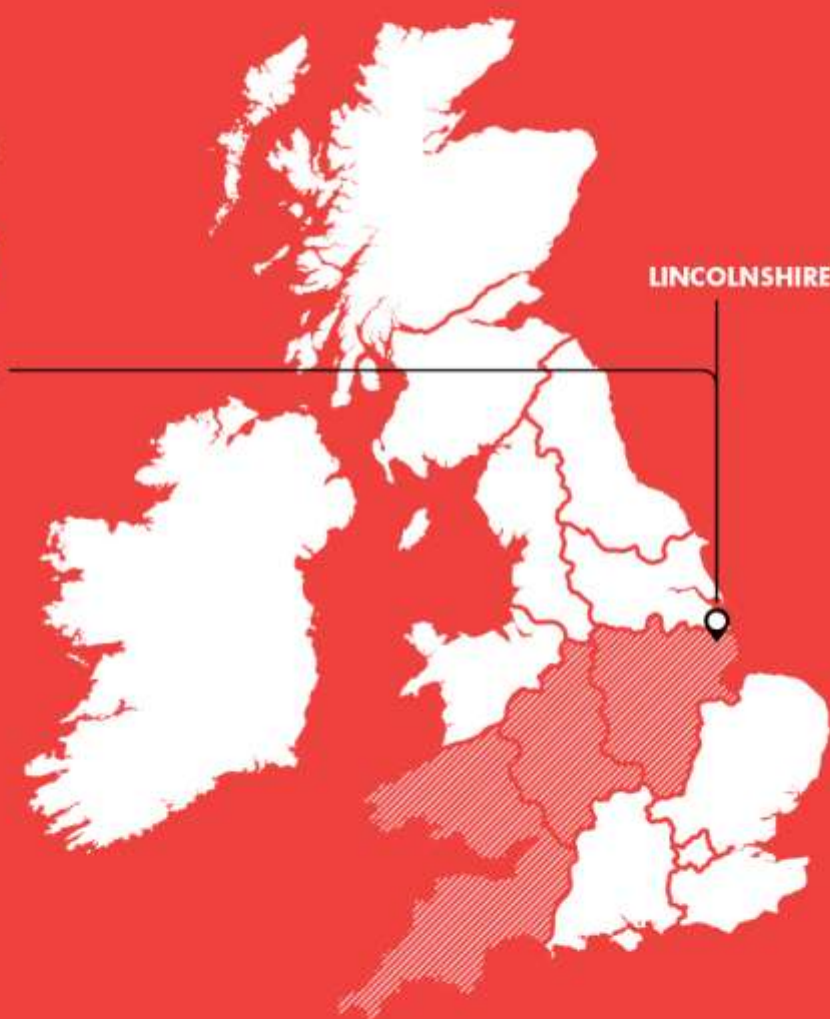


**CONNECTING
RENEWABLE ENERGY
IN LINCOLNSHIRE**



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Glossary

Term	Definition
ACSR	Aluminium Conductor Steel Reinforcement
AVC	Automatic Voltage Control
DG	Distributed Generation
DPCR5	Distribution Price Control Review Period 5
ED1	Electricity Distribution Period 1
EHV	Extra High Voltage
FACTS	Flexible AC Transmission system
HDA	Hard Drawn Aluminium
HV	High Voltage
LCNF	Low Carbon Networks Fund
LDC	Line Drop Compensation
LLCH	Lincolnshire Low Carbon Hub
OHL	Overhead Line
POWERON	GE's Network Management Software
PV	Photo Voltaic
SCADA	Supervisory control and data acquisition
SGS	Smarter Grid Solutions
Statcom	Static compensator

1 Executive Summary

Low Carbon Hub is funded through Ofgem's Low Carbon Networks Second Tier funding mechanism. Low Carbon Hub commenced in December 2010 and will be complete by 28th February 2015. Lincolnshire Low Carbon Hub is connecting renewable energy in Lincolnshire.

This report details the progress of Low Carbon Hub, focusing on the last six months, June 2014 to November 2014.

1.1 Business Case

The business case for this project remains very strong; there has been a sustained high level of enquiries and subsequent Distributed Generation (DG) connection offers and acceptances across all four WPD licence areas. As evidenced by the Distributed Generation constraints map, an increasing number of areas within WPD's licence areas are showing limitations in the ability to cost effectively connect distributed generation passively without significant conventional network reinforcement.

Within the project area, where appropriate, Alternative Connection offers have been offered since February 2014 alongside conventional connections offers for Distributed Generation connections were appropriate. 148MW of alternative connection offers have been received, 49MW have already been accepted and a further 47.4MW is still in the acceptance phase. Owing to the significant business case for Alternative Connections and work completed through the Lincolnshire Low Carbon Hub, the technique is being rolled out across all four licence areas as detailed on www.westernpower.co.uk/connections

The innovative methods being installed and tested continue to suggest they are a suitable and cost effective alternative to conventional network reinforcement. A full evaluation of the techniques will be included in the project close down report.

1.2 Project Progress

During this reporting period (December 2013 – May 2014) Low Carbon Hub has made progress in all project techniques, finalising many. The project remains on schedule to have all techniques completed and learning gathered by the end of the project.

- The construction activities installing new circuit breakers, isolators, protection relays and associated equipment at Alford, Bambers Wind Farm, Chapel St Leonards and Ingoldmells have been completed.
- All the telecommunications links have been completed with a programme of work in place to transfer all of the protection relays onto these comms links.
- The Dynamic AVC Pseudo VT has been commissioned and is operating at Horncastle and the Dynamic AVC algorithm has been honed in PowerON simulator with a number of small iterations to optimise it's operation taking place over the last reporting period.

1.3 Project Delivery Structure

1.3.1 Project Review Group

The Low Carbon Hub Project Review Group has met once during this reporting period discussing

Fortnightly Site Delivery reviews have continued during this reporting period. These meetings have been used to coordinate work from the relevant internal and external teams working on this project, review progress, risks and issues with the associated teams and project stakeholders.

1.3.2 Resourcing

The project resourcing has been maintained over the last six months with the use of Gunning Transmission and Distribution Services Ltd providing additional commissioning and fitting resource.

The projects risk (ID12) remains a major risk; this is associated with project loss of key delivery staff through long term absence or a change in role. This is due to the reliance on key parties to deliver the project in a short timescale.

1.3.3 Collaboration Partners

The Lincolnshire Low Carbon Hub does not have any collaboration partners, however continues to have a good relationship with relevant project suppliers and local stakeholders.

1.4 Procurement

The significant procurement activities associated with the Lincolnshire Low Carbon Hub have been documented in previous reporting periods. All long lead time items have been delivered to site or internal stores, significantly reducing the risks associated with delivery.

1.5 Installation

Installation activities for the Low Carbon Hub are continuing at a good pace, approximately 1 month ahead of schedule. The installation of equipment at Chapel St Leonards, Ingoldmells and Alford has been completed; the installation of additional hardware required for the Dynamic Voltage Control was carried out in June 2014 with further installations occurring in December 2014. The installation programme will allow the project to capture all the necessary learning from the project.

1.6 Project Risks

The Project Manager takes a proactive role in ensuring effective risk management for Low Carbon Hub. They ensure that processes have been put in place to review whether risks still exist, whether new risks have arisen, whether the likelihood and impact of risks has changed, and report significant changes which adjust risk priorities and deliver assurance of the effectiveness of control.

Contained within Section 8.1 of this report are the current top risks associated with successfully delivering Low Carbon Hub as captured in our Risk Register along with an update on the risks captured in our last six monthly project report. Section 8.2 provides an update on the most prominent risks identified at the project bid phase.

1.7 Project learning and dissemination

Project lessons learned and what worked well are captured throughout the project lifecycle. These are captured through a series of on-going reviews with stakeholders and project team members, and will be shared in lessons learned workshops at the end of the project. These are reported in Section 6 of this report.

During this reporting period we have shared our learning from Low Carbon Hub through two WPD events, the WPD FACTs dissemination event in Louth, Lincolnshire on 24th July 2014 and Balancing Generation and Demand event in Birmingham on 20th November 2014.

Flexible AC Transmission System devices (FACTs) disseminations

Following on from request and subsequent dissemination of FACTs learning to Scottish Power in May 2014, all DNO's were invited to attend the workshop, representatives from four attended. The event provided a detailed overview of FACTs, the relevance to Distribution Network Operators and provided a copy of all the WPD policies.

The lessons learnt from this installation at Trusthorpe Primary substation and how these lessons could be acted upon to make the FACTs solution a DNO could use as an alternative to conventional network reinforcement.

Balancing Generation and Demand dissemination

Over 100 people from across the industry attended WPD's Balancing Generation and Demand dissemination event where learning from all WPD projects was disseminated on in three core areas. The learning generated from the Low Carbon Hub commercial agreements was disseminated on through the Alternative Connections Agreements section.

Internal Knowledge Dissemination

The project has been presented on at a number of internal dissemination of learning has occurred, including the roll out of Alternative Connections, developed through the Low Carbon Hub to all Primary Network Design planners across WPD.

In addition to this we have shared our learning (where applicable), through discussions and networking at a number of knowledge sharing events hosted by other organisations.

Table 1-1 - Contribution to knowledge sharing events hosted by other organisations

Event Title	Date	Host	Contribution
LCNI Aberdeen dissemination event	21/10/2014	ENA	Presenter
Licence Network Operators event - Deployment of Alternative Connections to Generation Customers in the Midlands, South West and Wales	16/09/2014	ENA	Presenter

2 Project Managers Report

2.1 Project Background

The Low Carbon Hub for East Lincolnshire has been designed to test a variety of new and innovative techniques for integrating significant amounts of low carbon generation on to electricity networks, in an effort to avoid the costs that would normally be associated with more conventional methods.

The project received £3m of funding from Ofgem's Low Carbon Networks Fund Tier 2. In this project, we are seeking to explore how the existing electricity network can be developed ahead of need and thus deliver low carbon electricity to customers at a significantly reduced cost in comparison to conventional reinforcement.

Lincolnshire, being on the east coast makes it suitable for a wide range of renewable generation types, these include onshore and offshore wind farms, large scale solar Photo Voltaic (PV) and energy from bio crops. Many generators cannot connect to the distribution network closest to them due to the effects the connection would have on the network operation.

These connections tend to result in installing new underground cable to areas closer to Skegness where the effect on the network is less, meaning it could operate within its design and operation limits. This can be very expensive and prevent generation connections. We have received a high volume of connection enquiries from developers which made the location ideal for this project. Figure 2-1 shows the range of innovative techniques being trialled as part of this project.

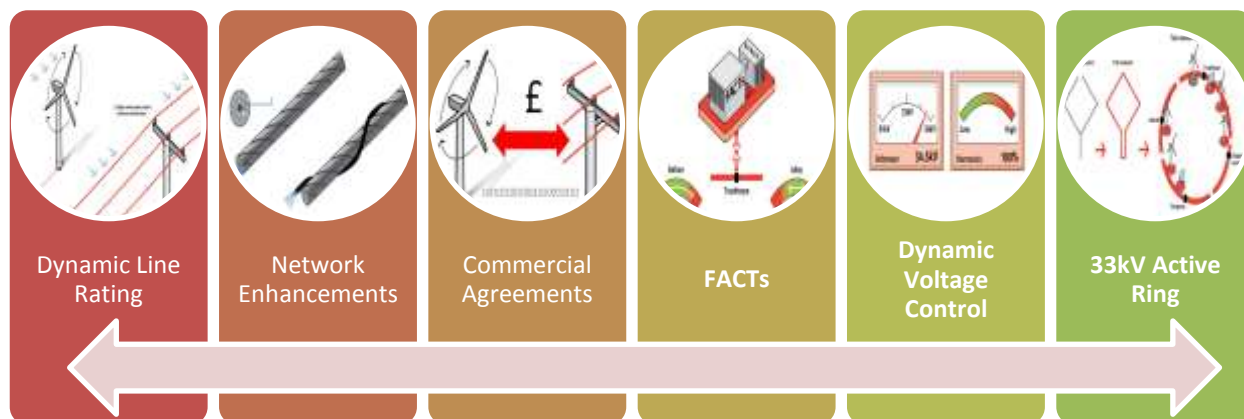


Figure 2-1 - Project techniques

2.2 Project Progress

Table 2-1 - Progress to date - Key Outputs and Milestones

Due Date	Type	Description	Status
28/02/2011	SDRC	Host a workshop with distributed generators interested in connecting to the Low Carbon Hub.	Activity Completed Feb 2011. For more information please see Dec 2010 to June 2011 report.
31/05/2011	SDRC	Dissemination to other GB DNOs and IDNOs of design recommendations for connecting optical fibres and wireless links to new and existing wood pole overhead power lines.	Activity Completed May 2011. For more information please see Dec 2010 to June 2011 report.
31/08/2012	SDRC	Apply dynamic line rating to GE PowerOn.	Activity Completed November 2012. For more information please see June 2012 to Dec 2012 report.
28/02/2015	SDRC	Determining the degree to which voltage can be controlled by installing and operating a FACTs device.	The FACTs device was connect to our network by 01/2014, the degree to which voltage can be controlled by installing and operating a FACTs device will be included in the close down report

2.2.1 Progress against Network Enhancements

When network assets are being replaced based on condition or load reasons, the replacement is based on the minimum cost scheme. This project has tested if additional functionality should be either designed or built, recording the increase in cost and further functionality these assets can provide in the future. This increased functionality has included installing assets with a larger capacity rating that have the provision for fibre communications to be installed.

In this project, sections of our existing 33kV network have been replaced due to poor condition. 10.5km of network was upgraded to increase capacity and designed with the capability for fibre installed for the first time. The work was completed in December 2013 and in addition to investment already funded through the current distribution price control (DPCR5) settlement.

The standard design when replacing rural 33kV Overhead lines is to install 150mm² Aluminium Conductor Steel Reinforced (ACSR), the circuits being replaced in the LLCH area have been replaced with 300mm² Hard Drawn Aluminium (HDA) with the provision for optical fibre both at the construction phase and as a retrofit activity.



Displayed at the LCNI conference – Sample conductors before and after the LCH Network Enhancements

Progress in the last reporting period

There has continued to be significant levels of industry debate regarding the ability for DNOs to build assets ahead of need for future DG connections. The full learning from this technique, options and potential barriers will be detailed in the project close down report.

2.2.2 Progress against Commercial Arrangements

The majority of the generation connection offers made are non-firm (teed connections) which operated with a fixed power factor. These typically have very little communications between the DNO and the generation customer, the only communications with the generator is the recovery of high level generation outputs through SCADA.

Generation connections made under a fit and forget arrangement must be modelled for the most onerous credible scenarios that could occur on the network. This connection philosophy will ensure under normal operating conditions the generation will be unconstrained. This can lead to significant amounts of spare capacity in the system for periods where the worst possible scenarios do not occur.

“Fit and forget” networks are modelled for the worst credible scenarios:

- Connected DG are all simultaneously operating at their full outputs
- Whilst the distribution network is at minimum demand
- Whilst the distribution network is operating the upper voltage bandwidth

The commercial agreements that have been developed through the Low Carbon Hub will allow customers to choose an alternative connection using the LCH innovative techniques. They will to have a much greater participation in the active network management which could lead to quicker and cheaper connections to the network.



Alternative Connection study example and the LCH Active Network Management controller

Progress in the last reporting period

The first alternative connections are continuing to be issued to generation developers. During the last reporting period responsibility for issuing Alternative Connection Offers has transferred from the Future Networks Team to the main business. Alternative connections have been rolled out across all WPD areas with all primary and 11kV planners now being able to offer connections. ANM connections are now being accepted in several areas including East Lincolnshire, Corby and Bridgwater and Street.

In total, 24 Alternative Connection have been offered to Generation Developers, 148MW of generation in total, 46.5MW wind generation, 98MW solar PV generation connections and 1.5MW of Anaerobic Digestion generation connections. A number of discussions continue to be held with Energy Storage developers looking at the opportunities associated with connecting energy storage in East Lincolnshire, this was also disseminated at the WPD dissemination event held on 20th November 2014.

The Constraint analysis tool has been scaled up to facilitate additional connections and model constraints across generation connections from the entire Grid group, comprising of Skegness, Sleaford and Grantham Grid substations, accounting for Constraints from the 400kV/132kV super grid transformers to the 11kV bars.

2.2.3 Progress against Dynamic AVC

Building on the principles of one of our previous Innovation Funding Incentive (IFI) projects, the voltage on the network will be actively varied. This technique, known as dynamic voltage control, will be carried out in real time using measurements coming from demand and generation sources. Dynamic voltage control should allow us to further increase the capacity of the network whilst maintaining the system voltage within the statutory limits.

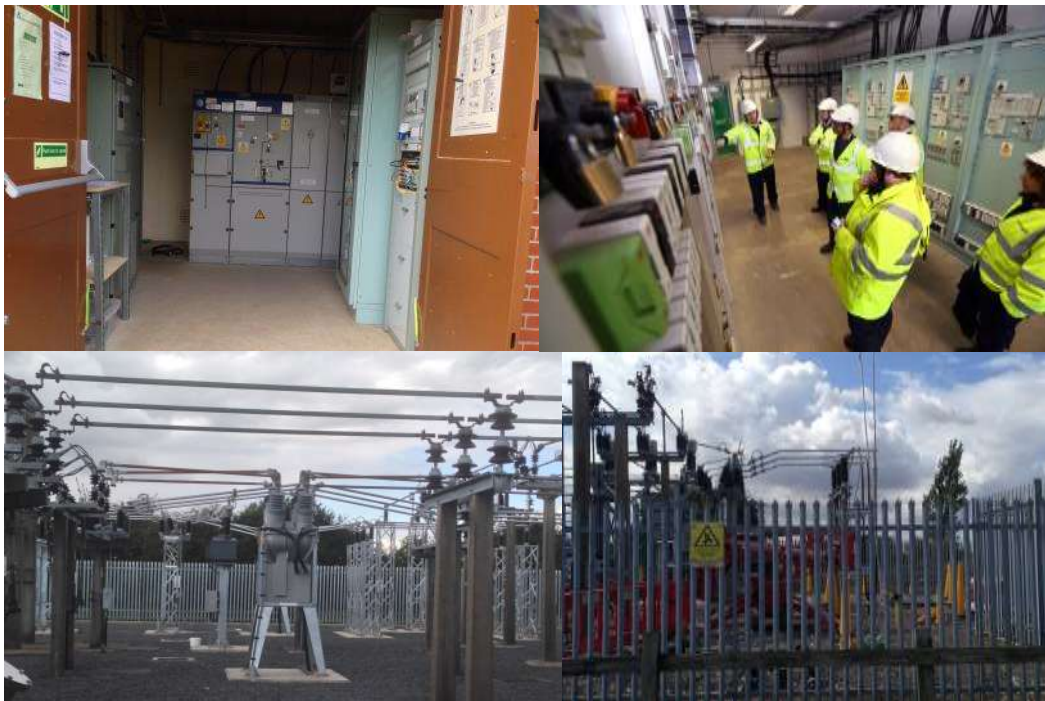
The primary network voltage is regulated through the Automatic Voltage Control (AVC) relays at Skegness. The AVC relays ensure the network voltage remains within statutory limits at all times. As networks are increasingly no longer just supporting demand, the connection of generation makes the process of regulating voltage with a static AVC set point increasingly more difficult.

Progress in the last reporting period

The installation of hardware at Horncastle was completed in June 2014, Skegness hardware will be installed in December 2014. The voltage optimisation algorithm has been updated over the last six months and is still being trialled using WPDs PowerOn simulator, this will be transferred to the live system after the hardware installation. The learning from the Dynamic AVC will be shared in the project close down report.

2.2.4 Progress against Ring Network

Creation of the 'active network ring' involves installing additional switchgear, disconnectors, new telecommunication links and new protection relays. Once complete, the network will run as a closed ring with greater controllability enabled by increased visibility of power flows and voltage profiles. This arrangement will allow us to reconfigure the system based on the real time status of the network. It also requires a more complex power system protection scheme to protect the system from damage in the event of a variety of different fault scenarios.



Construction works photos from the LCH substations.

Progress in the last reporting period

- The installation of a new three panel board was completed at Chapel St Leonards in November 2014
- The installation of a new bay at Ingoldmells substation was completed in November 2014.
- The works at Alford substation was completed in September 2014.
- The works at Skegness has started and is due to be completed during January 2015.
- The protection links between Chapel St Leonards to Trusthorpe and Alford - Trusthorpe have been commissioned and are now running on current differential protection.

2.2.5 Progress against FACTs system

In creating an active network with multiple in feeds from generation, a high degree of variability (both in terms of demand and generation) can result in unwanted voltage fluctuations and harmonics on the electricity network. A Flexible AC Transmission (FACTs) system device can rectify these issues automatically. FACTs technology is not normally deployed on distribution networks. In this instance, the FACTs device, also referred to as a DStatcom, will be connected in parallel with the electricity network at Trusthorpe and will operate as a controllable current source (an arrangement often referred to as 'shunt compensation').

This allows reactive power to be generated or absorbed by altering the capacitance or inductance and is a means of controlling power factor or voltage. In addition, if required filters can be used to remove unwanted harmonics. The solution will be designed in such a way to maximise the amount of generation that can be connected.



Photograph of the DStatcom during the DNO dissemination event

Progress in the last reporting period

The FACTs installation was completed by the end of January 2014 and is currently in an operational phase generating additional learning of how FACTs technology could be used by a DNO to control network voltages.

At the Factory Acceptance Tests, it was recognised that audible noise was an issue when the DStatcom was operated at full output, this would prevent the FACTS solutions from being installed and fully utilised in the majority of distribution substations. The manufacturer has conducted a detailed noise assessment of the FACTs at Trusthorpe whilst operating with a sustained high output. The specialist noise survey recommended a number of mitigation which is estimated to significantly reduce the 100Hz noise issue.

The FACTs device is being operated within WPD's noise standards ensuring no customer complaints have been received. The manufacturer will retrofit noise suppression solutions to the FACTs device to solve any noise issues, event at full output.

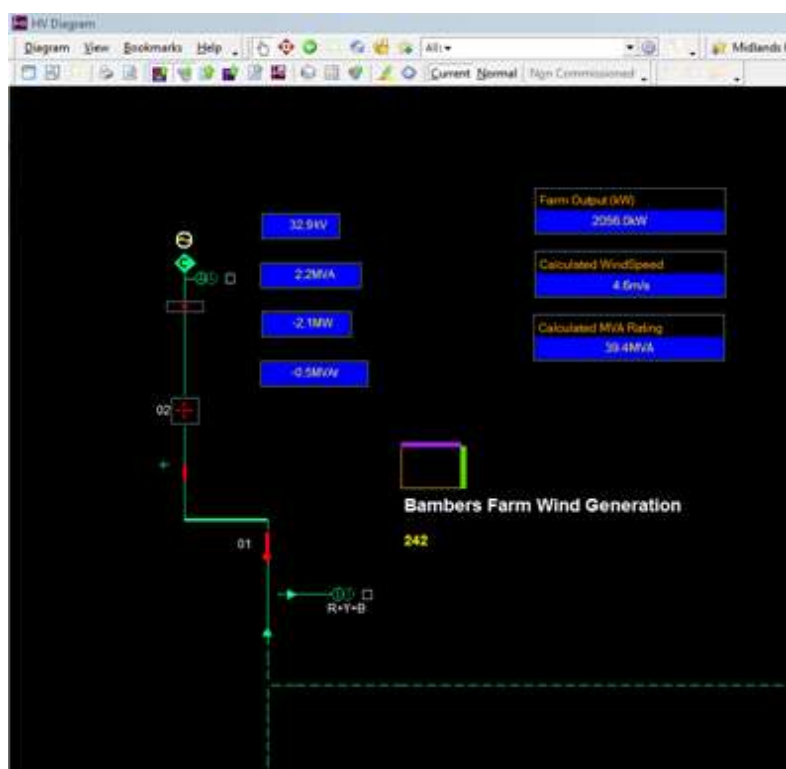
2.2.6 Progress against Dynamic line rating

The Skegness Registered Power Zone (RPZ) delivered cheaper connections to offshore wind farms by giving Western Power Distribution a facility to adopt dynamic ratings for overhead lines. This method, which has already been widely disseminated within the industry will be further developed to test new techniques for calculating plant and equipment ratings and the subsequent operating limits based on real time data.

The GE dynamic rating "Plug in" has been installed within POWERON to allow assets to be dynamically rated.

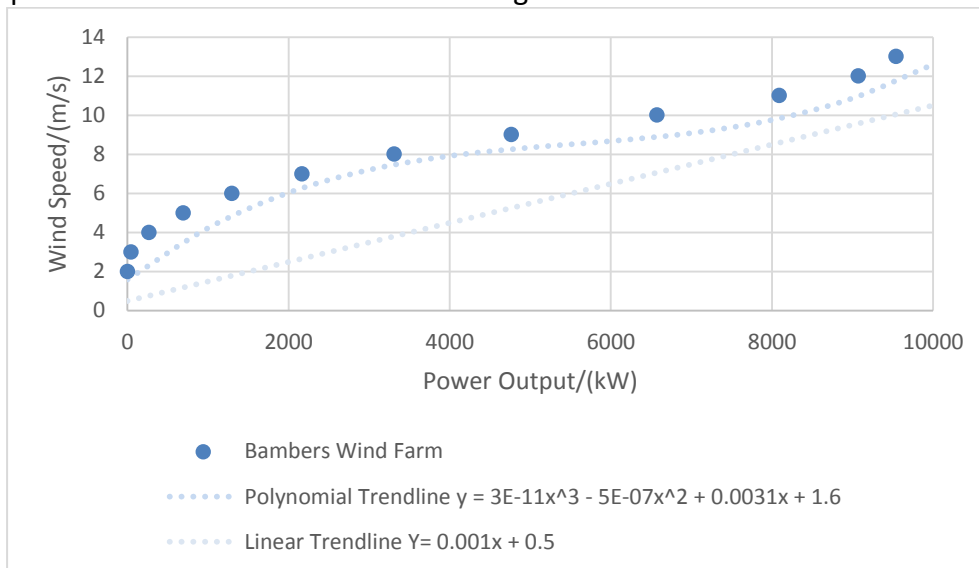
Progress in the last reporting period

Dynamic Line ratings have been applied in the Low Carbon Hub area using telemetry data from an existing wind farms. Several key circuits are now displaying an enhanced rating in the Network Management System PowerOn.



Screen shot – PowerOn – Dynamic Line Rating

The project has applied an algorithm to the electrical output of a Wind farm in East Lincolnshire. The algorithm conservatively calculates the wind speed at both nacelle height and at the height of the Overhead line. This wind speed has been used in the dynamic line rating equation to calculate the enhanced rating for the line.



Dynamic Line Ratings – Electrical output relationship to wind speed.

2.2.7 Progress against Telecommunications

The project requires low latency, high bandwidth communications to be installed for protection traffic and data recovery associated with the Dynamic system ratings.

Progress in the last reporting period

This section of the project has now been completed, with the installation of 25km of 96fibre skywrap optical fibre, on both new and existing overhead lines has been completed with all tests showing the links are suitable for telecommunications traffic. The three microwave protecting links between Trusthorpe – Chapel St Leonards, Chapel St Leonards – Ingoldmells and Ingoldmells – Skegness have been installed and commissioned.



Photographs showing a microwave tower at Trusthorpe and a 300HDA circuit with fibre wrap

3 Business Case Update

The Business case for this project continues to be strong. This is strengthened by the continual increases in renewable generation and the increasing limitations of the network to connect generation passively without conventional network reinforcement as is evidenced by the WPD constraints map.

Western Power Distribution has continued to receive increasing number of connection enquiries and subsequent DG connections to the EHV and HV network across all four licence areas. There is an increasing number of WPD network areas, especially focussed around certain areas of the East Midlands, showing the same network constraints are being exhibited as seen in the Lincolnshire network.

WPD's existing policies have meant DG connections could only be made with a passive connection. Connecting increasing numbers of generation connections to rural networks results in extensive conventional network reinforcement due to voltage rise under minimum load conditions. WPD has taken the learning from projects and is already being used to offer alternative connections across the 4 WPD licence areas.

Three of the techniques being developed through the LLCH will help manage voltage rise across other networks. These include using a Distribution Statcom, dynamically targeting a lower network voltage at the Grid Supply Point and developing a, connect and manage methodology for generation. These are equally appropriate to most network locations, especially the areas of Cornwall and Devon exhibiting voltage related network constraints.

We are expecting the amount of generation being connected to continue to increase as the UK transitions to a Lower Carbon Economy. The number of generation connections will also be influenced by external factors including support from the local community and local authority.

The estimated direct benefits for the connection of DG to the Lincolnshire Low Carbon Hub assumed some of the connection enquiries would lead to connections. All schemes are now awaiting either planning permission of the successful transition onto Contract For Difference (CFD's)

WPD have maintained a good relationship with previous connection enquiries and have disseminated on the opportunities at a conference in Birmingham (Distribution Networks Balancing Act). It is expected that future DG connections are likely to be from diverse sources due to the planning restrictions.

DIRECT BENEFIT FORECAST - REVISED

DG Incentive Value - including the OAM allowance
Total Direct Benefits

TOTAL

£480,000
£480,000

The Lincolnshire Low Carbon Hub focussed on the financial benefits to DNOs through the DG incentive value, this will be withdrawn at the start of ED1, April 2015. New mechanisms with ED1 will provide the business case to seek lower cost alternatives to conventional network reinforcement.

4 Progress against Budget

The actual project spend has exceeded 110% of the budget in key areas and the overall project budget; these include the civil installations and the telecoms section of the project. This is due to other working being carried out in the project area in coordination at the Low Carbon Hub sites & Customer credits due back to the project. The project is not requesting any additional funds.

Table 4-1 - Progress against budget

	Total Budget £k	Expected spend to date May 2014 £K	Actual Spend to date £k	Variance £k over period	Variance % over period
Box 6 - Labour					
WPD Project Management	235	219	238	18	8% ¹
Create a 33kV active network ring - Skegness	17	17	13	-3	-20% ²
Create a 33kV active network ring - Alford	36	36	65	29	80% ³
Create a 33kV active network ring - Ingoldmells	83	83	84	1	2%
Create a 33kV active network ring - Chapel St Leonards	91	91	160	68	75% ³
Create a 33kV active network ring - Trusthorpe	82	82	80	-2	-3%
Create a 33kV active network ring - Bambers	5	5	9	4	76% ⁴
Box 7 - Equipment	1510				
Dynamic Voltage Control - Development + Maintain of ENMAC and SCADA systems, Voltage control algorithm including Training and site AVC modifications	42	42	32	-10	-23% ²
Flexible Alternating Current Transmission system (FACTS) - procurement of Devices	575	575	571	-4	-1%
Create a 33kV active network ring - Skegness includes: new CT's, Protection, 33kV cable and small wiring	48	48	38	-9	-20% ²
Create a 33kV active network ring - Alford includes: new CT's, protection, 1250A busbar, voltage transformer, 36kV Breaker, 33kV cable & small wiring	102	115	180	65	57% ³

	Total Budget £k	Expected spend to date May 2014 £K	Actual Spend to date £k	Variance £k over period	Variance % over period
Create a 33kV active network ring - Ingoldmells includes: new CT's, protection, Voltage Transformer, earth electrode, 36kV Breaker, 1250a busbar, 3ph insulators, 33kV cable & small wiring	236	236	243	7	3%
Create a 33kV active network ring - Chapel St Leonards includes: new CT's, protection, Voltage Transformer, RMU, 1250a busbar, 33kV cable & small wiring	260	260	526	266	102% ³
Create a 33kV active network ring - Trusthorpe includes: new CT's, protection, Incoming Transformer, 3/7 new switchboard, earth electrode, 33kV cable & small wiring	233	233	268	36	15% ³
Create a 33kV active network ring - Bambers includes: new CT's, protection & small wiring	14	14	25	11	74% ⁴
Box 8 - Contractors	357				
Engineering Design & Surveys	106	106	107	0.4	0.4%
Enhancing planned network alterations - 33kV OHL asset rebuilds as 300HDA instead of 150 ASCR	80	80	78	-2	-2%
Innovative Commercial Arrangements - Workshop, Lawyers, data flows, network configuring with generators	70	70	56	-14	-20% ⁵
Development + Maintain of ENMAC and SCADA systems, Voltage control algorithm including Training and site AVC modifications	21	21	16	-5	-23% ⁵
Dynamic Systems Ratings - Future Design standard 1) fibre over existing lines	10	10	0	-10	-100% ¹
Dynamic Systems Ratings - Future Design standard 2) fibre over new lines	10	10	0	-10	-100% ¹

	Total Budget £k	Expected spend to date May 2014 £K	Actual Spend to date £k	Variance £k over period	Variance % over period
Dynamic Systems Ratings - Future Design standard 3) Radio or Microwave links	10	10	0	-10	-100% ¹
Flexible Alternating Current Transmission system (FACTS) - Provision of Foundations	50	50	50	0	1%
Box 10 - IT & Contingency	1002				
IT Costs (Inc. Telecommunications)	883	869	1027	158	18% ⁶
Contingency	129	129	314	185	143% ³

Table 4-2 - Credits due back to the project

	Budget	Current balance	Forecast spend	Credit Expected	Balance after credits received	Variance after credits
Contingency	129	314	60	-374	0	-100%
Labour - Create a 33kV active network ring - Alford	36	65	-	-26	39	8%
Equipment - Create a 33kV active network ring - Alford	102	180	-	-74	106	4%
Labour - Create a 33kV active network ring - Chapel St Leonards	91	160	-	-61.4	98	8%
Equipment - Create a 33kV active network ring - Chapel St Leonards	260	526	-	-245.6	280	8%
Remainder of budget	2809	2936	16	0	2954	5%
Total Project	3428	4180	76	-781	3475	1%

¹ Overspend due to doing Dynamic Systems Ratings - Future Design standard being completed internally by the Project Manager, not using external contractors.

² Spend due to be recited in Q1 2015 after the completion of works onsite.

³ Customer credit will be transferred in January 2015 following completion of works. See Table 4-2.

⁴ Variance in the scope of works (reconfiguring of transducers) and using external resource has resulted in increased costs

⁵ Spend scheduled for Q4 2014

⁶ Variance in the scope of works (installing 96 fibres instead of 24) and poor ground conditions have resulted in increased costs.

Bank Account

The LCN Fund Governance Document requires DNOs to:

‘3.80. The DNO’s auditors must review the system and processes that the DNO is proposing to use to conform to the requirements set out in this section and provide a signed statement to Ofgem that the systems and processes are fit for purpose, before the Project is initiated and any funds are spent.’

The following table summarises the memorandum account with all costs within this reporting period to 31st May 2014. To Date, total project spend is £2,972,583.28

MONTH	INCOME	EXPENDITURE	BALANCE
balance brought forward			£137,132.93
Jun-14	£321,692	570,623.97	-£111,798.89
Jul-14	£0	153,896.64	-£265,695.53
Aug-14	£0	461,564.01	-£727,259.54
Sep-14	£0	386,421.75	-£1,113,681.29
Oct-14	£538,487	197,888.41	-£773,082.91
Nov-14	£205,491	184,389.83	-£751,981.74
Balance at end of Nov 2014			-£751,981.74

Assumptions

- Purchase order costs will be paid at the end of the following month after good receipt.
- Salaries will be paid on the 26th of the month.
- Income will be transferred on the 28th of the month.
- Times sheet costs will be allocated on the 26th of the month.
- Stores and material issues; date of issue is date of payment.

Interest of 0% applied to balance in line with existing business current account rate.

5 Successful Delivery Reward Criteria (SDRC)

5.1 Future SDRCs

Table 5-1 captures the remaining SDRCs for completion during the project life cycle.

Table 5-1 - SDRCs to be completed

SDRC	Status	Due Date	Comments	
Determining the degree to which voltage can be controlled by installing and operating a FACTS device.	Green	28/02/2015	Technical paper due 07/2014, Site visit due 08/2014. A final report will be included in the project closure documentation in 02/2015.	✓ ✓
Development of a stronger relationship with distributed generation developers directly impacted by the Low Carbon Hub.	Green	28/02/2015	A telephone survey has already been conducted as a bench mark. For more information please see Dec 2010 to June 2011 report. The project is regularly engaging with the DG community, a further telephone survey will be conducted in 02/2015.	✓ ✓
The capture of sufficient information to determine the business case for operating active 33kV ring networks using innovative solutions.	Amber	28/02/2015	Project closure documentation (02/2015) will include a cost benefit analysis for each of the techniques deployed and the combination of all aspects.	
Disseminate knowledge and evaluate the potential for similar projects throughout the UK.	Green	28/02/2015	The final project report will be shared with DNOs and IDNOs and interested parties along with: An internet presence ENA workshops Publications Appropriate industry conferences	

Status Key:

Red	<Major issues – unlikely to be completed by due date>
Amber	<Minor issues – expected to be completed by due date >
Green	<On track – expected to be completed by due date>

6 Learning Outcomes

- Alternative Connections continue to be very popular with generation developers, however the network constraints quickly reach unacceptable levels for new connections.
- The FACTS device continues to be a very effective way at regulating network voltages, however noise mitigation would be required in the majority of locations due to fan noise.
- The ring network whilst effective is not a particularly flexible technique and the cost of retrofitting the associated plant and protection is prohibitive at some sites.
- Advanced planning tools using profiles or historic data are a requirement to allow the roll out of innovative solutions such as Alternative connections, DStatcoms and Dynamic AVC's
- The innovative solutions being applied continue to challenge the assumptions made by some internal staff and to think about how we deliver solutions today.

The project will be closed down by 28th February with the project close down report submitted by 29th May 2015.

7 Intellectual Property Rights

A complete list of all background IPR from all project partners has been compiled. The IP register is reviewed on a quarterly basis.

No relevant foreground IP has been identified and recorded in this reporting period.

8 Risk Management

Our risk management objectives are to:

- ensure that risk management is clearly and consistently integrated into the project management activities and evidenced through the project documentation;
- comply with WPDs risk management processes and any governance requirements as specified by Ofgem; and
- anticipate and respond to changing project requirements.

These objectives will be achieved by:

- ✓ defining the roles, responsibilities and reporting lines within the team for risk management
- ✓ including risk management issues when writing reports and considering decisions
- ✓ maintaining a risk register
- ✓ communicating risks and ensuring suitable training and supervision is provided
- ✓ preparing mitigation action plans
- ✓ preparing contingency action plans
- ✓ regular monitoring and updating of risks and the risk controls.

8.1 Current Risks

The Low Carbon Hub risk register is a live document and is updated regularly. There are currently 16 live project related risks. Mitigation action plans are identified when raising a risk and the appropriate steps then taken to ensure risks do not become issues wherever possible. In Table 8-1, we give details of our top five current risks by category. For each of these risks, a mitigation action plan has been identified and the progress of these are tracked and reported.

Table 8-1 - Top five current risks (by rating)

Risk	Risk Rating	Mitigation Action Plans	Progress
Certain aspects of the project may require WPD to work alongside new contractors who may not be used to WPD's safety requirements.	Moderate	Mitigation through procurement contracts with competent contractors. Clear working documentation RAMS will be agreed when working with contractors.	☑ Mitigation through procurement contracts with competent contractors. ☑ Clear documented RAMS will be agreed when working with contractors. ☑ Construction contractors managed by the delivery arm of WPD.
Designs are not yet available and potentially are holding up construction.	Major	Advanced training at the manufacturers facilities Recruitment of additional external resource, Escalation of delays to senior managers and project stakeholders.	Construction designs are now within target dates. Protection setting is a concern, leading to the mitigation plan being actioned.
Project construction could be delayed due to constraints around the operational outage plan.	Major	Early liaison with outage planning team Regular team meetings, balancing the work across the network. Bring the Chapel St Leonards project forward, delaying Alford until later in the project.	The re wrapping of the Alford – Trusthorpe circuit has increased this risk. The focus has been to prioritise work on sites to reduce the risk associated with operational outages, including accelerating the works at Chapel St Leonards.
Delivery will be unachievable if key project delivery staff are unavailable either through long term absence / change or role.	Moderate	Recruit additional resource to the project. Regular communication with key stakeholders and key project delivery staff.	Additional resource has been recruited to the project to aid delivery. This risk will continue until the end of the project 02/2015.

Risk	Risk Rating	Mitigation Action Plans	Progress
Technology fails once implemented	Moderate	Enhanced testing for techniques that could put the network at risk, Ensure Alternative connections are not reliant on the techniques working	Most technology in service, and working well

8.2 Update for risks previously identified

Descriptions of the most significant risks, identified in the previous six monthly progress report, are provided in Table 8-2 with updates on their current risk status.

Table 8-2 - Top five risks identified in previous six monthly report

Risk	Previous Risk Rating	Current Risk Rating	Comments
Delivery of goods and services do not meet the timescales for the project.	Moderate	Major	All long lead time items have been procured to reduce risk on the project. The project is experiencing quality issues in a number of areas. These issues have been highlighted to the WPD procurement team.
Project construction could be delayed due to constraints around the operational outage plan.	Moderate	Major	Network outages have been booked, multiple departments are coordinated to ensure work can be completed.
National Grid activity could constrain outage or	Moderate	Moderate	A Statement of Works has been submitted to National Grid, the response has confirmed the current connections
National Grid activity could constrain outage or	Moderate	Moderate	A Statement of Works has been submitted to National Grid, the response has confirmed the current connections
National Grid activity could constrain outage or	Moderate	Moderate	A Statement of Works has been submitted to National Grid, the response has confirmed the current connections

Descriptions of the most prominent risks, identified at the project bid phase, are provided in Table 8-3 with updates on their current risk status.

Table 8-3 - Top five risks identified at the project bid phase

Risk	Previous Risk Rating	Current Risk Rating	Comments
The project cannot be delivered for the amount of funding requested.	Moderate	Major	The project scope has increased since the bid phase to include additional works with higher risk. This has increased the risk that the total project costs will exceed the requested amount.
Significant additional network expenditure is required due to unforeseen network scenarios.	Moderate	Moderate	The inability to secure a wayleave from Skegness to Orby Marsh. The ground surveys confirmed the conditions were much worse than forecasted, increasing the reliance on piling for foundations.
There are extensive planning delays involved for either low carbon hub activities or generator construction.	Moderate	Minor	The Low Carbon Hub secured all permissions and an increasing number of generation developers are making applications for planning permission.
Experimental aspects of the Low Carbon Hub do not fully realise the planned benefits.	Moderate	Moderate	The project is behind its intended schedule, however as the project transitions into trial phases, the expected benefits mirror the planned benefits.
Generators choose not to connect to the network as they are targeting other locations.	Moderate	Minor	The accepted alternative re design of the Low Carbon Hub along with Alternative Connection offers has resulted in a higher than average number of connection applications.

9 Consistency with Full Submission

The project is being delivered in accordance with the full submission and project direction.

10 Accuracy Assurance Statement

This report has been prepared by the Low Carbon Hub Project Manager (Philip Bale), reviewed by the Future Networks Team Manager (Roger Hey), recommended by the Policy Manager (Paul Jewell) and approved by the Operations Director (Philip Swift).

All efforts have been made to ensure that the information contained within this report is accurate. WPD confirms that this report has been produced, reviewed and approved following our quality assurance process for external documents and reports.

