



Celsius Project Progress Report

Version 1.0
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Celsius

VERSION HISTORY

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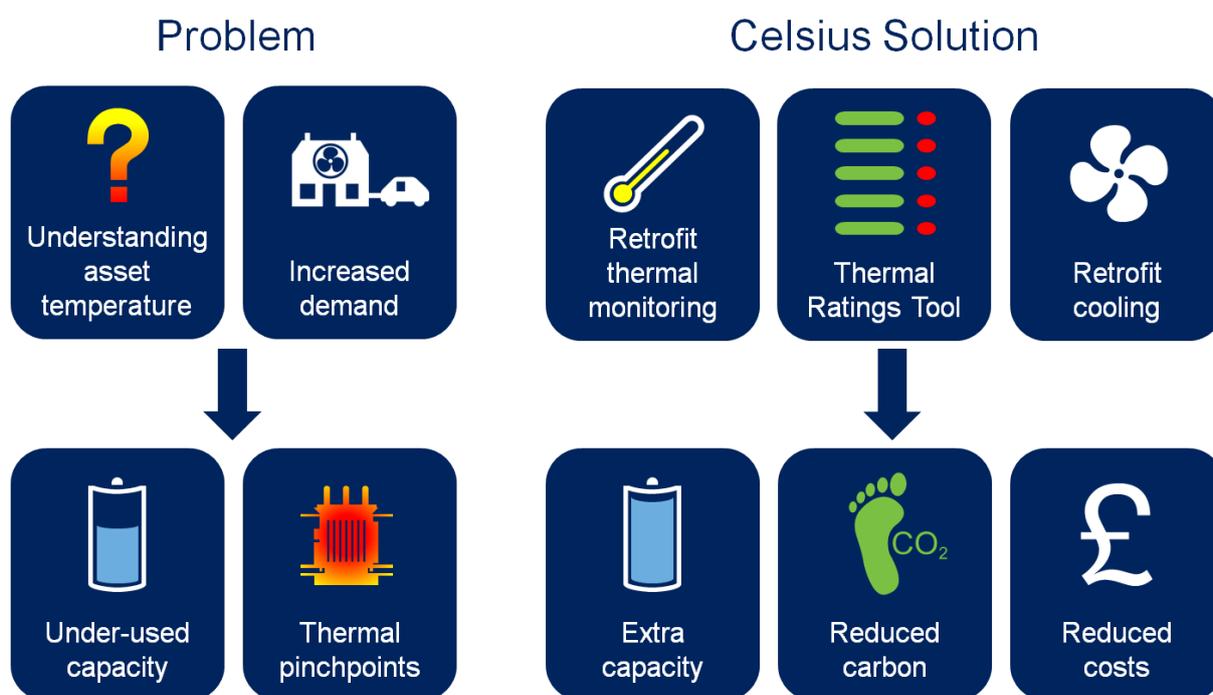
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1 EXECUTIVE SUMMARY

1.1 The Celsius project

Celsius is funded via Ofgem's Network Innovation Competition (NIC) funding mechanism. The project was authorised to commence in December 2015 and is expected to be complete by March 2020.

Celsius explores innovative, cost-effective approaches to managing potentially excessive temperatures at distribution substations, which could otherwise constrain the connection of low carbon technologies (LCTs).



Celsius first seeks to identify potential thermal issues by establishing how different distribution substations in differing environments behave thermally under a variety of load and environmental conditions. Celsius will develop the following methodologies to better understand the real thermal ratings of distribution substation assets in order to unlock capacity:

- **Retrofit thermal monitoring:** By using improved technology to measure asset and ambient temperatures, and relating these to a range of environmental, load and seasonal factors, Celsius will enable understanding of real thermal ratings of assets, rather than the nominal ratings that are used today. This will allow improved understanding of the amount of latent capacity which could be accessed without further intervention
- **Thermal ratings tool:** the learning from the retrofit thermal monitoring trials and analysis will be formalised and transferred into a simple tool that can be used by operations and planning employees at any network operator, to better understand the capacity of the existing or planned network.

Celsius will then identify, evaluate and demonstrate *retrofit cooling* technologies that can be used to directly manage the temperature of assets. By managing temperature in this way, Celsius will deliver additional capacity release. Customer surveys will establish customer perception of retrofit cooling techniques and whether the application of these techniques is as acceptable to them as traditional reinforcement.

1.2 Project progress

This is the first six-monthly project progress report (PPR) for the Celsius project. This report covers the period from December 2015 to the end of May 2016.

The project is currently on track to meet its aims, objectives and all successful delivery reward criteria (SDRC) as per the project plan.

The key project highlights during the reporting period are outlined below:

- Mobilisation of project team
- Celsius partner agreements have been finalised
- Project kick off workshop held involving partners and stakeholders
- Retrofit monitoring site selection completed
- Procurement in place for the monitoring phase.

There were no SDRC due in this reporting period but work is on track to deliver those due in the next period to time.

The project actual costs to date (end-May) are £534,000 and the estimated at completion costs is now £5,341,000 which is to project budget (including contingency).

1.3 Risks

Electricity North West employs recognised tested and audited risk management systems and processes as part of its day-to-day operations. Celsius will benefit from this approach which will be further refined to fully accommodate the requirements of Celsius and to incorporate learning from previous experience in the delivery of Low Carbon Networks Fund (LCN Fund) projects. This approach considers risks and issues that are business as usual and those specifically related to Celsius, all of which will be articulated in a common format.

Risks identified as part of the Celsius project bid have been initially reviewed by the delivery team.

There is one notable change to the risk log relating to the technology risk on the use of existing monitoring equipment. The probability of this occurring has been increased from three to four due to an issue raised by one of the project partners. The reason for the increase is the possibility of a greater than anticipated cost and effort required to implement and redeploy some of the existing monitoring equipment. The impact of this risk remains unaffected at this stage as the cost to deploy new monitoring equipment is relatively low and may be a more cost-effective solution. This is currently being investigated and a final decision is expected in the next reporting period. It is anticipated that additional risks will be identified and mitigated over the next six months.

Risks are monitored on a continuous basis, including the potential risks that were documented in the full submission. The status of these is described in Appendix A.

1.4 Learning and dissemination

The Celsius project team will utilise a range of tools to disseminate knowledge and learning with stakeholders throughout the project life. At this stage of the project there is one learning outcome to report.

Early engagement with project partner ASH Wireless has proved crucial. Following a review of the proposed monitoring equipment specifications one key change was required to ensure that the equipment met Electricity North West's internal standards. As this change in specification was identified early, impact on production was kept to a minimum. The cost of this change is currently being investigated and will be reported in the next reporting period.

The interim Celsius website will be upgraded in July, to a structure and style in line with the company's previous LCN Fund projects. Learning from the project will be uploaded to this website throughout delivery.

2 PROJECT MANAGER'S REPORT

2.1 Project background

Celsius will develop an understanding of the operating temperatures of distribution substation assets, including transformers and cables, within a range of substation environments. The project will also deliver alternative, innovative ways to optimise thermal capacity, leading to faster, cheaper responses to the connection of low carbon technologies.

Celsius explores a two-step intervention approach.

Firstly, Celsius will gather data across a range of environmental, load and seasonal factors on 520 distribution substations, selected to be representative of 80% of the GB substation population, using a range of new power and temperature monitoring equipment. The data gathered will be analysed to improve the understanding of the relationship between asset temperature, load characteristics and the surrounding environment. This will establish a set of reliable, thermal coefficients between the measured external temperature and the internal asset hotspot temperature and will reveal latent capacity which can be released quickly with no further intervention. The output of this package of work will be a Thermal Ratings Tool, which will require minimal inputs, such as temperature and environment, to quantify available capacity. This tool is likely to be developed in the form of a Microsoft Excel look-up table or similar which is easily transferable and will be made available for use by other GB distribution network operators (DNOs).

Secondly, Celsius will apply a range of cooling techniques on 100 of the monitored distribution substations to demonstrate the increased capacity and the benefits of each technique. This will result in a 'buy order' of cooling interventions for network operators to select.

2.2 General

Following the award of funding for Celsius, significant effort has been made to mobilise the project. The project team was appointed during February 2016 and was fully mobilised by March 2016. The project has been handed over to the delivery team from the bid team, who will remain involved in the project in an assurance role.

Contracts have been agreed between project partners Ricardo, ASH Wireless and Impact Research.

Individual workstream meetings have been held between the project team and relevant partners. These meetings were followed by a comprehensive project kick-off meeting with partners and key stakeholders attending a full day workshop to ensure a common understanding of the project. Project finances including bank accounts, partner contracts and initial purchase orders have been set up to meet the challenging delivery dates for installation of monitoring equipment.

The key project management activities undertaken during the reporting period are summarised below:

- **Management of project resources:** The internal resources required for the delivery of Celsius have been identified and placed. A number of these resources bring experience from other second tier projects (C₂C, CLASS, Smart Street and Respond).

- **Project monitoring and control:** Processes for the monitoring and control of the delivery of the Celsius project are now in place. These processes build on those developed during earlier LCN Fund projects to ensure that this project progresses in a controlled manner and that the outputs are of the highest quality.
- **Regular engagement with project partners:** The Electricity North West Celsius project team will engage and hold regular meetings with the project partners. A “start-up meeting” was held on 12 April 2016 with project partners; the first project steering group will be held in September 2016.

2.3 Technology, trials and analysis workstreams

The key activities undertaken by the technology, trials and analysis workstreams during the reporting period are summarised below:

- Meetings held with technical partners to discuss the design and installation plan in detail
- Weekly conference meetings have been established to track progress on technology design and production with project partners ASH Wireless and Ricardo
- Successful demonstration of prototype equipment held and verification test held at ASH Wireless premises on 28 April 2016
- A full review of site selection data and process resulting in an agreed list of sites for the monitoring phase
- Development of internal transformer monitor has commenced with initial prototype produced.

In the next reporting period, the technology, trials and research workstreams will undertake the following activities:

- Peer review of site selection methodology
- Retrofit monitoring trial design
- Finalise retrofit monitoring installation plan
- Commence installation of retrofit monitoring sensors
- Tender for thermal flow study.

2.4 Customer workstream

The key activities undertaken by the customer workstream during the reporting period are summarised below.

Work has commenced on developing the customer engagement plan and data privacy statement. First drafts have been completed and circulated for internal review.

Work has also commenced with Ricardo on developing a template for capturing important site information during the installation of monitoring equipment. A visual and audio assessment of each site will help establish customer awareness and perception of existing assets and any perceived changes in the assets following installation of the retrofit cooling techniques.

In the next reporting period, the customer engagement workstream will undertake the following activities:

- Complete customer engagement plan and send to Ofgem for approval
- Complete data privacy statement and send to Ofgem for approval.

2.5 Learning and dissemination workstream

Delivery of the Celsius project remains within its formative stage and has delivered one learning outcome to date.

Early engagement with project partner ASH Wireless has proved crucial. At an initial equipment specification review it was found that one element of the prototype voltage test lead did not meet the requirements of existing Electricity North West specifications. This was highlighted early in the development stage and so the change did not affect production times and therefore will not affect the project plan. The cost impact of this change is currently being investigated and will be reported in the next reporting period.

Electricity North West has hosted the first project workshop which was a platform to present the project objectives to partners and identify risks and opportunities across all workstreams.

- Celsius was publicised in Electricity North West's employee magazine, Newswire, in January 2016 to raise awareness of the project internally. In January 2016 further internal communications were delivered via the Electricity North West weekly email bulletin (Connect) and on the company intranet (the Volt). Planning for the first Celsius advertorial and the project website has commenced, both of which are due for completion in the next reporting period. The Celsius communications register which details all communications to date is detailed in Appendix F.

In the next reporting period, the learning and dissemination workstream will undertake the following activities:

- Publicise Celsius on the company intranet and in the internal email bulletin
- Launch the Celsius website
- Hold first knowledge sharing event
- Publish the first advertorial.

3 BUSINESS CASE UPDATE

The project team are not aware of any developments that have taken place since the issue of the Celsius project direction that affects the business case for the project.

4 PROGRESS AGAINST PLAN

The project plan is monitored, reviewed and updated on a continuous basis. This process takes into consideration potential risks that were documented in the full submission and any change to these risks. The process also considers newly identified risks and issues that are highlighted during the project lifecycle.

Progress against the project plan as outlined in the full submission is currently on track with no substantial issues raised in the first reporting period that are expected to affect the project plan. Some points worth noting:

- Project partner ASH Wireless completed the critical design review of the Celsius monitoring equipment on 26 May 2016 with no serious issues raised which are likely to impact the delivery of the monitoring equipment as per the project plan
- Project partner Ricardo finalised the data handling and IT plan on the 5 May 2016, two months ahead of schedule.

In the next reporting period there are no current issues or risks identified at this stage in the project that are expected to affect the project plan.

5 PROGRESS AGAINST BUDGET

The project budget as defined in the project direction is shown in Appendix C.

Actual spend to date compared to project budget is summarised in Table 5.1 below. The report includes expenditure up to and including 31 May 2016.

It will be noted that the project is currently performing favourably relative to budget. Project expenditure as at the end of May 2016 was £534,000 compared to a cost baseline of £995,000.

As already indicated, all Electricity North West resources are now in place. The favourable variance in labour costs, however, reflects the process undertaken to identify and recruit the appropriate resources.

Furthermore, while orders have been placed, not all goods and services covered by those orders have been received and invoiced. This accounts for the favourable variance relative to the projected costs for equipment and contractors.

The variance in IT cost is due to early completion of project milestones, for example the Data Handling and IT Plan has been completed and signed off in May, one month ahead of plan. This variance will readjust in the next reporting period.

Table 5.1: Summary of project expenditure

£'000s Excluding Partner Funding Ofgem Cost Category	Spend to date			Total Project		
	Actual	Budget	Variance	Forecast	Budget	Variance
Summary						
Labour	15	58	43	1,203	1,203	0
Equipment	350	719	369	1,333	1,333	0
Contractors	87	203	116	1,764	1,765	0
IT	74	0	(74)	209	209	(0)
IPR Costs	0	0	0	0	0	0
Travel & Expenses	0	0	0	0	0	0
Payments to Users	0	0	0	31	31	0
Contingency	0	0	0	537	537	0
Decommissioning	0	0	0	29	29	0
Other	8	15	7	230	230	0
Total Costs	534	995	462	5,337	5,338	0

Detailed expenditure is shown at Appendix D at project activity level.

6 BANK ACCOUNT

The Celsius project bank statement is shown in Appendix E. The statement contains all receipts and payments associated with the project up to the end of May 2016.

7 SUCCESSFUL DELIVERY REWARD CRITERIA (SDRC)

There were no SDRC due in this reporting period but work is on track to deliver those due in the next reporting period to time.

The SDRC due in the next reporting period are shown in table 7.1 below.

Table 7.1: Celsius SDRC due in the next reporting period

SDRC evidence	Planned date	Forecast date
CW.1 - Send customer engagement plan and data privacy statement to Ofgem by June 2016	Jun-16	Jun-16
LDW.2.1 - Publicise Celsius within Electricity North West via the Volt intranet site, email bulletins and/or Newswire company magazine by June 2016, March 2017, March 2018, March 2019 and March 2020	Jun-16	Jun-16
LDW.6.1 - Issue project progress reports in accordance with Ofgem's June and December production cycle and publish on the Celsius website	Jun-16	Jun-16
LDW.1 - Launch Celsius project website by July 2016	Jul-16	Jul-16
LDW.5.1 - Hold annual knowledge sharing events in September 2016, 2017, 2018 and December 2019. Provide one-to-one briefing sessions	Sep-16	Sep-16
LDW.3.1 - Publish advertorials annually by October 2016, October 2017, October 2018 and October 2019	Oct-16	Oct-16
LDW.4.1 - Participate at four annual LCNI conferences from 2016 to 2019	Nov-16	Nov-16
CI.3.1 - ENA workshop with DNOs held by November 2016 (to agree areas of changes to Engineering Recommendations P15 and P17)	Nov-16	Nov-16
LDW.6.2 - Issue project progress reports in accordance with Ofgem's June and December production cycle and publish on the Celsius website	Dec-16	Dec-16

The current status of the evidence for all Celsius SDRC is shown in Appendix B. Progress against the SDRCs and the project plan will continue to be monitored, and if the current forecast for SDRC delivery changes, future project progress reports will be updated accordingly.

8 LEARNING OUTCOMES

As this is Electricity North West's fifth LCN Fund Tier 2/NIC project, the project team has been able to review and apply lessons learnt from previous projects when commencing a new project. During this reporting period much of the work has evolved around project mobilisation, governance and ensuring the correct financial controls are in place.

There has been one learning outcome discussed in Section 2.5 (learning and dissemination workstream) regarding the importance of early engagement with partners involved with product development and the need to align specifications.

In the next reporting period it is expected further learning will be generated after the development of the monitoring equipment has been fully approved and the installation phase commences. In addition there will be a large piece of work involving IT testing and development which is expected to generate learning.

9 INTELLECTUAL PROPERTY RIGHTS (IPR)

Electricity North West is following the default IPR arrangements. No IPR have been generated or registered during the reporting period. The IPR implications of forthcoming project deliverables are currently being considered, and will be reported in the next project progress report.

10 RISK MANAGEMENT

There are currently no uncontrolled risks that could impede the achievement of any of the SDRC outlined in the project direction, or which could cause the project to deviate from the full submission.

The project risks identified in the Celsius bid document have been migrated into the Celsius delivery risk register, reviewed and are still valid. Risks will be monitored on a continuous basis, including the potential risks that were documented in the full submission. Project risks are described in detail in Appendix A.

With the agreement of partner contracts and placement of purchase orders, the mobilisation risk has diminished and is anticipated to be formally closed at the first project steering group.

The placement of purchase orders continues to mitigate the risks of delayed installation.

There is an increased probability that the use of existing monitoring equipment will not take place due to an issue raised by project partner Ricardo. The cost and effort required to redeploy existing monitoring equipment and implement this into the data handling system is being investigated and evaluated against deploying new equipment. The outcome of this evaluation will be reported in the next reporting period. The impact of this will be reassessed but at this stage is not expected to have a negative impact on the project plan or budget.

Changes to date are:

- Project partners have mobilised, and this risk is being reviewed prior to closure
- The likelihood of utilising existing monitoring equipment has decreased due to an expected increase in effort and cost.

11 CONSISTENCY WITH FULL SUBMISSION

At the end of this reporting period, it can be confirmed that the Celsius project is being undertaken in accordance with the full submission.

12 ACCURACY ASSURANCE STATEMENT

This document has been reviewed by a number of key business stakeholders. The project team and select members of the Celsius project steering group, including the lead member of the bid development team, have reviewed the report to ensure its accuracy. The narrative has also been peer-reviewed by the Electricity North West head of engineering.

The financial information has been produced by the Celsius project manager and the project's finance representative who review all financial postings to the project each month to ensure postings are correctly allocated to the appropriate project activity. The financial information has also been peer reviewed by the Electricity North West risk, control and assurance (finance) manager.

Issue of the document has been approved by the head of engineering.

13 APPENDICES

Appendix A: Status of risks from the full submission

Project phase/workstream	Description	Probability score	Impact score	Mitigating action/contingency action	Revised probability score	Revised impact score
Mobilisation	There is a risk that the project partners are not able to mobilise their resources in time because of other commitments leading to a delay in achieving potential milestones which could have a project reputational and financial repercussion.	3	4	<p>Suitable partnership agreements that ensure collaborative working, value for customers' money and achievement of learning objectives in a timely manner have been identified for all partners.</p> <p>A project initiation document will be issued to the project partners to ensure that all parties are ready.</p> <p><i>Contingency: Electricity North West will seek new partners should existing partners fail to mobilise.</i></p>	1	4
Technology	There is a risk that the lead time for delivery, installation and/or configuration of the thermal monitoring sensors may lead to a delayed start on the monitoring trial.	4	5	<p>Project plan specifies that a purchase order will be raised to procure the sensors allowing the partner to begin manufacture.</p> <p>Regular meetings/reports to track progress against the plan.</p> <p>Commitment to additional operational resource should any delays occur to the installation, testing and commissioning programme.</p> <p><i>Contingency: Flexibility is built into the installation programme; phased installation plan starts in autumn 2016</i></p>	2	5

Project phase/workstream	Description	Probability score	Impact score	Mitigating action/contingency action	Revised probability score	Revised impact score
				<p><i>to be completed by spring 2017.</i></p> <p><i>A full year's data for comparison with the cooling trial could be gained by overlapping these tasks more than planned.</i></p>		
Technology	There is a risk that sites with existing load monitoring may not be suitable or the existing monitoring units may require a software/hardware update for the sites to be included in the Celsius project.	3	4	<p>Allowance in budget and plans to move some existing load monitors if necessary.</p> <p>Communications with manufacturers of existing equipment to identify solutions early. Allowance in budget and plans to carry out updates.</p> <p><i>Contingency: New power monitoring units, supplied by project partner Ash Wireless will be installed where this is deemed most cost-effective.</i></p>	4 (Increase from 3)	2
Technology	There is a risk of monitoring equipment failure leading to a requirement for additional resource to attend site to fix or replace.	3	4	<p>Phased rollout of equipment to ensure systems are working properly before all sites are installed.</p> <p>Some remote monitoring and diagnostics will be possible, for example of performance of the communications and through data validation.</p> <p><i>Contingency: Budget for additional resource.</i></p>	3	2
Technology	There is a risk that internal transformer monitoring or retrofit cooling methods (and their	1	5	The technical and installation issues and requirements will be assessed before any installation is carried out,	1	2

Project phase/workstream	Description	Probability score	Impact score	Mitigating action/contingency action	Revised probability score	Revised impact score
	installation) may have an impact on the network as a whole leading to disruption or outage.			<p>which should identify any risk at an early stage to allow this to be mitigated, or for the technology to be discounted from the trial.</p> <p><i>Contingency: If any issues occur, then the technology will be removed and made good at the earliest signs.</i></p>		
Technology	There is a risk that there is inadequate signal at sites and communication outages or battery life issues could prevent data being sent to data management system for the duration leading to gaps in data sets.	3	4	<p>The data communications will use 'roaming' SIM cards, the signal will be checked prior to installation, if required an aerial will be installed. If inadequate signal the site will be excluded from the trial.</p> <p>Data will be sent once a day, any failures to send data will be identified automatically and corrected.</p> <p>Data being received will be continuously validated to identify missing or unrealistic data, so issues will be identified quickly.</p> <p>Battery life requirements have been defined and agreed at an early stage.</p> <p><i>Contingency: Select sites without signal issues. Where gaps in data occur, analysis can be carried out on the remaining data, and where necessary, missing data will be simulated.</i></p> <p><i>Sensors that are still required will be replaced.</i></p>	2	2

Project phase/workstream	Description	Probability score	Impact score	Mitigating action/contingency action	Revised probability score	Revised impact score
Technology	There is a risk that a lack of suitable retrofit cooling technologies and vendors may result in a poor response to invitations to tenders, leading to reduced competitiveness of quotes and reduced value for money.	2	4	A call for innovation in Celsius development showed that products are available from a number of vendors. A thorough market search will identify as many options as possible.	2	2
				<i>Contingency: Early vendor engagement. If there is significant difficulty in identifying enough suitable technology vendors, then the cooling trial can be implemented with fewer technology types.</i>		
Technology	There is a risk that the lead time for the retrofit cooling techniques may lead to a delay in the installation of this technology and delay the start of the monitoring trial.	3	3	During technology selection, each technology will be assessed based on a number of characteristics, including readiness and deployment issues. This will reveal early potential issues.	2	2
				<i>Contingency: Flexibility is built into the installation programme with a phased installation plan starting in winter 2018 and to be completed by summer 2018. If delays are unavoidable, then technology analysis could be carried out using less than one year's data. The limitations to the assessment caused by this will be identified.</i>		
Customer	There is a risk that customers on trial networks might notice a visual or audible impact from a local retrofit intervention, or be inconvenienced during the installation of the technology.	3	2	To ensure that there is no public or reputational damage to Electricity North West, Celsius will embed a process to quickly and appropriately manage any customer impacts.	2	1
				<i>Contingency: Customer impact will be</i>		

Project phase/workstream	Description	Probability score	Impact score	Mitigating action/contingency action	Revised probability score	Revised impact score
	This risk might result in a breakdown in customer relationship and reputation.			<i>carefully considered during site selection. This will mitigate against deploying specific interventions on certain networks where the risk of an adverse customer impact, specific to the customer/network/asset/environment type, from a particular technique, is considered excessively high.</i>		
Learning dissemination	<p>There is a risk that attendance at events may be low due to the number of projects and knowledge dissemination events already taking place.</p> <p>Learning may be inhibited due to stakeholders having different interests and learning styles</p>	2	3	<p>Electricity North West will try where possible to merge dissemination events and choose dissemination channels optimised to achieve maximum reach and coverage.</p> <p>Dissemination will be carried out through multiple communication channels including 121 briefings</p> <p><i>Contingency: Interested parties are able to contact the project team for any queries and request additional information.</i></p>	2	2
Closedown	There is a risk that new obligations and guidance will be released on key deliverables, such as the closedown report (eg the need to get it peer-reviewed) leading to a longer preparation and review period required.	3	3	<p>Communication channels from Ofgem will be monitored and any updates to such requirements identified as early as possible.</p> <p><i>Contingency: Additional time is allowed for closedown reporting and a DNO partner embedded in the project to provide ongoing review and challenge throughout project delivery.</i></p>	3	3

Appendix B: Summary of project SDRC

SDRC evidence	Planned date	Status
CW.1 - Send customer engagement plan and data privacy statement to Ofgem by June 2016	Jun-16	Delivered On track
LDW.2.1 - Publicise Celsius within Electricity North West via the Volt intranet site, email bulletins and/or Newswire company magazine by June 2016, March 2017, March 2018, March 2019 and March 2020	Jun-16	Delivered On track
LDW.6.1 - Issue project progress reports in accordance with Ofgem's June and December production cycle and publish on the Celsius website	Jun-16	On track
LDW.1 - Launch Celsius project website by July 2016	Jul-16	On track
LDW.5.1 - Hold annual knowledge sharing events in September 2016, 2017, 2018 and December 2019. Provide one-to-one briefing sessions	Sep-16	On track
LDW.3.1 - Publish advertorials annually by October 2016, October 2017, October 2018 and October 2019	Oct-16	On track
LDW.4.1 - Participate at four annual LCNI conferences from 2016 to 2019	Nov-16	On track
CI.3.1 - ENA workshop with DNOs held by November 2016 (to agree areas of changes to Engineering Recommendations P15 and P17)	Nov-16	On track
LDW.6.2 - Issue project progress reports in accordance with Ofgem's June and December production cycle and publish on the Celsius website	Dec-16	On track
CI.3.2 - Publish any areas for change identified at the ENA workshop and publish change proposal options to ER P15 and ENA ER P17 on Celsius website by February 2017	Feb-17	On track
LDW.2.2 - Publicise Celsius within Electricity North West via the Volt intranet site, email bulletins and/or Newswire company magazine by June 2016, March 2017, March 2018, March 2019 and March 2020	Mar-17	On track
TW.2.1 - Hold retrofit cooling workshop by May 2017	May-17	On track
LDW.6.3 - Issue project progress reports in accordance with Ofgem's June and December production cycle and publish on the Celsius website	Jun-17	On track
TW.2.2 - Review of highest scoring technologies, circulate workshop outcomes to DNOs and publish on the Celsius website by July 2017	Jul-17	On track
CW.2.1 - Deliver customer focus group workshop by July 2017	Jul-17	On track
TW.1 - Publish equipment specifications and installation reports by September 2017	Sep-17	On track
LDW.5.2 - Hold annual knowledge sharing events in September 2016, 2017, 2018 and December 2019. Provide one-to-one briefing sessions	Sep-17	On track

SDRC evidence	Planned date	Status
LDW.3.2 - Publish advertorials annually by October 2016, October 2017, October 2018 and October 2019	Oct-17	On track
TAW.2 - Publish thermal flow study report and initial recommendations for substation design on Celsius website by November 2017	Nov-17	On track
LDW.4.2 - Participate at four annual LCNI conferences from 2016 to 2019	Nov-17	On track
CW.2.2 - Publish lessons learned from testing customer communication materials on Celsius website by December 2017	Dec-17	On track
LDW.6.4 - Issue project progress reports in accordance with Ofgem's June and December production cycle and publish on the Celsius website	Dec-17	On track
LDW.2.3 - Publicise Celsius within Electricity North West via the Volt intranet site, email bulletins and/or Newswire company magazine by June 2016, March 2017, March 2018, March 2019 and March 2020	Mar-18	On track
LDW.6.5 - Issue project progress reports in accordance with Ofgem's June and December production cycle and publish on the Celsius website	Jun-18	On track
TAW.1.1 - Raw temperature monitoring data to be available from July 2017; and retrofit cooling monitoring data to be available from September 2018	Sep-18	On track
TAW.1.2 - Publish asset temperature behaviour analysis report on Celsius website by September 2018	Sep-18	On track
LDW.5.3 - Hold annual knowledge sharing events in September 2016, 2017, 2018 and December 2019. Provide one-to-one briefing sessions	Sep-18	On track
TAW.4.1 - Develop Thermal Ratings Tool using monitoring data to evaluate site capacity on Celsius substations by October 2018	Oct-18	On track
TAW.6 - Publish asset health study report on Celsius website by October 2018	Oct-18	On track
LDW.3.3 - Publish advertorials annually by October 2016, October 2017, October 2018 and October 2019	Oct-18	On track
TW.3 - Publish cooling equipment specifications and installation reports by November 2018	Nov-18	On track
LDW.4.3 - Participate at four annual LCNI conferences from 2016 to 2019	Nov-18	On track
LDW.6.6 - Issue project progress reports in accordance with Ofgem's June and December production cycle and publish on the Celsius website	Dec-18	On track
LDW.2.4 - Publicise Celsius within Electricity North West via the Volt intranet site, email bulletins and/or Newswire company magazine by June 2016, March 2017, March 2018, March 2019 and March 2020	Mar-19	On track

SDRC evidence	Planned date	Status
LDW.6.7 - Issue project progress reports in accordance with Ofgem's June and December production cycle and publish on the Celsius website	Jun-19	On track
CW.3.1 - Publish customer survey report quantifying the acceptability of innovative retrofit cooling techniques on the Celsius website by September 2019	Sep-19	On track
CW.3.2 - Publish additional customer survey analysis evaluating the change, if any, in the acceptability of innovative retrofit cooling techniques by educating customers, on the Celsius website by September 2019	Sep-19	On track
TAW.3 - Publish low cost monitoring solution specification on the Celsius website by September 2019	Sep-19	On track
LDW.3.4 - Publish advertorials annually by October 2016, October 2017, October 2018 and October 2019	Oct-19	On track
TAW.4.2 - Develop and validate Thermal Ratings Tool using retrofit cooling trial data, and publish on Celsius website by November 2019	Nov-19	On track
LDW.4.4 - Participate at four annual LCNI conferences from 2016 to 2019	Nov-19	On track
TAW.5 - Publish the cost benefit analysis and carbon impact assessment reports, Celsius business case and buy order of retrofit cooling techniques on Celsius website by December 2019	Dec-19	On track
LDW.5.4 - Hold annual knowledge sharing events in September 2016, 2017, 2018 and December 2019. Provide one-to-one briefing sessions	Dec-19	On track
TAW.4.3 - Develop and validate Thermal Ratings Tool, combining input data from the monitoring and cooling trials, and publish user guide on Celsius website by January 2020	Jan-20	On track
CI.1.1 - Produce Celsius closedown report by January 2020	Jan-20	On track
CI.3.3 - Incorporate relevant Celsius outputs into change proposal options for ER P15 and ER P17 and hold workshop with DNOs by January 2020	Jan-20	On track
LDW.2.5 - Publicise Celsius within Electricity North West via the Volt intranet site, email bulletins and/or Newswire company magazine by June 2016, March 2017, March 2018, March 2019 and March 2020	Mar-20	On track
CI.1.2 - Complete and publish peer review of Celsius closedown report by March 2020.	Mar-20	On track
CI.2 - Publish Electricity North West's approach to managing thermal constraints at distribution substations on the Celsius website by March 2020 and train planners/ operational engineers on new codes of practice	Mar-20	On track
CI.3.4 - Submit proposals for changing ER P15 and ER P17 to ENFG by March 2020	Mar-20	On track

Appendix C: Project direction budget

Project direction ref: ENWL / Celsius / 9 December 2015, Annex 1: Project budget

Cost Category	Cost (£)
Labour	1,203,362.07
Equipment	1,333,237.01
Contractors	1,764,545.12
IT	209,136.13
IPR Costs	0
Travel & Expenses	0
Payments to users	30,815.94
Contingency	537,250.86
Decommissioning	29,357.76
Other	230,089.50
Total	5,337,794.39

Labour	1,203
Labour - project management	469
Labour - general	288
Labour - installation/commissioning	446
Equipment	1,333
Equipment - Materials	349
Equipment - General	-
Equipment - Monitoring Equipment	984
Contractors	1,765
Contractor - Project management	74
Contractor - Close Out	25
Contractor - Technology	663
Contractor - Trials & Analysis	515
Contractor - Thermal Flow Study	97
Contractor - BAU Process & Tool	165
Contractor - Customer Survey	116
Contractor - Customer Engagement Activities	53
Contractor - Cost Benefit Analysis	32
Contractor - Dissemination Activities	24
IT	209
IT - Hardware	-
IT - Software	209
IPR costs	-
IPR costs	-
Travel & Expenses	-
Travel & Expenses	-
Payments to users	31
Payments to users - Customer Survey	31
Contingency	537
Contingency	537
Decommissioning	29
Decommissioning	29
Other	230
Other - Rent	57
Other - Dissemination Activities	149
Other - Other	-
Other - DNO Workshop	24
Total Project to date	5,338

Appendix D: Detailed project expenditure

£'000s Excluding Partner Funding Ofgem Cost Category	Spend to date			Total Project			Comments
	Actual	Plan	Variance	Forecast	Plan	Variance	
Labour	15	58	43	1,203	1,203	0	
Labour - project management	15	21	6	469	469	0	
Labour - general	1	26	25	288	288	0	
Labour - installation/commissioning	0	11	11	446	446	0	
Equipment	350	719	369	1,333	1,333	0	
Equipment - Materials	0	0	0	349	349	0	
Equipment - General	0	0	0	0	0	0	
Equipment - Monitoring Equipment	350	719	369	984	984	0	
Contractors	87	203	116	1,764	1,765	0	
Contractor - Project management	15	4	(11)	74	74	(0)	
Contractor - Close Out	0	2	2	25	25	0	
Contractor - Technology	40	107	67	663	663	0	
Contractor - Trials & Analysis	20	56	36	515	515	0	
Contractor - Thermal Flow Study	0	0	0	97	97	0	
Contractor - BAU Process & Tool	12	13	1	165	165	(0)	
Contractor - Customer Survey	0	1	1	116	116	(0)	
Contractor - Customer Engagement Activities	0	16	16	53	53	0	
Contractor - Cost Benefit Analysis	0	3	3	32	32	0	
Contractor - Dissemination Activities	0	2	2	24	24	(0)	
IT	74	0	-74	209	209	(0)	
IT - Hardware	0	0	0	0	0	0	
IT - Software	74	0	(74)	209	209	(0)	
IPR costs	0	0	0	0	0	0	
IPR costs	0	0	0	0	0	0	
Travel & Expenses	0	0	0	0	0	0	
Travel & Expenses	0	0	0	0	0	0	
Payments to users	0	0	0	31	31	0	
Payments to users - Customer Survey	0	0	0	31	31	0	
Contingency	0	0	0	537	537	0	
Contingency	0	0	0	537	537	0	
Decommissioning	0	0	0	29	29	0	
Decommissioning	0	0	0	29	29	0	
Other	8	15	7	230	230	0	
Other - Rent	0	0	0	57	57	0	
Other - Dissemination Activities	8	15	7	149	149	0	
Other - Other	0	0	0	0	0	0	
Other - DNO Workshop	0	0	0	24	24	0	
Total	534	995	462	5,337	5,338	0	

Appendix E: Project bank account

The bank statement below details all transactions relevant to the project. This includes all receipts and payments associated with the project up to the May 2016 month end reporting period.

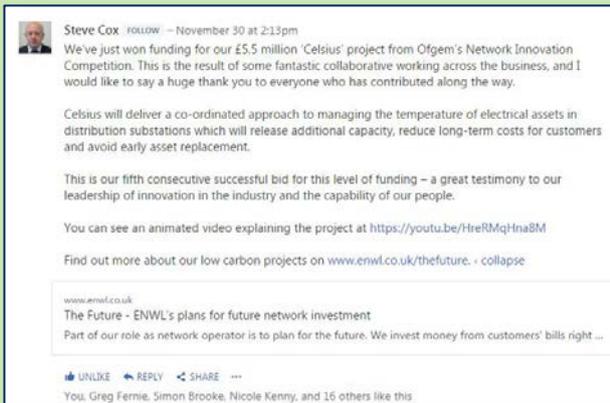
Lloyds Bank		P&S - ALL ACCOUNTS v2			391353	
Statements and Balances						
308012-13292060						
ELECTRICITY NWL NO.15 (CELSIUS) (GBP)						
Date	Type	Narrative	Value Date	Payments	Receipts	Balance
15FEB16		Opening Ledger Balance				0.00 Cr
15APR16	BGC	NO 3 PAYMENTS BGC			395,319.45	395,319.45 Cr
		NIC FUND 1ST DUE				
28APR16	CR	FROM A/C TFR			533,779.83	929,099.28 Cr
		02749020 300002				
16MAY16	BGC	NO 3 PAYMENTS BGC			395,319.46	1,324,418.74 Cr
		NIC FUND 2ND PAYME				
03JUN16	DR	TO A/C TFR		114,305.33		1,210,113.41 Cr
		02749020 300002				
03JUN16	DR	TO A/C TFR		50,000.00		1,160,113.41 Cr
		02749020 300002				
03JUN16	DR	TO A/C TFR		293,387.06		866,726.35 Cr
		02749020 300002				
03JUN16	DR	TO A/C TFR		75,787.50		790,938.85 Cr
		02749020 300002				
03JUN16		Value of Credits (3)			1,324,418.74	
03JUN16		Value of Debits (4)		533,479.89		
03JUN16		Closing Ledger Balance				790,938.85 Cr
03JUN16		Closing Cleared Balance				790,938.85 Cr
*** End of Report ***						

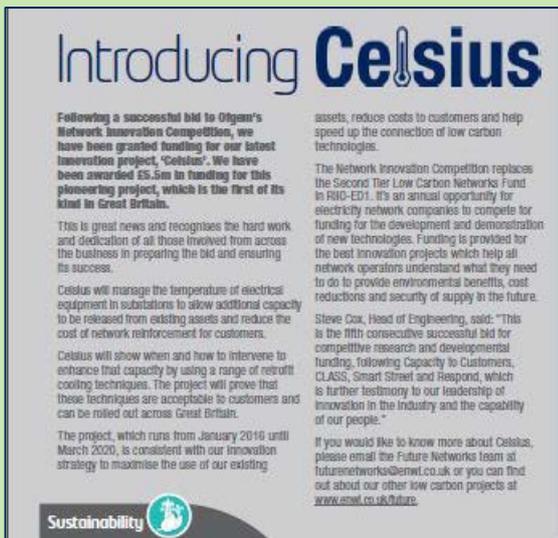
Note:

The bank statement shows the full ENWL project contribution being made to the project bank account on the 28APR16. In previous projects this payment has been made in monthly instalments

There is a rounding error in spend to date (£ 534k) and Payments (£533,479.89) to be corrected.

Appendix F: Celsius communications register

Date	Activity	Audience	Evidence
Nov 2015	Celsius introductory video on YouTube	All stakeholders	You Tube
Nov 2015	Introductory webpage on ENW Future website	All stakeholders	<p>Webpage</p> 
Nov 2015	Press release announcing Celsius funding	Media	Press release
Nov 2015	Celsius funding announced on Yammer	All employees	
Nov 2015	Celsius funding announced on Twitter	All stakeholders	
Nov 2015	Celsius funding announced on LinkedIn	All stakeholders	

Date	Activity	Audience	Evidence
Dec 2015	Employee announcement in Connect weekly bulletin	All employees	<p>Cool £5.5m funding announced for Celsius project</p> <p>Earlier this week, Ofgem announced that we have won funding for our latest innovation project, Celsius.</p>  <p>The first solution of its kind in Great Britain, Celsius will deliver a co-ordinated approach to managing the temperature of electrical assets in distribution substations. The £5.5 million project will release additional capacity, reduce long-term costs for customers and avoid early asset replacement.</p> <p>Celsius is funded under the Network Innovation Competition which replaces the Second Tier Low Carbon Networks Fund in RIIO-ED1. It's an annual opportunity for electricity network companies to compete for funding for the development and demonstration of new technologies. Funding is provided for the best innovation projects which help all network operators understand what they need to do to provide environmental benefits, cost reductions and security of supply in the future.</p> <p>This is our fifth consecutive successful bid for this type of funding following in the footsteps of Capacity to Customers, CLASS, Smart Street and Respond.</p> <p>Head of engineering Steve Cox said, "We have now won over £42 million of competitive research and development funding and this latest win is further testimony to our leadership of innovation in the industry and the capability of our people. I would like to say a huge thank you to Cara Blockley, Geraldine Bryson, Lauren Blewitt and Jane Stell and to everyone else who helped put the bid together. This is the result of some fantastic collaborative working across the business."</p> <p>If you would like to know more about Celsius, you can watch our animated video; visit our new webpage; or you can find out about our other low carbon projects at www.enwl.co.uk/thefuture</p> <p>Back to top</p>
Dec 2015	Web page and video promoted on LinkedIn	All stakeholders	 <p>Jane Stell Communications Manager, Electricity North West OWNER</p> <p>... Just now</p> <p>Celsius low carbon project - new website and video</p> <p>On 30 November 2015, Ofgem announced that we had won funding for our latest innovation project, Celsius. The first solution of its kind in Great Britain, Celsius will deliver a co-ordinated approach to managing the temperature of electrical assets in distribution substations. The £5.5 million project will release additional capacity, reduce long-term costs for customers and avoid early asset replacement. You can find out more about Celsius and watch our animated video on our new webpage at www.enwl.co.uk/celsius Show less</p>
Jan 2016	Employee overview on the Volt intranet	All employees	 <p>The screenshot shows a navigation menu on the left with categories like 'Customer and Business Services', 'Energy Solutions', and 'Networks Strategy and Tech'. The main content area is titled 'Celsius' and contains text about the funding announcement and a diagram. The diagram, titled 'Celsius Solution', shows a flow from 'Problem' (Understanding heat, Increased demand) to 'Celsius Solution' (Thermal Ratings Tool, Retrofit thermal monitoring, Retrofit cooling). Below this, it lists benefits: Under used capacity, Thermal efficiency, Extra capacity, Reduced carbon, and Reduced costs.</p>
Jan 2016	Article on new project in NewsWire internal magazine	All employees	 <p>The screenshot shows an article titled 'Introducing Celsius'. The text reads: 'Following a successful bid to Ofgem's Network Innovation Competition, we have been granted funding for our latest innovation project, "Celsius". We have been awarded £5.5m to fund this pioneering project, which is the first of its kind in Great Britain. This is great news and recognises the hard work and dedication of all those involved from across the business in preparing the bid and ensuring its success. Celsius will manage the temperature of electrical equipment in substations to allow additional capacity to be released from existing assets and reduce the cost of network reinforcement for customers. Celsius will show when and how to intervene to enhance that capacity by using a range of retrofit cooling techniques. The project will prove that these techniques are acceptable to customers and can be rolled out across Great Britain. The project, which runs from January 2016 until March 2020, is consistent with our innovation strategy to maximise the use of our existing assets, reduce costs to customers and help speed up the connection of low carbon technologies. The Network Innovation Competition replaces the Second Tier Low Carbon Networks Fund in RIIO-ED1. It's an annual opportunity for electricity network companies to compete for funding for the development and demonstration of new technologies. Funding is provided for the best innovation projects which help all network operators understand what they need to do to provide environmental benefits, cost reductions and security of supply in the future. Steve Cox, Head of Engineering, said: "This is the fifth consecutive successful bid for competitive research and developmental funding, following Capacity to Customers, CLASS, Smart Street and Respond, which is further testimony to our leadership of innovation in the industry and the capability of our people." If you would like to know more about Celsius, please email the Future Networks team at futurenetworks@enwl.co.uk or you can find out about our other low carbon projects at www.enwl.co.uk/thefuture.</p> <p>Sustainability</p>

Appendix G: Glossary of terms

Ambient temperature	Temperature of the air surrounding a component
Cable	An underground conductor used to distribute electrical power, typically buried directly in the ground or installed in ducts or troughs
Capacity	The amount of power that can be delivered by an asset
Current	The movement of electrons through a conductor, measured in amperes, milliamperes and microamperes
Demand	The amount of electrical energy that is being consumed at any given time
Distribution substation	A substation which contains high voltage (HV) switchgear, an HV/LV transformer, LV switchgear and short length of LV cable(s) and can be either pole- or ground-mounted
Distribution network operator (DNO)	The owner and/or operator of an electricity distribution system and associated assets
Energy Networks Association (ENA)	The industry body funded by GB electricity transmission and distribution licence holders and gas transporter licence holders. It lobbies on common issues in the operating environment, at domestic and European levels, and provides technical services for the benefit of members
High voltage (HV)	Voltages over 1kV up to, but not including, 22kV
Low Carbon Networks Fund (LCN Fund)	Funding to encourage the DNOs to innovate to deliver the networks needed for a low carbon economy
Low carbon technology (LCT)	A type of technology which operates with substantially fewer carbon emissions than traditional equivalents
Low voltage (LV)	This refers to voltages of 1kV and below
Reinforcement	Network development to relieve an existing network constraint or facilitate new load growth
Retrofit cooling	Techniques that can be applied to existing assets to reduce operating temperature
SDRC	Successful delivery reward criteria
Substation	A point on the network where voltage transformation occurs
Switchgear	Device for opening and closing electrical circuits
Thermal coefficient	The constant by which the external temperature needs to be multiplied to ascertain the hotspot temperature
Thermal constraint	The restriction of an electrical asset's capacity due to the operating temperature
Thermal headroom	The amount of capacity available for use
Thermal Ratings Tool	Software/Microsoft Excel-based solution which will calculate the available capacity at a site based on inputs of temperature, substation environment and asset type
Transformer	Device that changes the network voltage without changing the frequency