



CLNR Industrial & Commercial DSR Trials

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1. Document Purpose

This report provides details of the learning gained from the Spring 2014 demand side response (DSR) trials with industrial and commercial (I&C) customers in the Customer-Led Network Revolution (CLNR) project.

This is the second set of trials undertaken with I&C customers for the project. Details of the learning from the first set of trials can be found in the document; Initial report on industrial and commercial demand side response trials.¹

The key development items for the second set of trials were to:

- Assess the process of acquiring DSR at specific geographic locations;
- Engage directly with I&C customers to provide the DSR services;
- Build a larger DSR trial portfolio to test response from a broader cross-section of the I&C customer base;
- Trial an additional contract framework;
- Initiate the call for DSR from monitoring devices on the trial network; and
- Enhance the communication despatch protocols between the DNO and the aggregators for DSR by utilising the CLNR active network management system to issue DSR instructions direct to the aggregators and I&C customers

¹ CLNR-L014: <http://www.networkrevolution.co.uk/project-library/lessons-learned-report-enhanced-automatic-voltage-control/>

2. Executive Summary

The Customer-Led Network Revolution project is assessing the potential of novel smart grid network technologies, new commercial arrangements and customer flexibility solutions to find cost-effective ways to prepare UK electricity networks for the future.

The customer solution trialled was a direct control proposition which required industrial and commercial (I&C) customers to adapt their energy usage patterns upon request to create a controllable power flow. The methods employed by the customers included shifting load to another time outside the control period or utilising on-site generation to supply their load during the control period.

A first set of trials were carried out in 2012 with the key findings as follows:

- The DNOs can build effective relationships with commercial aggregators for the purpose of providing demand side response (DSR)
- The DNOs are effectively in a competitive market for DSR primarily with the National Grid short-term operating reserve (STOR) products. The two network requirements are potentially complementary and a joint DNO/ Transmission System Operator (TSO) and even Transmission Operator (TO) product may create value for all stakeholders
- The DSR contracts delivered a 77% success rate when participants were instructed to deliver DSR. So when customers are engaged, the operation of the arrangements is entirely feasible
- Locating customers that are willing to offer the level of DSR that we consider is required by the network as an adequate insurance product (i.e. for four hours in a day over a maximum 14-day period - potentially more than 14 days in some circumstances) will reduce the number of customers that can participate in these schemes. A solution to this issue is to use a portfolio of customers to deliver the DNOs requirements, each contributing towards the total requirement
- When targeting a tight geographic area the initial customer drop-out rates are high due to issues with contacting the sites, contacting the right person at the site and the size of site load
- The implementation of DSR from generation substitution is the most successful entry point for new I&C customers wishing to participate in DSR schemes as it provides a new revenue stream while minimising the number of changes and new risk to their business operation. Following this first step, customers can then engage in developments that may be more intrusive to their core processes such as load management. Energy efficiency is also a good entry point for customers new to DSR
- The lead times from making initial contact with a customer to finalising a DSR contract can range from 12 to 24 months

The main objective of the 2014 trials was to enhance the communication despatch protocols between the DNO and the aggregators for DSR services by demonstrating that network technology and a customer proposition could be combined to activate a customer response. This was carried out by utilising the CLNR active network management system to issue DSR instructions directly to the aggregators and I&C customers.

A total of fourteen sites DSR sites were signed up to the spring 2014 trials, thirteen with three aggregators and one contract was signed directly with an I&C customer which has expanded our customer engagement experience and provides a valuable comparison of the aggregator model compared to a DNO dealing directly with customers.

In total, 33 DSR instructions were issued across the portfolio, 31 instructions resulted in a successful DSR response giving a reliability of 94% for utilisation. The reason for the failed events was a diesel generator failure at one of the sites. Additional lessons learnt from the spring 2014 trials were as follows:

- **It is possible to build an end-to-end active network management scheme**
 - The trials have shown that it is possible to monitor what customers are doing on the network, identify constraints, then initiate and deliver solutions to relieve those constraints
- **The location of DSR provision in specific geographic locations will be difficult, requiring DNOs to improve engagement techniques to seek out and secure resource that is available**
 - The feasibility of targeting specific geographic locations for the provision of DSR was tested in these trials
 - Our experience of recruitment for the 2014 trials has again shown that it is extremely difficult and time consuming to recruit customer in specific geographic locations
- **The DSR reliability levels experienced during the trials means that DNOs need to over-procure to achieve the required level of network security**
 - The DSR sites had an availability of 50% for the trial period with 5 sites available for all of the trial period, 6 sites unavailable for all of the trial period and 3 sites with intermittent availability
 - The DSR sites delivered an 94% success rate when instructed to deliver DSR so a probabilistic approach is needed when planning, pricing and purchasing
 - These trials have shown that DSR provided through load reduction / shifting was found to be the most reliable form of DSR with a combined reliability of 100% for availability and utilisation compared with 38% for generation led DSR
- **The contract arrangements need to be simple to understand, simple to operate and they must offer a fair price to the provider and the DNO in order to be viable**
 - Customers are willing to accept alternative contract and payment structures to those they have worked with under STOR
 - Existing STOR participants are easier to recruit and sharing arrangements are needed to transition from trial to BAU
 - Customers found the contract terms relatively concise particularly when compared to other DSR schemes
 - For future DSR schemes, customers would like to a simple payment and penalty arrangement which allows some flexibility and for it to be aligned with the current National Grid demand side response schemes
 - Aggregators found that standard DNO payment routines and timescales could be improved
 - Business as usual pricing will be driven by supply and demand
 - DNOs will need to consider the deferred / avoided reinforcement costs, response reliability, benefit sharing between the DSR provider and all customers together with recognising that customers are looking for bankable business cases
- **It is easier to procure DSR from standby generation than find a truly flexible load**
 - Out of the 14 trial customers, we were successful in finding two effective and fast responding flexible loads. The first was provided by refrigeration plant operated by an ice manufacturer (0.6MW) connected at HV and the second was a gas compressor (5MW) connected at EHV
 - Standby generation appears to be the most successful entry point for I&C customers wishing to participate in DSR schemes as it provides a new revenue stream while minimising the number of changes and new risk to their business operation

3. Introduction

As part of the CLNR project, test cell 18 trialled a direct control proposition which requires industrial and commercial (I&C) customers to adapt their energy usage patterns upon request to create a controllable power flow by either increasing generation or reducing load.

A first set of DSR trials were carried out in 2012, with three I&C sites signed with two commercial aggregators. The sites were located in our regions but not in areas of our network which required DSR. The key objectives of the first trials were to:

- Assess the network requirement
- Develop the I&C DSR product
- Assess the market entry channels
- Develop relationships with DSR providers
- Design and execute DSR contracts
- Assess the operational trials
- Apply learning for the 2013 autumn trials

The contracts were tested during January and February 2012. A DSR event was simulated from the network perspective based on an event simulation plan. The DSR instruction was made via a telephone call from Northern Powergrid control rooms and the project team to the aggregator control rooms.

In total, 13 DSR instructions were issued across the portfolio. 10 instructions resulted in a successful DSR response. The reasons for the failed events included a fire at one of the sites and DSR not being delivered in accordance with the contractual requirements at the other two sites, i.e. the DSR delivered was less than the contracted amount.

The monitoring of what DSR was delivered was verified by post event metering data. In addition, this process supported the settlement process which validated what payments should be made to the aggregators. The settlement process was a manual activity and did require an iterative process to agree final positions with the aggregators.

This report details the second set of trials in this test cell which were run in spring 2014 and describes the methodology utilised, the results from the operational trials and the learning and recommendations.

The second set of trials targeted 14 customers within test cell 18 and sought to prove both:

- a) the commercial concept, that
 - it is possible for DNOs to contract for DSR services both directly with I&C customers and via Aggregators; and
 - I&C customers are willing to accept a variety of validation and payment methodologies.
- b) the paired technical concepts, that
 - a DSR response can be relied upon to deliver the service required to address localised network constraints; and
 - we can build an end-to-end active network management scheme to monitor what customers are doing on the network, identify constraints, then initiate and deliver solutions to relieve those constraints

4. Commercial Arrangements

For the spring 2014 trials, the agreement utilised for the 2012 trials was developed to include two additional validation methodologies together with a new payment type. In addition it was recognised that some of the definitions needed to be clearer and that a non-performance clause was missing from the agreement. This non-performance clause was added to clause 4 and sets out the process that must be followed if a site is declared unavailable.

Clauses that may need amending before these agreements can be utilised in a business as usual situation include:

- Clause 2 (Term and Termination) which currently states that the Agreement may be terminated by either Party upon one month prior written notice to the other Party. If DSR is to be utilised as business as usual one month's notice is unlikely to provide adequate time to find an alternative DSR provider
- Clause 3 (Pilot Scheme) which gives a description of the trial and will need rewriting for business as usual application
- Clause 4 (Demand Response Services) states that Sites shall not participate in the Short Term Operating Reserve scheme operated by National Grid Electricity Transmission plc for the same Availability Window as is used for this Agreement. This clause will need to be removed if the sharing of services with National Grid Electricity Transmission plc is to be pursued
- Schedules 1, 2 and 3 will also need completing with details appropriate for a business as usual case

4.1. Validation methodology

For the spring 2014 trials three validation methodologies were developed for determining the DSR provided:

- Benchmarking
- Floor methodology
- 10 day average

These are briefly described below and are covered in more detail in the appendices.

For all three methodologies the following were agreed:

- Agreed Demand (MW) which is the amount of demand response to be provided by the site. The site is not paid any additional monies for providing more demand response than has been agreed
- Response Time which is the maximum time in minutes which is permitted to elapse from the issuing of the instruction until the moment that the site provides the demand response
- Instruction Maximum which is the maximum number of days each site must provide a demand response during the trial period. For these trials it was agreed that a maximum of 10 events would be called per site
- Reporting Deadline which is the maximum time for providing metering data following an event. For these trials metering data was provided at the end of each month

4.1.1. Benchmarking

To verify the performance of the site, this methodology takes the baseline as the power consumption for the metered half hour data immediately before the despatch instruction and compares that to the post-despatch consumption levels for the half hourly data during the DSR event. The difference between the two consumption levels is the delivered DSR.

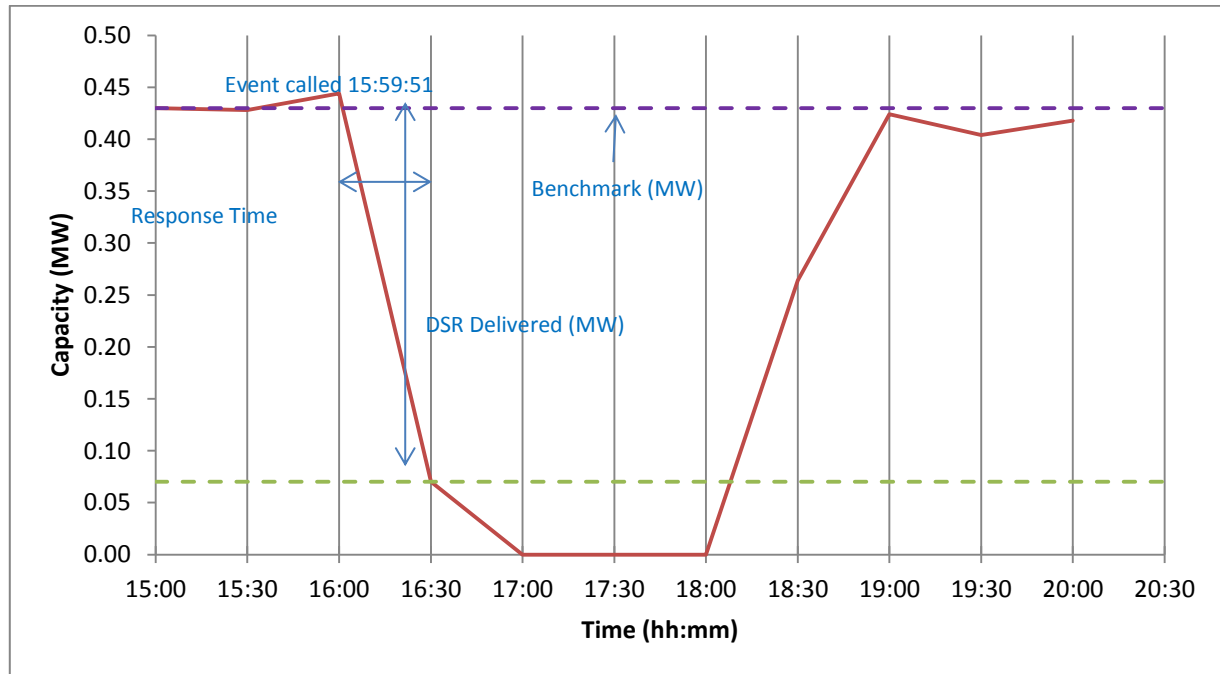


Diagram 1: Benchmarking methodology

Diagram 1 shows a site with an agreed DSR of 0.36MW and event duration of 2 hours. The DSR event shown in this diagram was called at 15:59:51. Table 1 shows how the DSR would be verified for this event by subtracting the capacity in MW recorded at each half hour during the event from the benchmark of 0.43MW (the half hourly data recorded at 15:30). This data verifies that the agreed DSR of 0.36MW was provided for the duration of the event.

Time (hh:mm)	15:30	16:00	16:30	17:00	17:30	18:00
Capacity (MW)	0.43	0.44	0.07	0.00	0.00	0.00
DSR Delivered (MW)	N/A	N/A	0.36	0.43	0.43	0.43

Table 1: Half hourly data during DSR event

A full copy of the contract is available in appendix A.

4.1.2. Floor methodology

This methodology requires the site to drop consumption below a threshold level during the DSR event. A “Floor” is agreed which the site must not go over during the DSR event. The DSR value which the site is paid to provide is calculated by subtracting the agreed Maximum Demand in MW during the DSR event from the agreed Average Demand calculated from the sites average consumption for the relevant time periods. The contract is verified by checking that the half hourly metered data during the DSR event is below the agreed floor level.

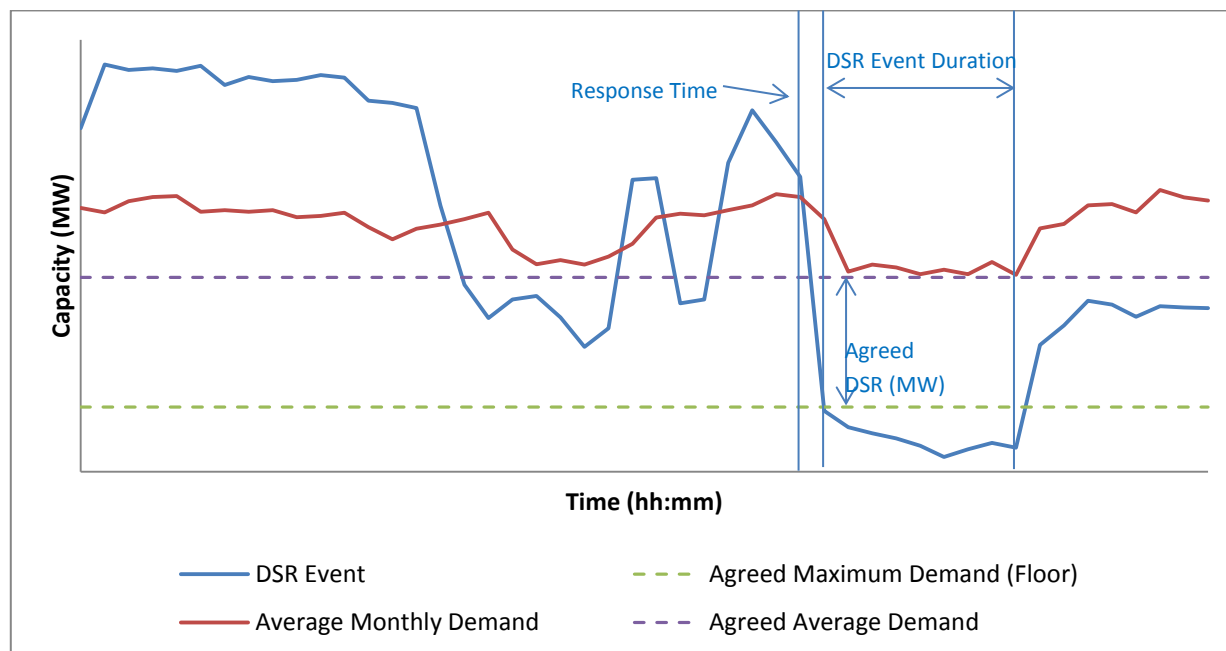


Diagram 2: Floor methodology

Diagram 2 shows a site with an agreed floor and demonstrates that the site did not breach this agreed maximum demand during the DSR event. This diagram verifies that the agreed DSR was provided for the duration of the event.

A full copy of the contract is available in appendix B.

4.1.3. 10 day average

For the 2014 trials a further baseline methodology was developed which is calculated by taking the average consumption from the previous 10-day period for the relevant time periods and comparing that profile with the post DSR instruction load profile. The difference is the DSR delivered. None of the sites chose to use this contract type for the trials. The reason given by the sites for not choosing this particular contract type was that they were satisfied with the verification provided with the benchmarking methodology and did not believe there was any additional benefit in utilising a 10 day average value.

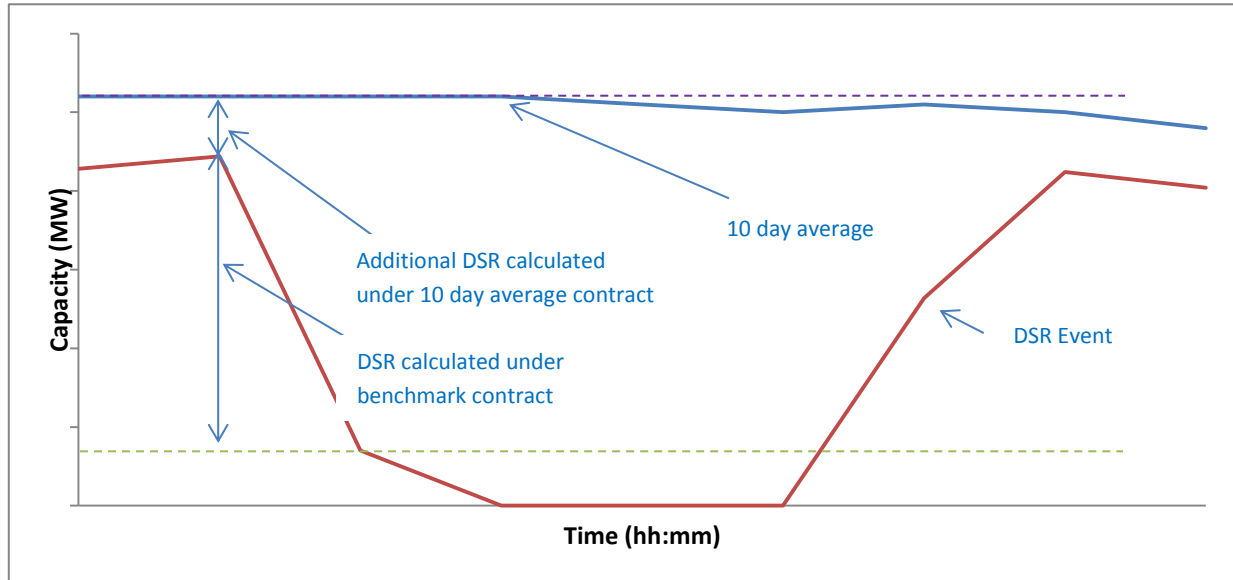


Diagram 3: 10 day average methodology

Diagram 3 shows that for this particular event, additional monies would have been paid had the site opted for the 10 day average contract rather than the baseline method.

A full copy of the contract is available in appendix C.

4.2. Payment structure

The payment structure used in the 2012 trials was based on the National Grid Short-term Operating Reserve (STOR) methodology, which uses an availability and utilisation component. In addition to this methodology, for the 2014 trials, a further option was developed which utilised a daily payment concept which removes the availability and utilisation structure. Although these payment structures could be used with each of the verification methodologies described in section 4.1, for the 2014 trials, the availability and utilisation payment structure was offered alongside the benchmarking and 10 day average methodologies and the daily payment concept was offered alongside the floor methodology.

4.2.1. Availability and utilisation payments

For the 2014 trials the availability and utilisation payment structure was utilised alongside the benchmarking methodology at ten of the fourteen sites. An availability price (AP_{sj}) of £10/MW/h and a utilisation price (EP_{sj}) of £300/MW/h was paid for the DSR services. The following formulae were used to calculate the availability and utilisation payments.

$$AF_{sm} = \sum_{j \in M_m} (AP_{sj} \times 0.5 \text{ hours} \times CM_{sj})$$

Where AF_{sm} is the sum of all availability payments for each half hour in the availability window (3pm – 7pm), AP_{sj} is the availability price, in £/MW/h and CM_{sj} is the contracted DSR capacity, in MW.

$$UF_{sm} = \sum_{j \in M_m} (R_{sj} \times EP_{sj})$$

Where UF_{sm} is the sum of all utilisation payments for each half hour during the DSR event, R_{sj} is the DSR delivered, in MWh and EP_{sj} is the agreed utilisation price, in £/MW/h.

Availability Payment (AF) Worked Example

$AP = £10/\text{MW/h}$, $CM = 0.36\text{MW}$

$AF = 10 \times 0.5 \times 0.36 = £1.80$ per half hour or £14.40 per availability window (4 hours)

Utilisation Payment (UF) Worked Example

$R = 0.18\text{MWh}$, $EP = £300/\text{MW/h}$, no. of half hours during DSR event = 8

$UF = (0.18 \times 300) \times 8 = £432$

For a 45 day availability window and 10 events called, the maximum payment would be £4968 (£648 availability payment and £4644 utilisation payment)

4.2.2. Daily charge

For the 2014 trials the daily charge payment structure was utilised alongside the floor methodology at four of the fourteen sites. The following formula was used to calculate the DSR payments.

Avoids admin involved with availability payments Sites have guaranteed revenue stream and are therefore incentivised to take part in DSR.

$$DF_{sm} = \sum_{d \in M_m} (DP_{sd} \times CM_{sd})$$

Where DF_{sm} is the sum of all the Demand Floor Payments for each half hour in the availability window (3pm – 7pm), DP_{sd} is the agreed Demand Response Price, in £/MW/day and CM_{sj} is the contracted DSR capacity, in MW.

Daily Charge Worked Example

DP = £306/MW/day, CM = 0.36MW

DF = 306 x 0.36 = £110.16 per day

For a 45 day availability window and 10 events called, the maximum payment would be £4957.20.

4.2.3. Comparison of availability and utilisation payments vs. Daily charge

It can be seen from the worked examples in section 4.2 and from diagram 4 that the trial was designed to pay the same to participants for 10 events called during a 45 day availability window, no matter which contract type they chose.

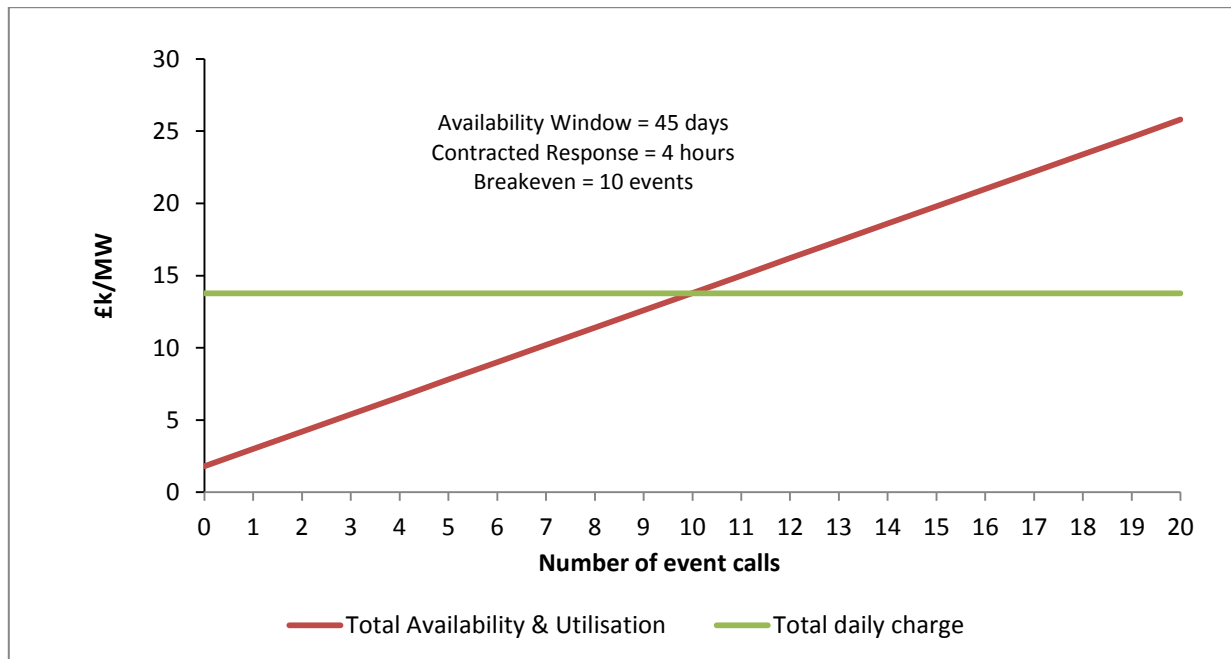


Diagram 4: Comparison of Availability & Utilisation vs. Daily Charge for 2014 CLNR Trials

Table 2 shows the pros and cons of the two payment structures from both a DNO and a DSR provider perspective.

Payment Type	DNO perspective		DSR provider perspective	
	Pros	Cons	Pros	Cons
Availability & Utilisation	DSR availability was notified & visible each week Lower cost (if not called as often as predicted)	More complicated to operate and validate	Pays more if utilised more	Requires weekly notifications. Only the availability payment is guaranteed
Daily Charge	Simple to operate and validate Costs are fixed	Higher cost option (if not called as often as predicted) Availability notification was not a contract requirement	Simple - No availability notification required Guaranteed income to cover costs	No additional revenue if called more than the base case

Table 2: Comparison of payment types from DNO and DSR provider perspective

5. Customer Engagement

The feasibility of targeting specific geographic locations for the provision of DSR was tested in these trials. Our experience of recruitment for the 2014 trials has again shown that it is extremely difficult and time consuming to recruit customer in specific geographic locations.

DSR can be hard to come by which, if this is to be included in the DNO portfolio of solutions, will need all DNOs to focus on customer engagement, whether this is directly, via aggregators or via Suppliers.

For the spring 2014 I&C trials the project worked with the aggregators again but in addition we have engaged directly with an I&C customer.

Site	Market Channel	DSR Provision	Contract Type	Pricing Model	Connected Voltage	DSR (MW)	Run Hours Cap
A	Direct	Load Shifting	Floor	Daily Charge	EHV	5.0	4
B	Aggregator	Generation	Benchmark	Availability and Utilisation	HV	0.36	2
C	Aggregator	Generation	Benchmark	Availability and Utilisation	HV	3.6	2
D	Aggregator	Generation	Floor	Daily Charge	HV	0.5	4
E	Aggregator	Load Shedding	Floor	Daily Charge	HV	0.6	4
F	Aggregator	Generation	Benchmark	Availability and Utilisation	HV	0.23	2
G	Aggregator	Generation	Benchmark	Availability and Utilisation	HV	0.97	2
H	Aggregator	Generation	Benchmark	Availability and Utilisation	HV	0.35	2
I	Aggregator	Generation	Benchmark	Availability and Utilisation	HV	0.3	2
J	Aggregator	Generation	Benchmark	Availability and Utilisation	HV	0.71	2
K	Aggregator	Generation	Benchmark	Availability and Utilisation	HV	0.94	2
L	Aggregator	Generation	Benchmark	Availability and Utilisation	HV	1.4	2
M	Aggregator	Generation	Floor	Daily Charge	HV	0.8	4
N	Aggregator	Generation	Benchmark	Availability and Utilisation	HV	1.05	2

Table 3: DSR site participants for 2014 trials

5.1. Commercial aggregators

Thirteen DSR sites were signed up to the trials with three aggregators for the spring 2014 trials. Two of the aggregators (a total of ten sites) opted to sign the benchmarking contract with the availability and utilisation payment method. One of the aggregators (a total of 3 sites) opted to sign the floor methodology contract with the daily charging method.

5.2. Direct engagement

One contract was signed directly with an I&C customer which has expanded our customer engagement experience and provides a valuable comparison of the aggregator model compared to a DNO dealing directly with customers. The customer chose to sign the floor methodology contract with the daily charging method.

6. Trial Description and Results

6.1. CLNR Active Network Management (ANM) system

6.1.1. Event initiation

All the trial events were initiated automatically through the CLNR ANM system.

This system consists of a network model which uses data coming in from monitored network equipment to identify and predict thermal and voltage constraints. It can then make intervention decisions based on the flexibility available from installed smart network technology or notified commercial arrangements with customers and it uses this information to then deploy the optimum solution to mitigate these constraints.

The details of the DSR providers were loaded into the CLNR ANM system and the signal to call the DSR was generated by simulating a forecast overload on the transformers at Rise Carr Primary Substation by changing the set points on the transformer real time thermal rating model from 1350 Amps to 275 Amps, during peak time.

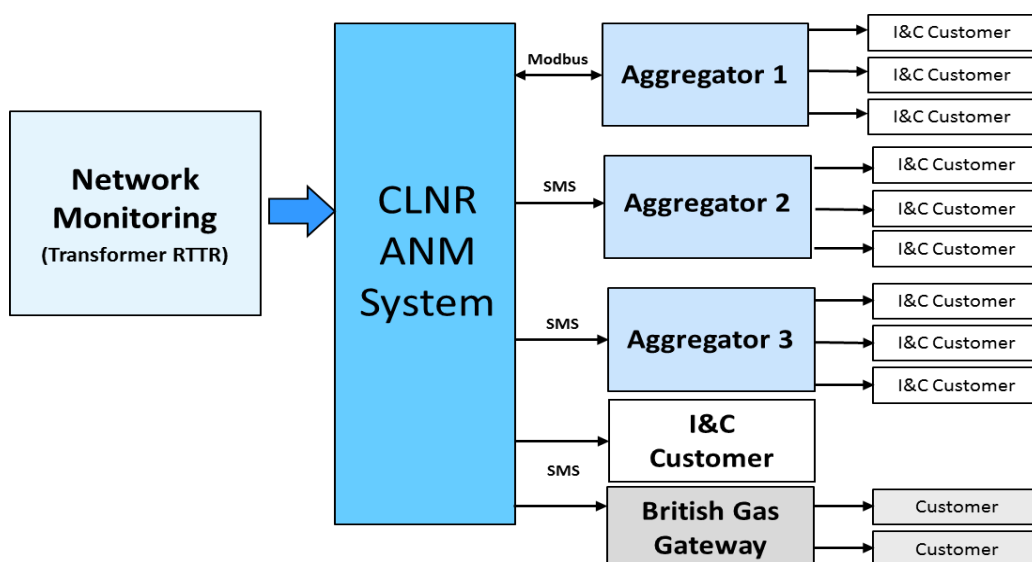


Diagram 5: Integration of network monitoring & control to the DSR provider

Transformer real time thermal ratings (RTTR²) were calculated within the remote distributed controller (RDC) located in the substation, with real time current and ambient air temperature analogues compared with previous readings. These analogues were used in the thermal modelling block of the RDC to determine the maximum current able to flow through the transformer within the next 30 minutes without causing the transformer to be thermally overloaded; this output was called the ampacity.

Within the CLNR ANM system the ampacity value was compared with the actual current and when the actual load was greater than the RTTR value the transformer was forecast to be overloaded if the current was not reduced and hence a violation was seen and an intervention was instructed.

² From the description below, it can be seen that this is strictly a dynamic model, as it takes into account both recent and future loading

The CLNR ANM system was set up to check the network every 10 minutes. If a violation was observed, the control options available were checked (in this case DSR) and the intervention command sent. For the DSR a power reduction command was either sent to the aggregators, who then contacted the appropriate sites or to the site directly to initiate the DSR. Messages were automatically sent from the CLNR ANM system to the aggregator or the customer.

Information on the DSR contracts was held within the CLNR ANM system in two forms:

- a) For communication via SMS, a static, up-front declaration of availability was made;
- b) For communication via Modbus, a dynamic declaration of availability updated on-line in real-time was made.

In order to demonstrate that the system was able to choose which sites to call on a least cost basis, a merit order, shown in Table 4, was added to the system. The merit order took into account the size of the contracted DSR and the price. The price in the system did not reflect the actual contractual costs but were amended to prove the technical concept of a merit order. The system then chose an optimum DSR provider based on cost by multiplying the price in £/MWh by the MW available and the call duration available.

Site	Provider Name	Interface Type	DSR	Availability Window		Call duration	Price	Merit Order
			MW	start	end	hrs	£/MWh	
F	Aggregator 2	SMS	0.23	1500	1900	2	200	92.0
I	Aggregator 2	SMS	0.3	1500	1900	2	200	120.0
H	Aggregator 2	SMS	0.35	1500	1900	2	200	140.0
B	Aggregator 1	Modbus	0.36	1500	1900	4	200	288.0
G	Aggregator 2	SMS	0.97	1500	1900	2	200	388.0
N	Aggregator 2	SMS	1.05	1500	1900	2	200	420.0
J	Aggregator 1	Modbus	0.71	1500	1900	4	300	852.0
E	Aggregator 3	SMS	0.6	1500	1900	4	400	960.0
D	Aggregator 3	SMS	0.5	1500	1900	4	500	1000.0
K	Aggregator 1	Modbus	0.94	1500	1900	4	300	1128.0
M	Aggregator 3	SMS	0.8	1500	1900	4	500	1600.0
L	Aggregator 1	Modbus	1.4	1500	1900	4	400	2240.0
A	EHV Customer	SMS	5	1500	1900	4	200	4000.0
C	Aggregator 1	Modbus	3.6	1500	1900	4	300	4320.0

Table 4: Merit order in CLNR ANM system

6.1.2. Communications

To enhance the communication despatch protocols, communication links were set up between the DNO, aggregators and I&C customer and the CLNR ANM system. These links allowed the ANM system to issue DSR instructions direct to the aggregators and I&C customer via SMS or Modbus. The Modbus is a serial communication protocol between two devices, which allows the exchange of data between two control systems, in this case between the Aggregator and the CLNR ANM. The Aggregator had the facility to change the amount of DSR available during each contract period and the CLNR ANM used the Modbus to send out requests for DSR stating the amount required.

6.1.3. Monitoring

Verification monitoring, to validate actual customer response, was completed in two ways:

- Two way data from Modbus interface
- Email or telephone confirmation that the site had responded, from the SMS interface.

6.2. Reliability

6.2.1. Availability

Both the Benchmarking and Floor contracts stated that 'Availability Declarations' were to be made via e-mail by 10:00 am each Friday during the 'Availability Window'. This declaration was to advise which of the sites were unavailable to provide DSR in the week immediately following the issue of the notice (commencing on the Monday of that week). The contracts also stated that if the site became unavailable after the declaration was made then such changes should be advised by e-mail as soon as reasonably practicable.

The trials were operated over a period of 25 weeks, although not all 14 sites were signed up for this period. Table 5 shows the availability of sites during the trials period. The maximum number of available declarations for the trials was 181 with a total of 87 weeks declared unavailable, giving a reliability of 50% for availability (100% for DSR via load sheading and 42% through the use of standby generation). Six sites were unavailable for the duration of the trials. Of these six sites, four were owned by a telecommunication company and were unavailable because they did not meet their acceptance test for participation in DSR.

The other two sites were owned by a water company and both these sites developed generator engine faults during triad running and, because the generators are standby only, fault repairs were not a priority. The other sites with intermittent availability were due to communication problems between the site and aggregator.

Site	DSR Provision	Week Numbers																									Reliability
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
A	Load																✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	100%
B	Generation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✗	✗	✗	✗	✗	✗	✗	✓	✓	✓	✓	✓				62%
C	Generation	✓	✓	✓	✓	✓	✓	✗	✗	✓	✗	✓	✓	✓	✗	✗	✓	✓	✓	✓	✓	✓					76%
D	Generation									✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					100%
E	Load									✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					100%
F	Generation																✗	✗	✗	✗	✗	✗					0%
G	Generation																✗	✗	✗	✗	✗	✗					0%
H	Generation																✗	✗	✗	✗	✗	✗					0%
I	Generation																✓	✓	✓	✓	✓	✓					100%
J	Generation	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗					0%
K	Generation	✓	✓	✓	✓	✓	✓	✗	✗	✗	✓	✓	✓	✓	✓	✗	✓	✓	✗	✗	✗	✗					62%
L	Generation	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗					0%
M	Generation									✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					100%
N	Generation																✗	✗	✗	✗	✗	✗					0%
Load Reliability																											100%
Generation Reliability																											42%
Overall Trial Reliability for Availability																											50%

Table 5: Availability of sites during trials period

6.2.3. Utilisation

In total, 33 DSR instructions were issued across the portfolio, 31 instructions resulted in a successful DSR response giving a reliability of 94% for utilisation (100% for DSR via load shedding and 91% through the use of standby generation). The reason for the failed events was a diesel generator failure at Site I.

Event		1	2	3	4	5	6	7	8	9	10	11	12	Reliability
Contract / Site		Wk19 Thu	Wk19 Mon	Wk20 Tue	Wk20 Wed	Wk20 Thu	Wk20 Fri	Wk21 Mon	Wk21 Wed	Wk21 Thu	Wk21 Fri	Wk25 Thu	Wk25 Fri	
Benchmark Availability & Utilisation	B			✓	✓		✓	✓	✓		✓			100%
	C			✓	✓		✓	✓	✓		✓			100%
	I	X	✓	X				✓	✓					60%
Floor Daily Payment	D			✓	✓	✓		✓		✓				100%
	E	✓	✓	✓	✓	✓	✓	✓	✓					100%
	A				✓							✓	✓	100%
Load Reliability														100%
Generation Reliability														91%
Overall Trial Reliability														94%

Table 6: Utilisation of sites during trials

6.2.4. Combined Reliability

By multiplying the reliability figure for availability by the reliability figure for utilisation we can see the combined reliability figure of DSR for these trials. Table 7 shows the results when considering all the sites in the trials and gives a combined reliability figure of 47% (100% for DSR via load shedding and 38% through the use of standby generation).

Site	DSR Provision	Availability Reliability	Utilisation Reliability	Combined Reliability
A	Load	100%	100%	100%
B	Generation	62%	100%	62%
C	Generation	76%	100%	100%
D	Generation	100%	100%	100%
E	Load	100%	100%	100%
F	Generation	0%	N/A	N/A
G	Generation	0%	N/A	N/A
H	Generation	0%	N/A	N/A
I	Generation	100%	60%	60%
J	Generation	0%	N/A	N/A
K	Generation	62%	N/A	N/A
L	Generation	0%	N/A	N/A
M	Generation	100%	N/A	N/A
N	Generation	0%	N/A	N/A
Load Reliability		100%	100%	100%
Generation Reliability		42%	91%	38%
Overall Trial Reliability		50%	94%	47%

Table 7: Combined reliability of sites during trials

However, if the sites that were declared unavailable for the duration of the trials are ignored in these calculations, then the combined reliability rises to 83% (100% for DSR via load sheading and 76% through the use of standby generation).

This is a valid assumption as it was clear at the beginning of the trials that a number of the sites were not going to be able to offer the DSR service and this could be taken in to account in a business as usual situation by being selective in the sites that are signed to contract.

Site	DSR Provision	Availability Reliability	Utilisation Reliability	Combined Reliability
A	Load	100%	100%	100%
B	Generation	62%	100%	62%
C	Generation	76%	100%	76%
D	Generation	100%	60%	60%
E	Load	100%	100%	100%
I	Generation	100%	60%	60%
K	Generation	62%	N/A	N/A
M	Generation	100%	N/A	N/A
Load Reliability		100%	100%	100%
Generation Reliability		83%	91%	76%
Overall Trial Reliability		88%	94%	83%

Table 8: Combined reliability of sites during trials with some sites data removed

6.3. Customer results

6.3.1. Generation support

DSR customer B is a supermarket connected at HV, with a standby diesel generator utilised to provide DSR. Diagram 6, shows the site response for a DSR event called at 15:40:27. The contractual response time of 20 minutes was easily achieved with the standby generator started at 15:43:28 and 0MW reached at 15:43:49. Load was reduced from 455kW to 0kW with 0.455MW of DSR provided, more than meeting the contracted DSR of 0.36MW. Load was restored at 17:48:19 with the run hours cap of two hours being met.

Customer B: Supermarket

Contract Type: Benchmark

Payments: Availability & Utilisation

Contracted DSR: 0.36 MW

Availability: 3pm – 6pm, Weekdays

Run hours cap: 2 hours

Response Time: 20 minutes

Season: November – March 2014

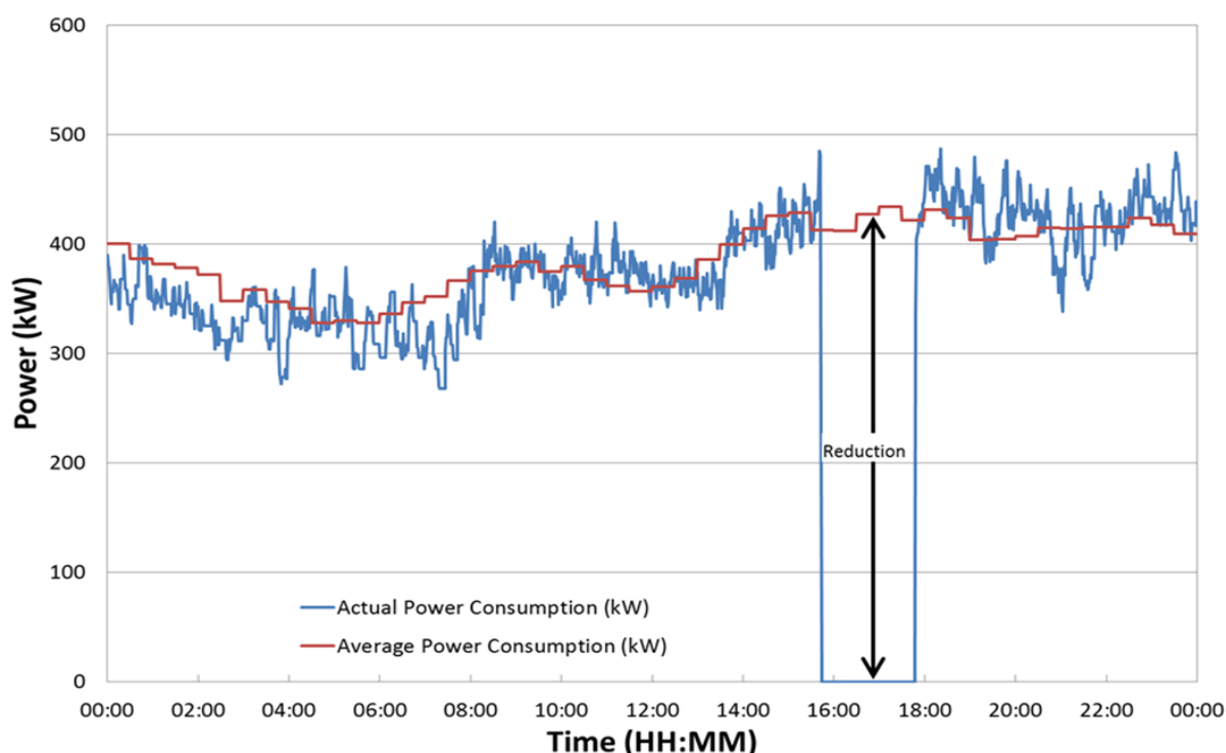


Diagram 6: Load profile for DSR event provided by Generation Support

The site was paid approximately £200 for this event with an overall payment for participation in the trials of just over £2000 for 60 days of availability and 6 DSR events (£0.9k availability and £1.3k utilisation).

6.3.2. Demand Reduction

DSR customer E is a refrigeration company connected at HV, with DSR provided through load reduction. Diagram 7, shows the site response for a DSR event called at 15:26:06. The contractual response time of 20 minutes was easily achieved with the floor reached at 15:33. The 1.65MW was breached at 19:15 with the contracted end time of 19:00 being met.

Customer E: Refrigeration

Contract Type: Floor

Payments: Daily Payments

Contracted DSR: 0.6 MW

Availability: 3pm – 7pm, Weekdays

Run hours cap: 4 hours

Response Time: 20 minutes

Season: February – March 2014

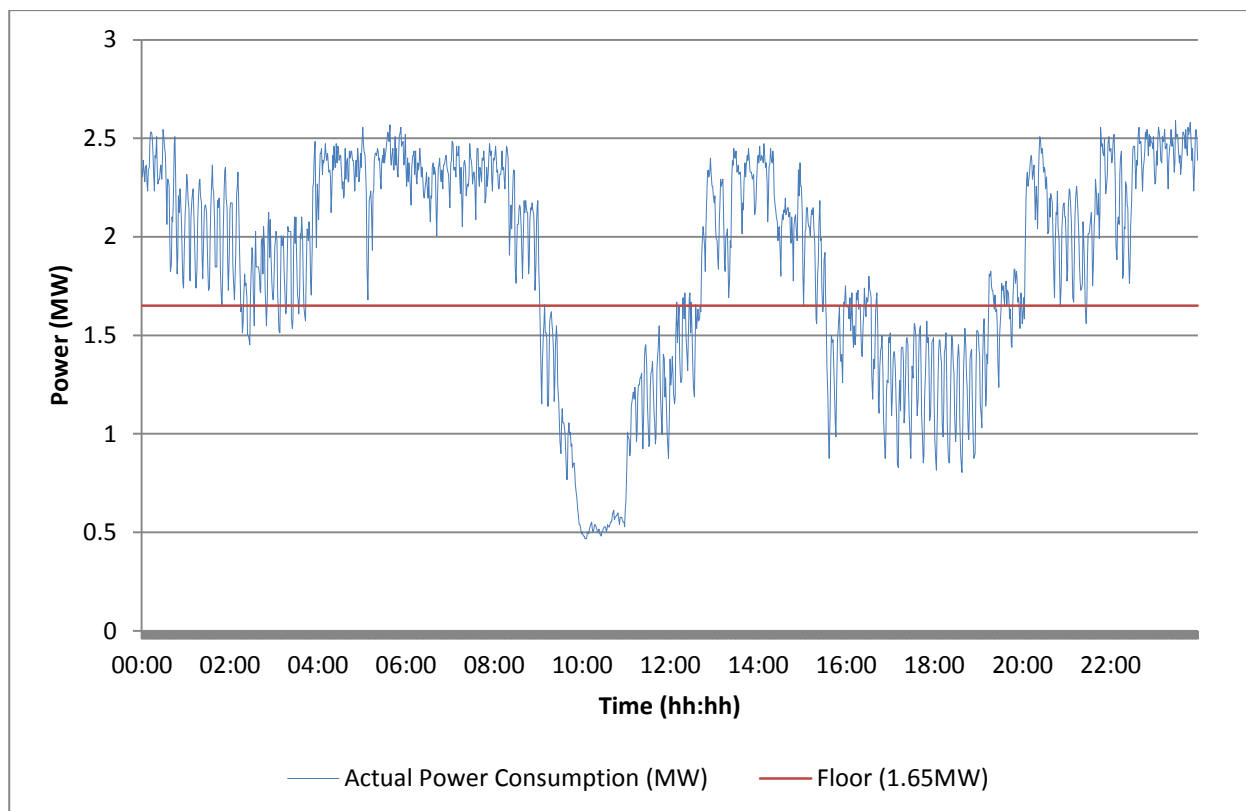


Diagram 7: Load profile for DSR Event provided through Demand Reduction

The site was on a daily payment contract and received approximately £180 per day with an overall payment for participation in the trials of just over £11,000 for 60 days of availability.

6.3.3. Demand Shifting

DSR customer A is a compressed gas supply company connected at EHV, its main demand is a motor which has a peak demand of approximately 10MW. The motor can be operated anytime during the day and as illustrated in Diagram 8, during the DSR event the site has delayed starting the motor until after the availability window has ended. Although this site has the ability to provide 10MW of DSR, the I&C customer was willing to sign a contract paying for only 5MW. The site also had the capability to provide more than four hours availability as can be seen in Diagram 8.

Customer A: Gas Production and Distribution

Contract Type: Floor

Payments: Daily Payments

Contracted DSR: 5 MW

Availability: 3pm – 7pm, Weekdays

Run hours cap: 4 hours

Response Time: 20 minutes

Season: March – April 2014

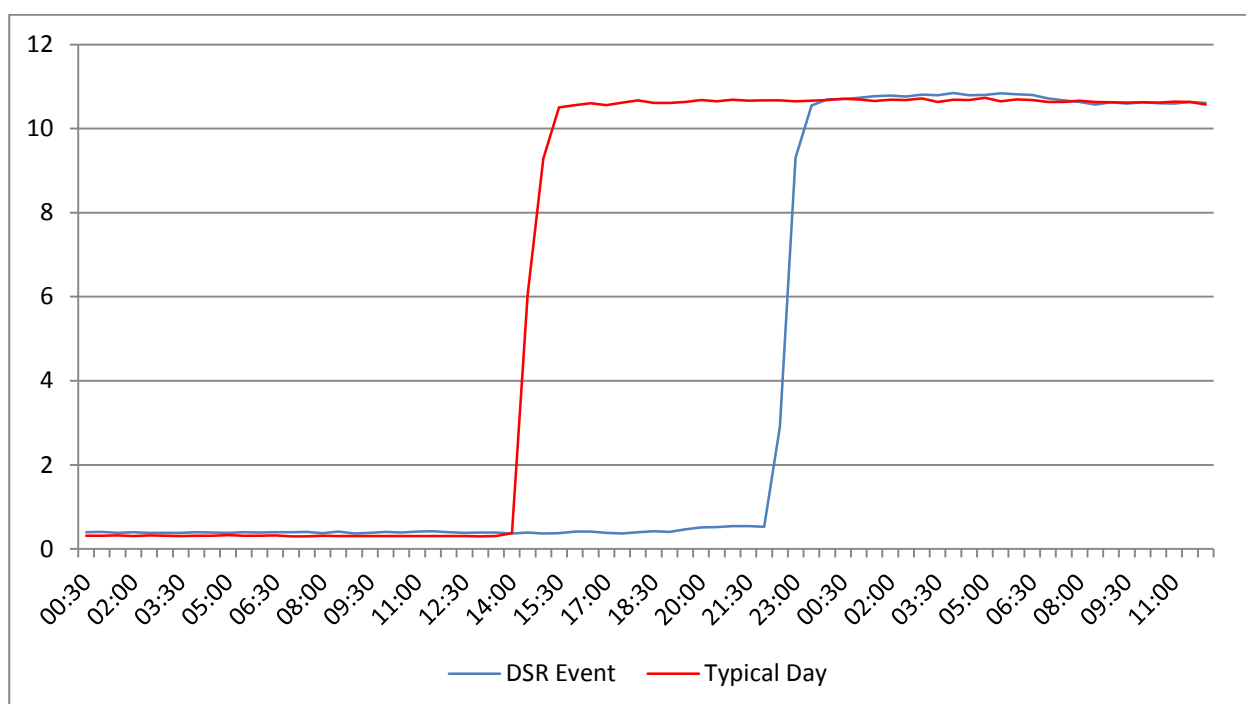


Diagram 8: Load profile for DSR Event provided through Demand Shifting

The site was on a daily payment contract and received £750 per day with an overall payment for participation in the trials of £36,000 for 48 days of availability.

6.4. Network results

Diagram 9 compares the load profiles during DSR event 6 for Customer E with that of the primary substation they are connected to. The DSR call was received at 15:16:42 and it can be seen that the demand at the customer's site and at the primary substation both show a reduction after the DSR call. It can also be seen that when the event ends and the demand increases at the site there is a corresponding increase in demand at the primary substation.

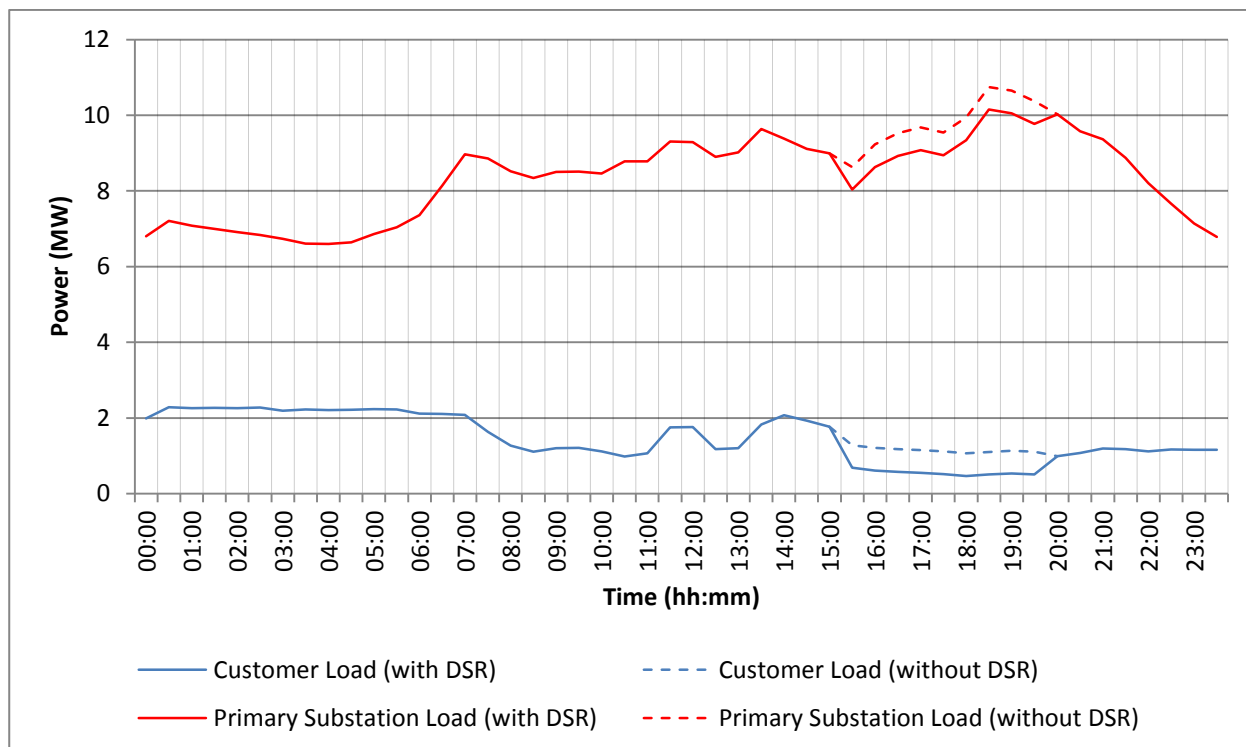


Diagram 9: Load profile at Primary Substation and customer site for DSR event

Table 9 shows the reduction in demand at the Primary Substation and Customer site when the DSR event was called at 15:16:42. The table shows that a reduction in load at the customer's site contributes to a corresponding drop in the load at the primary substation, partially offset by load increases elsewhere on the network. It also shows an increase in load at 20:00 when the DSR event has finished.

Time (hh:mm)	I&C Customer Load (MW)	I&C Load Change (MW)	Primary Load (MW)	Primary Substation Load Change (MW)
15:00	1.766		8.997	
15:30	0.682	-1.084	8.033	-0.964
16:00	0.606	-0.076	8.633	0.6
16:30	0.578	-0.028	8.927	0.294
17:00	0.554	-0.024	9.081	0.154
17:30	0.52	-0.034	8.941	-0.14
18:00	0.468	-0.052	9.338	0.397
18:30	0.504	0.036	10.148	0.81
19:00	0.534	0.03	10.05	-0.098
19:30	0.512	-0.022	9.771	-0.279
20:00	0.988	0.476	10.022	0.251
20:30	1.078	0.09	9.576	-0.446

Table 9: Demand reduction at Primary Substation and customer site during DSR event

6.5. Attitudinal analysis

To gain feedback on the trials a series of interviews were carried out with trial participants which included both the commercial aggregators and the I&C customers. The texts from the interviews are given in Appendix D but a summary of the responses is as follows:

- All respondents were already participating in other DSR schemes such as STOR and TRIAD avoidance;
- The reasons given for taking part in the trials were to take advantage of the revenue opportunity and to support the development of the use of DSR by DNOs;
- As the trials participants were already taking part in other DSR schemes existing infrastructure was already in place. Therefore the only costs of participation were the fuel costs of standby generators or the rescheduling costs for load shifting.
- The contract terms were found to be relatively concise particularly when compared to National Grid schemes;
- One respondent listed the communication protocol as an issue and would have preferred a Modbus connection rather than an SMS;
- Respondents stated that any future DSR scheme must have a simple payment and penalty arrangement and must allow some flexibility and importantly needs to be aligned with the current National Grid demand side services
- Aggregators found that standard DNO payment routines and timescales could be improved

6.6. Back office systems

The monitoring of the DSR delivered was verified by post-event metering data utilising existing half hourly metering at the customers' premises.

No additional metering was installed to support the trials, however, in a business as usual situation more granular information would be required. In addition, this process supported the settlement process which validated what payments should be made to the aggregators and the I&C customer.

Due to the small number of customers and events, the settlement process was a manual activity. More development would be required to produce a process that would be efficient on a greater scale.

7. Summary / Conclusions

These trials have proved that it is both operationally and commercially possible for DNOs to enter into DSR contracts with commercial aggregators and also directly with I&C customers. DSR could therefore be a real alternative to traditional system reinforcement. However, there are a number of factors that need to be taken into consideration when pursuing DSR as a business as usual solution:

- **It is possible to build an end-to-end active network management scheme to initiate DSR**
 - The trials have shown that it is possible to monitor what customers are doing on the network, identify constraints, then initiate and deliver solutions to relieve those constraints
- **The location of DSR provision in specific geographic locations will be difficult, requiring DNOs to improve engagement techniques to seek out and secure DSR resource that is available**
 - The feasibility of targeting specific geographic locations for the provision of DSR was tested in these trials
 - Our experience of recruitment for the 2014 trials has again shown that it is extremely difficult and time consuming to recruit customer in specific geographic locations
 - DSR only provides an alternative to network solutions if sufficient willing providers can be found on the relevant parts of the system to make a large enough reduction
- **The DSR reliability levels experienced during the trials means that DNOs need to over-procure to achieve the required level of network security**
 - The DSR sites had an availability of 50% for the trial period with 5 sites available for all of the trial period, 6 sites unavailable for all of the trial period and 3 sites with intermittent availability
 - The DSR sites delivered an 94% success rate when instructed to deliver DSR so a probabilistic approach is needed when planning, pricing and purchasing
 - These trials have shown that DSR provided through load reduction / shifting was found to be the most reliable form of DSR with a combined reliability of 100% for availability and utilisation (from a smaller sample set) compared with 38% for generation led DSR
 - DNOs would need to over-contract in order to compensate for the availability and utilisation reliability, which would put a downward pressure on prices
- **The contract arrangements need to be simple to understand, simple to operate and they must offer a fair price to both the provider and the DNO in order to be viable**
 - Customers are willing to accept alternative contract and payment structures to those they have worked with under STOR
 - Existing STOR participants are easier to recruit and sharing arrangements are needed to transition from trial to BAU
 - Customers found the contract terms relatively concise particularly when compared to other DSR schemes
 - For future DSR schemes, customers would like to a simple payment and penalty arrangement which allows some flexibility and for it to be aligned with the current National Grid demand side response schemes
 - Aggregators found that standard DNO payment routines and timescales could be improved
 - Business as usual pricing will be driven by supply and demand

- DNOs will need to consider the deferred / avoided reinforcement costs, response reliability, benefit sharing between the DSR provider and all customers together with recognising that customers are looking for bankable business cases
- **It is easier to procure DSR from standby generation than find a truly flexible load**
 - Out of the 14 trial customers, we were successful in finding two effective and fast responding flexible loads. The first was provided by refrigeration plant operated by an ice manufacturer (0.6MW) connected at HV and the second was a gas compressor (5MW) connected at EHV
 - Standby generation appears to be the most successful entry point for an I&C customers wishing to participate in DSR schemes, as it provides a new revenue stream while minimising the number of changes and new risk to their business operation

Glossary of Terms

Ampacity	The maximum amount of electrical current a conductor or device can carry before sustaining immediate or progressive deterioration.
ANM	Active Network Management
CLNR	Customer-Led Network Revolution
DG	Distributed Generation
DSR	Demand-Side Response
DNO	Distribution Network Operator
EAVC	Enhanced Automatic Voltage Control
I&C	Industrial and Commercial
RTTR	Real-Time Thermal Rating
MW	Megawatt
MWh	Megawatt Hour
STOR	Short Term Operating Reserve
TO	Transmission Operator
TSO	Transmission System Operator



Appendix A - I&C DSR benchmarking contract

DATED _____ 2013

NORTHERN POWERGRID (NORTHEAST) LIMITED

and

NORTHERN POWERGRID (YORKSHIRE) PLC

and

[AGGREGATOR NAME]

COMMERCIAL AGGREGATOR PILOT SCHEME AGREEMENT
HALF HOURLY INDUSTRIAL AND COMMERCIAL CUSTOMERS

relating to the Customer-Led Network Revolution Project

THIS AGREEMENT dated the _____ day of _____ 2013 is made

BETWEEN:-

- (1) NORTHERN POWERGRID (NORTHEAST) LIMITED (CRN 2906593) whose registered office is at Lloyds Court, 78 Grey Street, Newcastle upon Tyne, NE1 6AF ("**Northeast**");
- (2) NORTHERN POWERGRID (YORKSHIRE) PLC (CRN 4112320) whose registered office is at Lloyds Court, 78 Grey Street, Newcastle upon Tyne, NE1 6AF ("**Yorkshire**"); and collectively "**Northern Powergrid**"; and
- (3) [AGGREGATOR NAME] (CRN/SC [I]) whose registered office is at [I] ("the "**Aggregator**")

(each of Northern Powergrid and the Aggregator being a "**Party**", and collectively the "**Parties**").

BACKGROUND

- (A) Northeast and Yorkshire are licensed electricity distribution network operators who are participating in the Customer-Led Network Revolution Project (the "**Project**") which was established to consider the best means to minimise operating costs whilst simultaneously meeting Customer requirements to install greater levels of renewable generation and evaluate the possibilities of switching to lower carbon forms of heating and transport.
- (B) As part of the Project, Northern Powergrid wishes to consider how Customer load reduction and flexible distributed generation can be utilised as an alternative to electricity distribution network reinforcement. In order to consider this proposition, Northern Powergrid is seeking to establish a pilot scheme with the assistance of aggregators who would act as an intermediary between the Customer and the Northern Powergrid (the "**Pilot**").
- (C) The Aggregator is an experienced aggregator who currently participates in the Short Term Operating Reserve scheme operated by National Grid Electricity Transmission plc, upon which the Pilot is based, and wishes to participate in the Pilot with Northern Powergrid.

IT IS AGREED as follows:-

1. DEFINITIONS AND INTERPRETATION

1.1. The words and phrases below shall have the following meanings:

"Affiliate"	means any subsidiary or parent undertaking of a Party or any company which is a subsidiary company of the ultimate parent undertaking of a Party where the expressions "parent undertaking" and "subsidiary" having the meanings ascribed thereto by section 1159 and 1162 of the Companies Act 2006 save that in relation to Northern Powergrid the term shall be restricted to its subsidiaries or parent undertakings that are registered in the UK;
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“Agreed Demand”	means the amount of Demand Response to be provided by a Site for which Northern Powergrid has contracted, with the Aggregator as more particularly set out in Schedule 3, in MW;
“Apparatus”	means all equipment in which electrical conductors are used, supported or of which they may form a part;
“Arising IPR”	means any Intellectual Property Rights created pursuant to this Agreement and the Pilot;
“Authorised Person”	means the persons listed in Part 1 of Schedule 1;
“Availability Price”	means those sums described as such and set out in Part 2 of Schedule 2;
“Availability Payment”	means the payment made by Northern Powergrid to the Aggregator in consideration for the Aggregator making available the Demand Response and the Demand Response Services during the Season pursuant to Clause 6.1;
“Availability Window”	means the time period(s) described as such in paragraph 4.1, Part 1 of Schedule 2;
“Background IPR”	means any Intellectual Property Rights, excluding Arising IPR, which are controlled or owned by a Party;
“Balancing and Settlement Code”	means the document of that name established by National Grid Electricity Transmission plc pursuant to its transmission licence and to which Northern and Yorkshire are signatories;
“Bank Holiday”	means any day Monday to Friday inclusive upon which banks in the UK are closed by law;
“Confidential Information”	means all information designated as such in writing, together with all other information which relates to the business, affairs, developments or personnel of a Party or information which may be reasonably regarded as the Confidential Information of the Party disclosing it (the “Disclosing Party”);
“Connection and Use of System Code”	means the document designated as such by the Secretary of State as amended from time to time;
“Customer”	means a person connected to an electricity distribution network owned or operated by Northern Powergrid;
“Demand”	means in relation to a Site, the maximum amount of electrical energy (MW) being consumed at such Site at a specific point in time;

“Demand Response”	means either a reduction in Demand or a level of Generation provided by Customers to the Aggregator in accordance with the agreement between them provided during a Response Period;
“Demand Response Services”	means the services more particularly described in Schedules 2 and 3;
“Distribution Code(s)”	means the Distribution Code established by an electricity distribution network operator pursuant to its license;
“End Time”	means in respect of an Instruction the time upon which the Response Period will end;
“Energy Delivered”	means in relation to each Site and for each Settlement Period (or part thereof) that is included in the Response Period that amount of the Agreed Demand provided at such Site and calculated in accordance with Clause 6.5, in MWh;
“Generating Unit”	means any Apparatus which produces electricity;
“Generation”	means the electrical output (in MW) of a Generating Unit;
“GUS”	means the Grande Unified Scheme network control system forming part of the electricity distribution network;
“Instruction”	means an instruction issued by an Authorised Person or if issued by GUS, in the file format, from the number and detailing the information set out in Part 4 of Schedule 1 on behalf of Northern Powergrid to the Aggregator pursuant to Clause 4.2;
“Instruction Maximum”	means the maximum number of days per Site for which the Aggregator must provide Demand Response in any Season as more particularly set out in Schedule 3;
“Intellectual Property Rights” or “IPR”	<p>means any and all of the following:-</p> <p>rights in inventions, patents, registered designs, design rights, know-how, trademarks and service marks (whether registered or not) and all rights in relation to any Internet domain name;</p> <p>any trade, brand or business name and any distinctive sound used to differentiate the goods and services of a business;</p>

	utility models;
	copyright (including all such rights in computer software and databases); and
	any rights or forms of protection of a similar nature to those detailed above;
“Material”	means an increase in fuel prices of more than 10% since the date of this Agreement;
“Metering Data”	means the active power recorded in kWh for each Settlement Period to be provided by the Aggregator pursuant to Clause 5.1:
“Personal Data”	has the meaning attributed to that expression in the Data Protection Act 1998;
“Reporting Deadline”	means, the maximum time for the Aggregator to provide Metering Data in respect of each Site as evidence of the Demand Response provided during such event as set out in Schedule 3;
“Response Period”	means the period of time, commencing on the Start Time and ending at the End Time as stipulated in the relevant Instruction;
“Response Time”	means, in relation to an Instruction, the maximum period of time (in minutes) which is permitted to elapse from the issuing of an Instruction to the Aggregator until the moment the relevant Site(s) provides the Demand Response;
“Season”	means the period of time in which Demand Response Services will be provided as more particularly detailed at paragraph 4.1, Part 1, Schedule 2;
“Settlement Period”	has the meaning ascribed to it in the Balancing and Settlement Code;
“Site”	means each of the Customer’s sites listed in Schedule 3, (as amended from time to time), in respect of which the relevant Customer and the Aggregator have entered into an agreement or other arrangement whereby on receipt of notification by the Aggregator such Customer will provide the agreed Demand Response;
“Start Time”	means in respect of an Instruction the time the Response Period commences;
“Term”	means the duration of this Agreement as more particularly set out in Clause 2;

“Utilisation Price” means those sums described as such and set out in Part 2 of Schedule 2; and

“Utilisation Payment” means the sums payable by Northern Powergrid to the Aggregator for the Energy Delivered during the Response Period and calculated in accordance with Clause 6.2.

1.2. In this Agreement, unless otherwise expressly provided or unless the context otherwise requires, references to:-

1.2.1 the singular include the plural and vice versa.

1.2.2 words denoting any gender shall include all genders.

1.2.3 a person includes any individual, firm, body corporate, association or partnership government body or any joint venture association or partnership (whether or not having legal personality).

1.2.4 Clauses and Schedules are to Clauses of, and Schedules to, this Agreement.

1.2.5 laws, statutory provisions and regulatory obligations shall include reference to any subordinate legislation made pursuant thereto and shall be construed as referring to those laws, provisions and subordinate legislation as respectively amended or re-enacted from time to time.

1.2.6 the Parties include their respective successors in title, permitted assigns and legal personal representatives.

1.3. The headings of this Agreement are for ease of reference only and are not part of this Agreement for the purposes of construction.

1.4. The Schedules form part of this Agreement and shall have effect as if set out in full in the body of this Agreement and accordingly any reference to this Agreement includes the Schedules.

2. TERM AND TERMINATION

2.1. This Agreement shall commence on 1 September 2013 and continue until 31 December 2014.

2.2. This Agreement may be terminated by either Party upon 1 (one) month prior written notice to the other Party.

3. PILOT SCHEME

3.1. The Aggregator and Northern Powergrid have entered into this Agreement to evaluate whether the provision of Demand Response Services can avoid the need to reinforce congested areas of Northern Powergrid's electricity distribution networks.

- 3.2. The Parties acknowledge and agree that the Demand Responses Services are provided as part of the Pilot and they anticipate they will agree changes to the same from time to time in accordance with Clause 3.4.
- 3.3. The Parties shall cooperate with each other in order to determine the appropriate level of Demand Responses Services required by Northern Powergrid and provided by the Aggregator. No change to this Agreement shall be effective unless agreed by the Parties in writing. Areas in which the Parties foresee such changes occurring are:-
- 3.3.1. amendments to the Season;
 - 3.3.2. amendments to the operating parameters currently set out in Part 2 of Schedule 2; and/or
 - 3.3.3. amendments to the Agreed Demand for any Site.
- 3.4. The Parties anticipate that an Instruction could result in a Site(s) providing Demand Response for 10 consecutive working days once in a three year period and the Aggregator has used this example when discussing the Pilot with Customers.
- 3.5. If there is a Material change in fuel prices after the commencement date of this Agreement, the Parties shall review such change in order to determine whether changes will be made to the Utilisation Charges.

4. DEMAND RESPONSE SERVICES

- 4.1. In consideration for the Availability Payments calculated in accordance with Clause 6, the Aggregator has or shall enter into agreements with Customers to provide the Demand Response and the Demand Response Services during the Availability Windows in accordance with this Agreement. The Customers participating in the Pilot are set out in Schedule 3.
- 4.2. Northern Powergrid may from time to time issue Instructions to the Aggregator detailing the Site(s) that are to respond and the Response Period for which its response is required. The Response Period must fall within the Availability Window. Where a Response Period extends beyond a single Availability Window, it shall be taken to include only those Availability Windows which fall within the Response Period. Where the Response Period is continuing for more than 1 (one) Availability Window, Northern Powergrid shall by 11.00am each calendar day provide updates to the Aggregator on the anticipated Response Period.
- 4.3. After the receipt of an Instruction, the Aggregator will, within the Response Time, acknowledge its receipt and that it has instructed the relevant Customer(s) Site(s) accordingly.
- 4.4. If any Customer(s) indicates in respect of any Site(s) that due to technical breakdown or other similar event, it is unable to provide the Agreed Demand, the Aggregator shall notify Northern Powergrid as soon as reasonably practicable that the Agreed Demand is unavailable, pursuant to Clause 1.1, Part 1, Schedule 2. Immediately from receipt of such notification until the completion of the process set out in Clause 4.6, the Aggregator shall not be entitled to receive Availability Payments [in respect of such Site(s)].
- 4.5. The Aggregator will not be entitled to receive Availability Payments, in respect of Site(s) for which a notice has been issued pursuant to Clause 4.4, for the period starting on the date the Demand Response is unavailable until the Aggregator has, if so required, completed the non-performance process detailed in Clause 4.6 below.

4.6. If any Site(s) is/are not available to provide Demand Response and Demand Response Services, then Northern Powergrid shall have no obligation to make any Availability Payments until such time:

- 4.6.1. as the Aggregator submits a written report detailing the reasons for such unavailability and the actions taken to ensure availability from a specified date and time, the form and content of which report must be acceptable to Northern Powergrid (acting reasonably); and
- 4.6.2. If required by Northern Powergrid at its sole discretion, a full operational test verifying the capability of the Site(s) to deliver the Demand Response and Demand Response Services has been successfully completed

Northern Powergrid shall make Availability Payments commencing on the date and time set forth in the report provided pursuant to sub-Clause 4.6.1 or if operational test are required pursuant to sub-Clause 4.6.2 from the first Availability Window following successful completion of such tests whichever is the later to occur.

4.7. The Parties agree that, for the purpose of notifications and confirmations issued pursuant to this Clause 4, the forms of communication detailed below are acceptable:-

- 4.7.1. Modbus over TCP/IP over a VPN;
- 4.7.2. SMS;
- 4.7.3. telephone; and
- 4.7.4. e-mail.

4.8. The Response Period of an Instruction must not be less than 30 (thirty) minutes. Any Instructions not fulfilling this condition may be ignored.

4.9. Sites shall not participate in the Short Term Operating Reserve scheme operated by National Grid Electricity Transmission plc for the same Availability Window as is used for this Agreement. Sites shall be allowed to participate in Triad Demand management, with no penalties or other adverse effects for doing so imposed by this Agreement.

5. REPORTING

5.1. Following the provision of a Demand Response the Aggregator shall by the Reporting Deadline provide the Metering Data.

5.2. Any reports provided by the Aggregator, pursuant to Clause 5.1, shall be issued by e-mail to the Authorised Persons in CSV (Comma Separated Values) format.

6. PAYMENTS

6.1. An Availability Payment (AF_{sm}) shall be paid monthly by Northern Powergrid to the Aggregator which will be an amount calculated in accordance with the following formula (using the notation as defined in Clause 0):-

$$AF_{sm} = \sum_{j \in M_m} (AP_{sj} \times 0.5 \text{ hours} \times CM_{sj} \times FF_{sj} \times FM_{sj})$$

6.2. A Utilisation Payment (UF_{sm}) shall be paid monthly by Northern Powergrid to the Aggregator which will be an amount calculated in accordance with the following formula (using the notation as defined in Clause 0):-

$$UF_{sm} = \sum_{j \in M_m} (R_{sj} \times EP_{sj})$$

6.3. In Clause 6.1 and 6.2:-

$\sum_{j \in M_m}$	is the summation over all Settlement Periods j , in the set M_m of Settlement Periods in the Availability Windows;
AP_{sj}	is the Availability Price, in £/MW/h, applicable in Settlement Period j contained in an Availability Window for Site s , taken to be the value specified in Part 2, Schedule 2;
CM_{sj}	is the Agreed Demand, in MW, in respect of Site s , applicable in each Settlement Period j contained in an Availability Window;
FF_{sj}	is 0 in respect of each Settlement Period j , contained in an Availability Window where Agreed Demand is declared unavailable for Site s by the Aggregator or where Clause 6.4 provides that, in respect of Settlement Period j and Site s , the Aggregator will not be entitled to receive an Availability Payment, otherwise 1;
FM_{sj}	is 0 in respect of each Settlement Period j , contained in an Availability Window where Clause 13 (Force Majeure) applies in respect of Site s , otherwise 1;
R_{sj}	is the Energy Delivered, in MWh (being a volume not greater than the Agreed Demand multiplied by the duration of a Settlement Period, or when a Response Period commences during a Settlement Period, the relevant part thereof, in hours), by either the increase in Generation or the reduction in Demand by Site s in Settlement period j , in accordance with an Instruction, as determined by Clause 6.4; and
EP_{sj}	is the Utilisation Price, in £/MWh, applicable in Settlement Period j for Site s , taken to be the value specified in Part 2, Schedule 2.

6.3.1. With respect to an Instruction, the Energy Delivered, in MWh, for a Site and Settlement Period shall be calculated by subtracting the Site's metered consumption for the aforementioned Settlement Period from the Site's metered consumption for the Settlement Period immediately preceding the Settlement Period in which the Instruction was received; or

6.3.2. If a Demand Response that extends beyond one Availability Window the Energy Delivered, in MWh, for each Site and Settlement Period in each subsequent Availability Window shall be calculated by subtracting each Site's metered consumption from the Site's metered consumption for the Settlement Period commencing one hour before such subsequent Availability Window.

For the avoidance of doubt, metered consumption includes the aggregate of any Demand minus the aggregate of any Generation. It is acceptable for the metered consumption to be negative if the amount of Generation is greater than the amount of Demand at a point in time.

6.4. If, for a Settlement Period in an Availability Window for which an Instruction was given, the Energy Delivered (as determined by Clause 6.4) falls below 90% of the Agreed Demand multiplied by the duration of a Settlement Period (or when a Response Period commences during a Settlement Period, the relevant part thereof) in hours, then effective upon receipt

of the report provided by the Aggregator pursuant to Clause 5, it shall no longer be entitled to receive the Availability Payments in respect of that Settlement Period or any and subsequent Settlement Periods until the Aggregator completes the process as detailed in Clause 4.6.

7. INVOICING

- 7.1. For each month during the Season, the Aggregator shall issue a request for payment to Northern Powergrid in respect of the Availability Payments and Utilisation Payments incurred in that month on or before the 7th (seventh) day of the following month.
- 7.2. Northern Powergrid shall, within 4 (four) business days of receipt of the same, issue an order number which the Aggregator must quote on its invoice and either confirm to the Aggregator that the request for payment is correct or advise that the request for payment is incorrect and work with The Aggregator to resolve any outstanding issues.
- 7.3. In circumstances where a request for payment cannot be agreed, Northern Powergrid shall pay the undisputed part of the invoice and the balance shall be referred to dispute in accordance with Clause 18.
- 7.4. Properly rendered invoices, or undisputed parts thereof, shall be paid by Northern Powergrid within 30 days of receipt of the invoice.

8. IPR OWNERSHIP

- 8.1. All Background IPR belonging to a Party is and shall remain the exclusive property of that Party owning it (or, where applicable, the third party from whom its right to use the Background IPR has derived).
- 8.2. Subject to any existing third party obligations, each Party grants the other Party a royalty-free, non-transferable, non-exclusive, licence to use its Background IPR for the sole purpose of the performance of its obligations under this Agreement, but not for the purposes of commercial exploitation or otherwise.
- 8.3. Arising IPR shall vest and be owned by Northern Powergrid.
- 8.4. Northern Powergrid Limited hereby grants and agrees that it will grant to the Aggregator a non-exclusive, perpetual, royalty free, fully paid-up license to use such Arising IPR for its own internal purposes, but not for the purposes of commercial exploitation or otherwise.

9. IPR INDEMNITY

- 9.1. If any claim is made against or notice is received by a Party (the “**Defending Party**”), either by or from a third party alleging infringement of its Intellectual Property Rights by virtue of the Defending Party’s use of the Background IPR supplied to it by the other Party (the “**Indemnifying Party**”), the Defending Party shall inform the Indemnifying Party of the infringement (alleged or otherwise) by its Background IPR as soon as reasonably practicable upon such infringement coming to its notice.
- 9.2. Subject to Clauses 9.2.3 and 9.3, the Indemnifying Party will indemnify and hold harmless the Defending Party against all liability, losses, damages, costs, legal costs, professional and other expenses of any nature whatsoever incurred or suffered by the Defending Party in respect of any claim or action that the use of Indemnifying Party’s Background IPR in respect of its performance of the Project infringes the Intellectual Property Rights of any third party (an ‘**Intellectual Property Infringement**’) provided that the Defending Party:
 - 9.2.1. gives notice to the Indemnifying Party of any Intellectual Property Infringement forthwith upon becoming aware of the same;

- 9.2.2. gives the Indemnifying Party the sole conduct of the defence to any claim or action in respect of an Intellectual Property Infringement and does not at any time admit liability or otherwise settle or compromise or attempt to settle or compromise the said claim or action except upon the express instructions of the Indemnifying Party; and
- 9.2.3. acts in accordance with the reasonable instructions of the Indemnifying Party and gives the Indemnifying Party such assistance as it shall reasonably require in respect of the conduct of that defence.
- 9.3. In respect of any claim for which an indemnity is sought under this Agreement the Defending Party seeking such indemnity will:
 - 9.3.1. as soon as reasonably practicable after becoming aware of the claim provide the Indemnifying Party with reasonable details of it and thereafter provide in a timely manner such information relating to the claim as may reasonably be requested from time to time;
 - 9.3.2. not make, and use its reasonable endeavours to procure that there is not made, any admission of liability, except with the prior written consent of the Indemnifying Party, (such consent not to be unreasonably withheld or delayed);
 - 9.3.3. keep the Indemnifying Party reasonably informed of all material developments relating to the claim;
 - 9.3.4. use its reasonable endeavours to procure that the handling of the claim, including without limitation any resistance of or defence to it, is carried out and conducted in all material respects in accordance with such reasonable written directions as may be given by the Indemnifying Party; and
 - 9.3.5. at the option of the Indemnifying Party, relinquish the handling and control of the claim to the Indemnifying Party and thereafter use its reasonable endeavours to co-operate in the handling of the claim, including without limitation any resistance of or defence to it or not settle or compromise the claim, and procure that the claim is not settled or compromised, except with the prior written consent of the Indemnifying Party which consent shall not be unreasonably withheld or delayed.

10. CONFIDENTIALITY

- 10.1. A Party (the “**Receiving Party**”) shall keep confidential and shall not disclose to any third party other than its, or its Affiliates’, directors, officers or employees who need to know the Confidential Information, any Confidential Information disclosed to it or otherwise belonging to another Party or its Affiliates, save to the extent authorised by such other Party, or required by this Agreement.
- 10.2. The Receiving Party shall not, during the period of 2 (two) years after the termination of this Agreement, use any such Confidential Information for any purpose other than the carrying out of its obligations under this Agreement or other than in accordance with the terms of this Agreement.
- 10.3. The undertaking in Clause 10.2 above shall not apply to Confidential Information:
 - 10.3.1. which, at the time of disclosure, has already been published or is otherwise in the public domain other than through breach of the terms of this Agreement or breach of any other obligation owed to a Party;
 - 10.3.2. which, after disclosure, is subsequently published or comes into the public domain by means other than an action or omission on the part of any of the Parties;
 - 10.3.3. lawfully acquired from third parties who had a right to disclose it with no obligations of confidentiality to any of the Parties; or

- 10.3.4. is required to be disclosed by applicable law or court order or requested by Northern Powergrid's regulatory body, which is empowered by Statute or Statutory Instrument, but only to the extent of such disclosure and the Receiving Party shall notify the Disclosing Party promptly of any such request.
- 10.4. When a Party is permitted to disclose Confidential Information to another person by the other Party then such Party shall secure that the recipients of any such Confidential Information shall enter into a confidentiality agreement on terms substantially similar to the terms of this Clause 10.

11. TERMINATION

- 11.1. If the following occurs in respect of either Party (the "**Defaulting Party**"):
- 11.1.1. the Defaulting Party commits a material breach of this Agreement, and the other Party serves written notice of such breach or default on the Defaulting Party and the Defaulting Party fails to remedy such default or breach within thirty days after receipt of such written notice; or
 - 11.1.2. the Defaulting Party passes or has passed in respect of it a resolution for its winding-up; or
 - 11.1.3. a court of competent jurisdiction makes an order for the Defaulting Party's winding-up or dissolution or makes an administration order in relation to that Party; or
 - 11.1.4. the Defaulting Party has appointed a receiver over, or an encumbrance takes possession of or sells an asset or any part of the business of, that Party; or
 - 11.1.5. the Defaulting Party makes an arrangement or composition with its creditors generally or makes an application to a court of competent jurisdiction for protection from its creditors generally; or
 - 11.1.6. the Defaulting Party is unable to pay its debts;
- then the other Party may, in addition to any other remedies which it may have at law or equity, give notice to the Defaulting Party terminating this Agreement in which case the provisions of Clause 15 (Continuing Obligations) shall apply.
- 11.2. Any such notices shall be effective as of the date of the receipt of such notice.

12. LIMITATION OF LIABILITY

- 12.1. Nothing in the Agreement limits a Party's liability for death or personal injury for fraud or fraudulent misrepresentation or for any other liability to the extent it may not be excluded or limited by law.
- 12.2. Subject to Clause 12.1, neither Party shall be liable under or in relation to the Agreement to the other for any special, indirect, consequential or pure economic loss, loss of turnover, profits or goodwill, whether or not the loss in question would arise in the ordinary course of events or was in the contemplation of the Parties as at the date of the Agreement, is reasonably foreseeable or otherwise.
- 12.3. Subject to Clauses 12.1 and 12.2 each Party's liability to the other (in aggregate) is limited to 1 (one) months Availability Charges.
- 12.4. Nothing in this Clause 12 shall prevent or restrict any Party from enforcing any obligation (including suing for a debt) owed to it under or pursuant to this Agreement.

13. FORCE MAJEURE

- 13.1. A Party shall not be liable for failure to perform its obligations under this Agreement, nor be liable to any claim for compensation or damage, nor be deemed to be in breach of this Agreement, if such failure arises from an occurrence or circumstances beyond the control of that Party.

14. NON-ASSIGNMENT

- 14.1. This Agreement or any of the rights or obligations hereunder may not be assigned or otherwise transferred or sub-contracted by any Party other than to their respective Affiliates, in whole or in part, without the express prior written consent of the other Party.

15. CONTINUING OBLIGATIONS

- 15.1. The provisions of Clause **Error! Reference source not found.**6 (Payments), 7 (Invoicing), 8 (IPR Ownership), 9 (IPR Indemnity), 10 (Confidentiality), 12 (Limitation of Liability), 15 (Continuing Obligations), 16 (Governing Law), 18 (Dispute Resolution), 22 (Bribery Act) and 23 (Miscellaneous), shall survive termination of this Agreement.

16. GOVERNING LAW

- 16.1. This Agreement shall be governed by and construed in accordance with English Law and each Party agrees to submit to the exclusive jurisdiction of the English Courts as regards any claim or matter arising under this Agreement.

17. NO PARTNERSHIP

- 17.1. Nothing in this Agreement shall create or be deemed to create a partnership (within the meaning of the Partnership Act 1890) or to have created the relationship of principal and agent, a membership or any other legal entity between the Parties other than as specifically set out herein.

18. DISPUTE RESOLUTION

- 18.1. The Parties shall use good faith efforts to resolve any dispute, claim or proceeding arising out of or relating to this Agreement. In the event that any disputes cannot be resolved at this level then a director of the Parties who have authority to settle the same shall use good faith efforts to resolve the dispute. If the matter is not resolved through negotiation, it shall be settled as agreed by the Parties by mediation in accordance with the Centre for Dispute Resolution ("CEDR") Model Mediation Procedure (the "Model Procedure").
- 18.2. To initiate mediation a Party must give notice in writing to the other Parties to the dispute requesting mediation pursuant to the Model Procedure. A copy of the request shall also be sent to CEDR. The mediation shall be before a single, jointly agreed upon, mediator.

18.2.1. If the Parties in dispute are unable to select a mutually agreeable mediator within 60 days of a dispute being notified to the relevant directors, then either Party may refer the matter to the Courts in accordance with 18.2.2.

Failing resolution under 18.1, the matter shall be referred to the exclusive jurisdiction of the English Courts.

18.3. Nothing in this Clause 18 shall prevent any Party from taking immediate action in the Courts or seeking interlocutory relief (including, but not limited to, by way of an injunction) to protect its Confidential Information and Intellectual Property Rights.

19. ENTIRE AGREEMENT

19.1. This Agreement including its Schedules supersedes all other agreements and understandings, whether written or oral, between the Parties about the Pilot. This Agreement and its Schedules, which are incorporated into and form part of this Agreement, constitute the entire agreement between the Parties with regard to the Pilot.

20. NOTICES

20.1. Any notice to be given under this Agreement shall be sent by facsimile or first class recorded delivery or delivered personally to the following addresses:

Northern Powergrid (Northeast) Limited

For the attention of the Company Secretary

Lloyds Court. 78 Grey Street, Newcastle upon Tyne, NE1 6AF Lloyds Court

Northern Powergrid (Yorkshire) plc

For the attention of the Company Secretary

Lloyds Court. 78 Grey Street, Newcastle upon Tyne, NE1 6AF Lloyds Court

[Aggregator Name]

For the Attention of []

[Aggregator Address]

20.2. Any notices or agreed variations shall be served by recorded delivery.

20.3. For the avoidance of doubt, notices sent by e-mail shall not be deemed to be validly served for the purposes of this Clause 20.

21. PRECEDENCE CLAUSE

21.1. In the event of any conflict between the Agreement and the Schedules they will take precedence in the order set out below:

1. Terms and Conditions
2. Schedule 1
3. Schedule 2
4. Schedule 3

BRIBERY ACT

21.2. The Parties shall:

21.2.1. comply with all applicable laws, statutes, regulations, and codes] relating to anti-bribery and anti-corruption including but not limited to the Bribery Act 2010 (“**Relevant Requirements**”);

21.2.2. not engage in any activity, practice or conduct which would constitute an offence under sections 1, 2 or 6 of the Bribery Act 2010 if such activity, practice or conduct had been carried out in the UK;

21.2.3. have and shall maintain in place throughout the term of this Agreement its own policies and procedures, including (but not limited to) adequate procedures under the Bribery Act 2010, to ensure compliance with the Relevant Requirements and will enforce them where appropriate;

21.2.4. promptly report to the other any request or demand for any undue financial or other advantage of any kind received by the such Party in connection with the performance of this Agreement; and

21.2.5. immediately notify the other Party (in writing) if a foreign public official becomes an officer or employee of such Party or acquires a direct or indirect interest in such Party (and warrants that it has no foreign public officials as officers, employees or direct or indirect owners at the date of this Agreement).

21.3. The Parties shall ensure that any persons associated with then and who are performing services in connection with this Agreement do so only on the basis of a written contract which imposes on and secures from such person terms equivalent to those imposed on the Parties in this Clause 22. The Parties shall be responsible for the observance and performance by such persons of the Relevant Requirements, and shall be directly liable to the other Party for any breach by such persons of any of the Relevant Requirements.

21.4. Breach of this Clause 22 shall be deemed a material breach of this Agreement.

21.5. For the purpose of this Clause 22, the meaning of foreign public official and whether a person is associated with another person shall be determined in accordance with section 7(2) of the Bribery Act 2010 (and any guidance issued under section 9 of that Act), sections 6(5) and 6(6) of that Act and section 8 of that Act respectively. For the purposes of this Clause 22, a person shall be associated with a Party if it is a subcontractor of that Party.

22. MISCELLANEOUS

- 22.1. If any part or any provision of this Agreement shall to any extent prove invalid or unenforceable in law, including the laws of the England, the remainder of such provision and all other provisions of this Agreement shall remain valid and enforceable to the fullest extent permissible by law, and such provision shall be deemed to be omitted from this Agreement to the extent of such invalidity or unenforceability. The remainder of this Agreement shall continue in full force and effect and the Parties shall negotiate in good faith to replace the invalid or unenforceable provision with a valid, legal and enforceable provision which has an effect as close as possible to the provision or terms being replaced.
- 22.2. No failure to exercise or delay in the exercise of any right or remedy which any Party may have under this Agreement or in connection with this Agreement shall operate as a waiver thereof, and nor shall any single or partial exercise of any such right or remedy prevent any further or other exercise thereof or of any other such right or remedy.
- 22.3. Except as otherwise expressly provided for herein, the Parties confirm that nothing in this Agreement shall confer or purport to confer on any third party any benefit or any right to enforce any term of this Agreement for the purposes of Contracts (Rights of Third Parties) Act 1999.
- 22.4. This Agreement is not intended to establish, and shall not be construed by either Party in the future as having established, any form of business partnership or joint venture between themselves. Moreover, neither Party shall use the other Party's name, crest, logo or registered image for any purpose without the express permission of the other Party.
- 22.5. This Agreement may be executed in any number of counterparts and by the Parties on separate counterparts. Each counterpart shall constitute an original of the Agreement but all the counterparts together shall constitute one and the same Agreement.
- 22.6. As witness, the duly authorised representatives of the Parties have executed this Agreement after the Schedules on the date stated.

SCHEDULE 1

Aggregation Procedures

Part 1 – Persons Authorised to issue Instructions pursuant to Clause 4.2:-

Name of Authorised Person	Designation
TBC	
TBC	

Part 2 – Contact Details for Authorised Persons

Name of Authorised Person	Mobile No.	E-mail Address
TBC		
TBC		

Part 3 – The Aggregator's Contact Details for receiving Instructions

Telephone Number	Update
E-mail Address	Update
SMS	Update

Part 4 – GUS notices - file formats and validation information.

File Format	Short Messaging Service (SMS)
Contact Number	TBC
Required Fields	TBC

SCHEDULE 2

Demand Response Services

The Demand Response Services are set out below in Part 1 of this Schedule 2 and the Charges payable to the Aggregator in respect of the same in Part 2.

Part 1

The Demand Response Services provided by the Aggregator will comprise the following:-

1. Availability Declarations

- 1.1 By 10:00 am each Friday of the Season the Aggregator shall issue to Northern Powergrid by e-mail the Site(s) that are unavailable to provide Demand Response in the week immediately following the issue of such notice (commencing on the Monday of such week).
- 1.2 If, after the issuing notification pursuant to paragraph 0 above, the Aggregator becomes aware of any changes to the availability of the Site(s) so notified, it will advise Northern Powergrid of such changes as soon as reasonably practicable.

2 Demand Response

- 2.1 The Customer(s) set out in Schedule 3 has/have agreed, to provide Demand Response and if called upon to do so shall pursuant to this Agreement reduce Demand at the Site during the Availability Window set out in paragraph 4.1 below.
- 2.2 Northern Powergrid can issue an Instruction Maximum as set out in Schedule 3 of this Agreement.
- 2.3 The Aggregator shall ensure that the agreed forms of communication set out in Clause 4.7 are monitored 1 (one) hour prior to and during the Availability Window, each day of the Term.
- 2.4 The Aggregator shall provide the Demand Response Services as more particularly set out in Clauses 3 and 4 of this Agreement.

3 Performance Monitoring

- 3.1 The Aggregator shall provide Metering Data from the Customer(s) Site(s) providing Demand Response as evidence of the response provided by Customer(s).

4 Periods of Availability

4.1 The table below details the Season and Availability Window for the Demand Response Services.

Season	TBC
Availability Window	Mon – Fri, excluding statutory Bank Holidays, 15:00 – 19:00

Part 2

Availability and Utilisation Prices

The Table below details the Availability Price and the Utilisation Price.

Availability Price	£10/MW/h
Utilisation Price	£300/MWh

SCHEDULE 3

Customer's Participating in the Pilot

Site address	Update
MPAN	Update
Agreed Demand (MW)	Update
Response Time	20 minutes
Instruction Maximum	10
Reporting Deadline	12:00 (midday) on the day immediately following the provision of Demand Response.



SIGNED BY _____

For and on behalf of Northern Powergrid (Northeast) Limited

Print Name: _____

Position: _____

Date: _____

SIGNED BY _____

For and on behalf of Northern Powergrid (Yorkshire) Plc

Print Name: _____

Position: _____

Date: _____

SIGNED BY: _____

For and on behalf of [Aggregator Name]

Print Name: _____

Position: _____

Date: _____

Appendix B - I&C DSR floor contract

DATED _____ 2013

NORTHERN POWERGRID (NORTHEAST) LIMITED

and

NORTHERN POWERGRID (YORKSHIRE) PLC

and

[AGGREGATOR NAME]

COMMERCIAL AGGREGATOR PILOT SCHEME AGREEMENT
HALF HOURLY INDUSTRIAL AND COMMERCIAL CUSTOMERS

relating to the Customer-Led Network Revolution Project

THIS AGREEMENT dated the _____ day of _____ 2013 is made

BETWEEN:-

- (1) NORTHERN POWERGRID (NORTHEAST) LIMITED (CRN 2906593) whose registered office is at Lloyds Court, 78 Grey Street, Newcastle upon Tyne, NE1 6AF ("**Northeast**");
- (2) NORTHERN POWERGRID (YORKSHIRE) PLC (CRN 4112320) whose registered office is at Lloyds Court, 78 Grey Street, Newcastle upon Tyne, NE1 6AF ("**Yorkshire**"); and collectively "**Northern Powergrid**"; and
- (3) [AGGREGATOR NAME] (CRN/SC []) whose registered office is at [] ("**the Aggregator**").

(each of Northern Powergrid and the Aggregator being a "**Party**", and collectively referred to as the "**Parties**").

BACKGROUND

- (A) Northeast and Yorkshire are licensed electricity distribution network operators who are participating in the Customer-Led Network Revolution Project (the "**Project**") which was established to consider the best means to minimise operating costs whilst simultaneously meeting Customer requirements to install greater levels of renewable generation and evaluate the possibilities of switching to lower carbon forms of heating and transport.
- (D) As part of the Project, Northern Powergrid wishes to consider how Customer load reduction and flexible distributed generation can be utilised as an alternative to electricity distribution network reinforcement. In order to consider this proposition, Northern Powergrid is seeking to establish a pilot scheme with the assistance of aggregators who would act as an intermediary between the Customer and the Northern Powergrid (the "**Pilot**").
- (E) The Aggregator is an experienced aggregator who currently participates in the Short Term Operating Reserve scheme operated by National Grid Electricity Transmission plc, upon which the Pilot is based, and wishes to participate in the Pilot with Northern Powergrid.

IT IS AGREED as follows:-

1. DEFINITIONS AND INTERPRETATION

1.1. The words and phrases below shall have the following meanings:

“Affiliate”	means any subsidiary or parent undertaking of a Party or any company which is a subsidiary company of the ultimate parent undertaking of a Party where the expressions “parent undertaking” and “subsidiary” having the meanings ascribed thereto by section 1159 and 1162 of the Companies Act 2006 save that in relation to Northern Powergrid the term shall be restricted to its subsidiaries or parent undertakings that are registered in the UK;
“Agreed Demand”	means the amount of Demand Response to be provided by a Site for which Northern Powergrid has contracted, with the Aggregator as more particularly set out in Schedule 3, in MW;
“Apparatus”	means all equipment in which electrical conductors are used, supported or of which they may form a part;
“Arising IPR”	means any Intellectual Property Rights created pursuant to this Agreement and the Pilot;
“Authorised Person”	means the persons listed in Part 1 of Schedule 1;
“Availability Window”	means the time period(s) described as such in paragraph 4.1, Part 1 of Schedule 2;
“Average Demand”	means the average Demand at a Site calculated for the Availability Window, but only for periods during which Demand Response is not provided;

“Background IPR”	means any Intellectual Property Rights, excluding Arising IPR, which are controlled or owned by a Party;
“Balancing and Settlement Code”	means the document of that name established by National Grid Electricity Transmission plc pursuant to its transmission licence and to which Northern and Yorkshire are signatories;
“Bank Holiday”	means any day Monday to Friday inclusive upon which banks in the UK are closed by law;
“Confidential Information”	means all information designated as such in writing, together with all other information which relates to the business, affairs, developments or personnel of a Party or information which may be reasonably regarded as the Confidential Information of the Party disclosing it (the “Disclosing Party”);
“Connection and Use of System Code”	means the document designated as such by the Secretary of State as amended from time to time;
“Customer”	means a person connected to an electricity distribution network owned or operated by Northern Powergrid;
“Demand”	means in relation to a Site, the maximum amount of electrical energy (MW) being consumed at such Site at a specific point in time;
“Demand Response”	means either a reduction in Demand or a level of Generation provided by Customers to the Aggregator in accordance with the agreement between them provided during a Response Period;
“Demand Response Payments”	means any and all payment(s) made by Northern Powergrid to the Aggregator pursuant to Clause 6;
“Demand Response Price”	means the sum described as such in Part 2 of Schedule 2 payable by Northern Powergrid to the Aggregator for

the Demand Response;

“Demand Response Services” means the services more particularly described in Schedules 2 and 3;

“Distribution Code(s)” means the Distribution Code established by an electricity distribution network operator pursuant to its license;

“End Time” means in respect of an Instruction the time upon which the Response Period will end;

“Generating Unit” means any Apparatus which produces electricity;

“Generation” means the electrical output (in MW) of a Generating Unit;

“GUS” means the Grand Unified Scheme network control system forming part of the electricity distribution network;

“Instruction” means an instruction issued by an Authorised Person or if issued by GUS, in the file format, from the number and detailing the information set out in Part 4 of Schedule 1 on behalf of Northern Powergrid to the Aggregator pursuant to Clause 4.2;

“Instruction Maximum” means the maximum number of days per Site for which the Aggregator must provide Demand Response in any Season as more particularly set out in Schedule 3;

“Intellectual Property Rights” or “IPR” means any and all of the following:-

- (a) rights in inventions, patents, registered designs, design rights, know-how, trademarks and service marks (whether registered or not) and all rights in

relation to any Internet domain name;

- (b) any trade, brand or business name and any distinctive sound used to differentiate the goods and services of a business;
- (c) utility models;
- (d) copyright (including all such rights in computer software and databases); and
- (e) any rights or forms of protection of a similar nature to those detailed above;

“Material” means an increase in fuel prices of more than 10% since the date of this Agreement;

“Maximum Demand” means the relevant maximum Demand applicable at each Site which shall not be exceeded during an Instruction as more particularly set out in Schedule 3;

“Metering Data” means the active power recorded in kWh for each Settlement Period to be provided by the Aggregator pursuant to Clause 5.1:

“Personal Data” has the meaning attributed to that expression in the Data Protection Act 1998;

“Reporting Deadline” means, the maximum time for the Aggregator to provide Metering Data in respect of each Site as evidence of the Demand Response provided during such event as set out in Schedule 3;

“Response Period” means the period of time, commencing on the Start Time and ending at the End Time as stipulated in the relevant Instruction;

“Response Time” means, in relation to an Instruction, the maximum period of time (in minutes) which is permitted to elapse from

the issuing of an Instruction to the Aggregator until the moment the relevant Site(s) provides the Demand Response;

“Season” means the period of time in which Demand Response Services will be provided as more particularly detailed at paragraph 4.1, Part 1, Schedule 2;

“Settlement Period” has the meaning ascribed to it in the Balancing and Settlement Code;

“Site” means each of the Customer’s sites listed in Schedule 3, (as amended from time to time), in respect of which the relevant Customer and the Aggregator have entered into an agreement or other arrangement whereby on receipt of notification by the Aggregator such Customer will provide the agreed Demand Response;

“Start Time” means in respect of an Instruction the time the Response Period commences; and

“Term” means the duration of this Agreement as more particularly set out in Clause 2;

1.2. In this Agreement, unless otherwise expressly provided or unless the context otherwise requires, references to:-

1.2.1.1. the singular include the plural and vice versa.

1.2.1.2. words denoting any gender shall include all genders.

1.2.1.3. a person includes any individual, firm, body corporate, association or partnership government body or any joint venture association or partnership (whether or not having legal personality).

1.2.1.4. Clauses and Schedules are to Clauses of, and Schedules to, this Agreement.

1.2.1.5. laws, statutory provisions and regulatory obligations shall include reference to any subordinate legislation made pursuant thereto and shall be construed as referring to those laws, provisions and subordinate legislation as respectively amended or re-enacted from time to time.

1.2.1.6. the Parties include their respective successors in title, permitted assigns and legal personal representatives.

1.3 The headings of this Agreement are for ease of reference only and are not part of this Agreement for the purposes of construction.

1.4 The Schedules form part of this Agreement and shall have effect as if set out in full in the body of this Agreement and accordingly any reference to this Agreement includes the Schedules.

2 TERM AND TERMINATION

2.2 This Agreement shall commence on 1 September 2013 and continue until 31 December 2014.

2.3 This Agreement may be terminated by either Party upon 1 (one) month prior written notice to the other Party.

3 PILOT SCHEME

3.2 The Aggregator and Northern Powergrid have entered into this Agreement to evaluate whether the provision of Demand Response and Demand Response Services can avoid the need to reinforce congested areas of Northern Powergrid's electricity distribution networks.

3.3 The Parties acknowledge and agree that the Demand Response and Demand Responses Services are provided as part of the Pilot and they anticipate they will agree changes to the same from time to time in accordance with Clause 3.4.

3.4 The Parties shall cooperate with each other in order to determine the appropriate level of Demand Response and Demand Responses Services required by Northern Powergrid and provided by the Aggregator. No change to this Agreement shall be effective unless agreed by the Parties in writing. Areas in which the Parties foresee such changes occurring are:-

3.4.1 amendments to the Season;

3.4.2 amendments to the operating parameters currently set out in Part 2 of Schedule 2;

3.4.3 amendments to the Agreed Demand for any Site and/or

3.4.4 amendments to the Average Demand for any Site due to a material change in its operations.

3.5 The Parties anticipate that an Instruction could result in a Site(s) providing Demand Response for 10 consecutive working days once in a three year period and the Aggregator has used this example when discussing the Pilot with Customers.

3.6 If there is a Material change in fuel prices after the commencement date of this Agreement, the Parties shall review such change in order to determine whether changes will be made to the Utilisation Charges.

4. DEMAND RESPONSE SERVICES

4.1. In consideration for the promise to make Demand Response Payments, the Aggregator has or shall enter into agreements with Customers to provide the Demand Response and

the Demand Response Services during the Availability Windows in accordance with this Agreement. The Customers participating in the Pilot are set out in Schedule 3.

- 4.2. Northern Powergrid may from time to time issue Instructions to the Aggregator detailing the Site(s) that are to respond and the Response Period for which its response is required. The Response Period must fall within the Availability Window. Where a Response Period extends beyond a single Availability Window, it shall be taken to include only those Availability Windows which fall within the Response Period. Where the Response Period is continuing for more than 1 (one) Availability Window, Northern Powergrid shall by 11.00am each calendar day provide updates to the Aggregator on the anticipated Response Period.
- 4.3. After the receipt of an Instruction, the Aggregator will, within the Response Time, acknowledge its receipt and that it has instructed the relevant Customer(s) Site(s) accordingly.
- 4.4. If any Customer(s) indicates in respect of any Site(s) that due to technical breakdown or other similar event, it is unable to provide the Agreed Demand, the Aggregator shall notify Northern Powergrid as soon as reasonably practicable that the Agreed Demand is unavailable, pursuant to paragraph 1.1, Part 1, Schedule 2.
- 4.5. The Aggregator will not be entitled to receive Demand Response Payments in respect of Site(s) for which a notice has been issued pursuant to Clause 4.4 for the period starting on the date the Demand Response is unavailable until the Aggregator has, if so required, completed the non-performance process detailed in Clause 4.6 below.
- 4.6. If any Site(s) is/are not available to provide Demand Response and Demand Response Services, then Northern Powergrid shall have no obligation to make any Demand Response Payments until such time:
 - 4.6.1. as the Aggregator submits a written report detailing the reasons for such unavailability and the actions taken to ensure availability from a specified date and time, the form and content of which report must be acceptable to Northern Powergrid (acting reasonably); and
 - 4.6.2. If required by Northern Powergrid at its sole discretion, a full operational test verifying the capability of the Site(s) to deliver the Demand Response and Demand Response Services has been successfully completed
 - 4.6.2.1. Northern Powergrid shall make Demand Response Payments commencing on the date and time set forth in the report provided pursuant to sub-Clause 4.6.1 or if operational test are required pursuant to sub-Clause 4.6.2 from the first Availability Window following successful completion of such tests whichever is the later to occur.
- 4.7. The Parties agree that, for the purpose of notifications and confirmations issued pursuant to this Clause 4, the forms of communication detailed below are acceptable:-
 - 4.7.1. Modbus over TCP/IP over a VPN;
 - 4.7.2. SMS
 - 4.7.3. telephone; and
 - 4.7.4. e-mail.
- 4.8. The Response Period of an Instruction shall not be less than 30 (thirty) minutes. Any Instructions not fulfilling this condition may be ignored.
- 4.9. Sites shall not participate in the Short Term Operating Reserve scheme operated by National Grid Electricity Transmission plc for the same Availability Window as is used for this Agreement. Sites shall be allowed to participate in Triad Demand management, with no penalties or other adverse effects for doing so imposed by this Agreement.

5. REPORTING

- 5.1. Following the provision of a Demand Response the Aggregator shall by the Reporting Deadline provide the Metering Data.

5.2. Any reports provided by the Aggregator, pursuant to Clause 5.1, shall be issued by e-mail to the Authorised Persons in CSV (Comma Separated Values) format.

6. PAYMENTS

6.1. A Demand Response Payment (DF_{sm}) shall be paid monthly by Northern Powergrid to the Aggregator which will be an amount calculated in accordance with the following formula (using the notation as defined in Clause 6.2):-

$$DF_{sm} = \sum_{d \in M_m} (DP_{sd} \times CM_{sd} \times FF_{sd} \times FM_{sd})$$

6.2. I

$\sum_{d \in M_m}$	is the summation over all days d , in Availability Window M , in month m ;
DP_{sd}	is the Demand Response Price, in £/MW/day applicable for days d for Site s , taken to be the value specified in Part 2, Schedule 2;
CM_{sd}	is the Agreed Demand, in MW, in respect of Site s , applicable for each day d ;
FF_{sd}	is 0 in respect of each day d contained in an Availability Window where Agreed Demand is declared unavailable for Site s by the Aggregator or where Clause 6.3 provides that, in respect of day d and Site s , the Aggregator will not be entitled to receive an Availability Payment, otherwise 1;
FM_{sd}	is 0 in respect of each day d contained in an Availability Window where Clause 13 (Force Majeure) applies in respect of Site s , otherwise 1.

6.3. If, for a Settlement Period in an Availability Window for which an Instruction was given to a Site(s), the Site(s) exceeds the Maximum Demand by a value that is more than 10% of the Average Demand the Aggregator will not be entitled to receive a Demand Response Payment for the day following which the exceeded Maximum Demand occurs or for any subsequent day until the Aggregator pursuant to Clause 4.6 satisfies Northern Powergrid (acting reasonable) that the Site(s) is/are able to provide Demand Response.

7. INVOICING

7.1. For each calendar month during the Season, the Aggregator shall issue a request for payment to Northern Powergrid for Demand Response Payments in respect of Demand Response and Demand Response Services provided in the relevant month on or before the 7th (seventh) day of the following month.

- 7.2. Northern Powergrid shall, within 4 (four) business days of receipt of the same, issue an order number which the Aggregator must quote on its invoice and either confirm to the Aggregator that the request for payment is correct or advise that the request for payment is incorrect and work with The Aggregator to resolve any outstanding issues.
- 7.3. In circumstances where a request for payment cannot be agreed, Northern Powergrid shall pay the undisputed part of the invoice and the balance shall be referred to dispute in accordance with Clause 18.
- 7.4. Properly rendered invoices, or undisputed parts thereof, shall be paid by Northern Powergrid within 30 days of receipt of the invoice.

8. IPR OWNERSHIP

- 8.1. All Background IPR belonging to a Party is and shall remain the exclusive property of that Party owning it (or, where applicable, the third party from whom its right to use the Background IPR has derived).
- 8.2. Subject to any existing third party obligations, each Party grants the other Party a royalty-free, non-transferable, non-exclusive, licence to use its Background IPR for the sole purpose of the performance of its obligations under this Agreement, but not for the purposes of commercial exploitation or otherwise.
- 8.3. Arising IPR shall vest and be owned by Northern Powergrid.
- 8.4. Northern Powergrid Limited hereby grants and agrees that it will grant to the Aggregator a non-exclusive, perpetual, royalty free, fully paid-up license to use such Arising IPR for its own internal purposes, but not for the purposes of commercial exploitation or otherwise.

9. IPR INDEMNITY

- 9.1. If any claim is made against or notice is received by a Party (the “**Defending Party**”), either by or from a third party alleging infringement of its Intellectual Property Rights by virtue of the Defending Party’s use of the Background IPR supplied to it by the other Party (the “**Indemnifying Party**”), the Defending Party shall inform the Indemnifying Party of the infringement (alleged or otherwise) by its Background IPR as soon as reasonably practicable upon such infringement coming to its notice.
- 9.2. Subject to Clauses 9.2.3 and 9.3, the Indemnifying Party will indemnify and hold harmless the Defending Party against all liability, losses, damages, costs, legal costs, professional and other expenses of any nature whatsoever incurred or suffered by the Defending Party in respect of any claim or action that the use of Indemnifying Party’s Background IPR in respect of its performance of the Project infringes the Intellectual Property Rights of any third party (an “**Intellectual Property Infringement**”) provided that the Defending Party:
- 9.2.1. gives notice to the Indemnifying Party of any Intellectual Property Infringement forthwith upon becoming aware of the same;
- 9.2.2. gives the Indemnifying Party the sole conduct of the defence to any claim or action in respect of an Intellectual Property Infringement and does not at any time admit liability or otherwise settle or compromise or attempt to settle or compromise the said claim or action except upon the express instructions of the Indemnifying Party; and

- 9.2.3. acts in accordance with the reasonable instructions of the Indemnifying Party and gives the Indemnifying Party such assistance as it shall reasonably require in respect of the conduct of that defence.
- 9.3. In respect of any claim for which an indemnity is sought under this Agreement the Defending Party seeking such indemnity will:
- 9.3.1. as soon as reasonably practicable after becoming aware of the claim provide the Indemnifying Party with reasonable details of it and thereafter provide in a timely manner such information relating to the claim as may reasonably be requested from time to time;
 - 9.3.2. not make, and use its reasonable endeavours to procure that there is not made, any admission of liability, except with the prior written consent of the Indemnifying Party, (such consent not to be unreasonably withheld or delayed);
 - 9.3.3. keep the Indemnifying Party reasonably informed of all material developments relating to the claim;
 - 9.3.4. use its reasonable endeavours to procure that the handling of the claim, including without limitation any resistance of or defence to it, is carried out and conducted in all material respects in accordance with such reasonable written directions as may be given by the Indemnifying Party; and
 - 9.3.5. at the option of the Indemnifying Party, relinquish the handling and control of the claim to the Indemnifying Party and thereafter use its reasonable endeavours to co-operate in the handling of the claim, including without limitation any resistance of or defence to it or not settle or compromise the claim, and procure that the claim is not settled or compromised, except with the prior written consent of the Indemnifying Party which consent shall not be unreasonably withheld or delayed.

10. CONFIDENTIALITY

- 10.1. A Party (the “**Receiving Party**”) shall keep confidential and shall not disclose to any third party other than its, or its Affiliates’, directors, officers or employees who need to know the Confidential Information, any Confidential Information disclosed to it or otherwise belonging to another Party or its Affiliates, save to the extent authorised by such other Party, or required by this Agreement.
- 10.2. The Receiving Party shall not, during the period of 2 (two) years after the termination of this Agreement, use any such Confidential Information for any purpose other than the carrying out of its obligations under this Agreement or other than in accordance with the terms of this Agreement.
- 10.3. The undertaking in Clause 10.2 above shall not apply to Confidential Information:
- 10.3.1. which, at the time of disclosure, has already been published or is otherwise in the public domain other than through breach of the terms of this Agreement or breach of any other obligation owed to a Party;
 - 10.3.2. which, after disclosure, is subsequently published or comes into the public domain by means other than an action or omission on the part of any of the Parties;
 - 10.3.3. lawfully acquired from third parties who had a right to disclose it with no obligations of confidentiality to any of the Parties; or
 - 10.3.4. is required to be disclosed by applicable law or court order or requested by Northern Powergrid’s regulatory body, which is empowered by Statute or Statutory Instrument,

but only to the extent of such disclosure and the Receiving Party shall notify the Disclosing Party promptly of any such request.

- 10.4. When a Party is permitted to disclose Confidential Information to another person by the other Party then such Party shall secure that the recipients of any such Confidential Information shall enter into a confidentiality agreement on terms substantially similar to the terms of this Clause 10.

11. TERMINATION

- 11.1. If the following occurs in respect of either Party (the “Defaulting Party”):

11.1.1. the Defaulting Party commits a material breach of this Agreement, and the other Party serves written notice of such breach or default on the Defaulting Party and the Defaulting Party fails to remedy such default or breach within thirty days after receipt of such written notice; or

11.1.2. the Defaulting Party passes or has passed in respect of it a resolution for its winding-up; or

11.1.3. a court of competent jurisdiction makes an order for the Defaulting Party’s winding-up or dissolution or makes an administration order in relation to that Party; or

11.1.4. the Defaulting Party has appointed a receiver over, or an encumbrance takes possession of or sells an asset or any part of the business of, that Party; or

11.1.5. the Defaulting Party makes an arrangement or composition with its creditors generally or makes an application to a court of competent jurisdiction for protection from its creditors generally; or

11.1.6. the Defaulting Party is unable to pay its debts;

then the other Party may, in addition to any other remedies which it may have at law or equity, give notice to the Defaulting Party terminating this Agreement in which case the provisions of Clause 15 (Continuing Obligations) shall apply.

- 11.2. Any such notices shall be effective as of the date of the receipt of such notice.

12. LIMITATION OF LIABILITY

- 12.1. Nothing in the Agreement limits a Party’s liability for death or personal injury for fraud or fraudulent misrepresentation or for any other liability to the extent it may not be excluded or limited by law.

- 12.2. Subject to Clause 12.1, neither Party shall be liable under or in relation to the Agreement to the other for any special, indirect, consequential or pure economic loss, loss of turnover, profits or goodwill, whether or not the loss in question would arise in the ordinary course of events or was in the contemplation of the Parties as at the date of the Agreement, is reasonably foreseeable or otherwise.

- 12.3. Subject to Clauses 12.1 and 12.2 each Party’s liability to the other (in aggregate) is limited to 1 (one) months Availability Charges.

- 12.4. Nothing in this Clause 12 shall prevent or restrict any Party from enforcing any obligation (including suing for a debt) owed to it under or pursuant to this Agreement.

13. FORCE MAJEURE

- 13.1. A Party shall not be liable for failure to perform its obligations under this Agreement, nor be liable to any claim for compensation or damage, nor be deemed to be in breach of this Agreement, if such failure arises from an occurrence or circumstances beyond the control of that Party.

14. NON-ASSIGNMENT

- 14.1. This Agreement or any of the rights or obligations hereunder may not be assigned or otherwise transferred or sub-contracted by any Party other than to their respective Affiliates, in whole or in part, without the express prior written consent of the other Party.

15. CONTINUING OBLIGATIONS

- 15.1. The provisions of Clause 6 (Payments), 7 (Invoicing), 8 (IPR Ownership), 9 (IPR Indemnity), 10 (Confidentiality), 12 (Limitation of Liability), 15 (Continuing Obligations), 16 (Governing Law), 18 (Dispute Resolution), 22 (Bribery Act) and 23 (Miscellaneous), shall survive termination of this Agreement.

16. GOVERNING LAW

- 16.1. This Agreement shall be governed by and construed in accordance with English Law and each Party agrees to submit to the exclusive jurisdiction of the English Courts as regards any claim or matter arising under this Agreement.

17. NO PARTNERSHIP

- 17.1. Nothing in this Agreement shall create or be deemed to create a partnership (within the meaning of the Partnership Act 1890) or to have created the relationship of principal and agent, a membership or any other legal entity between the Parties other than as specifically set out herein.

18. DISPUTE RESOLUTION

- 18.1. The Parties shall use good faith efforts to resolve any dispute, claim or proceeding arising out of or relating to this Agreement. In the event that any disputes cannot be resolved at this level then a director of the Parties who have authority to settle the same shall use good faith efforts to resolve the dispute. If the matter is not resolved through negotiation, it shall be settled as agreed by the Parties by mediation in accordance with the Centre for Dispute Resolution ("CEDR") Model Mediation Procedure (the "Model Procedure").
- 18.2. To initiate mediation a Party must give notice in writing to the other Parties to the dispute requesting mediation pursuant to the Model Procedure. A copy of the request shall also be sent to CEDR. The mediation shall be before a single, jointly agreed upon, mediator.
- 18.2.1. If the Parties in dispute are unable to select a mutually agreeable mediator within 60 days of a dispute being notified to the relevant directors, then either Party may refer the matter to the Courts in accordance with 18.2.2.
- 18.2.2. Failing resolution under 18.1, the matter shall be referred to the exclusive jurisdiction of the English Courts.

- 18.3. Nothing in this Clause 18 shall prevent any Party from taking immediate action in the Courts or seeking interlocutory relief (including, but not limited to, by way of an injunction) to protect its Confidential Information and Intellectual Property Rights.

19. ENTIRE AGREEMENT

- 19.1. This Agreement including its Schedules supersedes all other agreements and understandings, whether written or oral, between the Parties about the Pilot. This Agreement and its Schedules, which are incorporated into and form part of this Agreement, constitute the entire agreement between the Parties with regard to the Pilot.

20. NOTICES

- 20.1. Any notice to be given under this Agreement shall be sent by facsimile or first class recorded delivery or delivered personally to the following addresses:

Northern Powergrid (Northeast) Limited

For the attention of the Company Secretary

Lloyds Court. 78 Grey Street, Newcastle upon Tyne, NE1 6AF Lloyds Court

Northern Powergrid (Yorkshire) plc

For the attention of the Company Secretary

Lloyds Court. 78 Grey Street, Newcastle upon Tyne, NE1 6AF Lloyds Court

[Aggregator Name]

For the Attention of []

[Aggregator Address].

- 20.2. Any notices or agreed variations shall be served by recorded delivery.
- 20.3. For the avoidance of doubt, notices sent by e-mail shall not be deemed to be validly served for the purposes of this Clause 20.

21. PRECEDENCE CLAUSE

- 21.1. In the event of any conflict between the Agreement and the Schedules they will take precedence in the order set out below:

1. Terms and Conditions
2. Schedule 1
3. Schedule 2
4. Schedule 3

22. BRIBERY ACT

- 22.1. The Parties shall:
- 22.2. comply with all applicable laws, statutes, regulations, and codes] relating to anti-bribery and anti-corruption including but not limited to the Bribery Act 2010 (“Relevant Requirements”);
- 22.3. not engage in any activity, practice or conduct which would constitute an offence under sections 1, 2 or 6 of the Bribery Act 2010 if such activity, practice or conduct had been carried out in the UK;
- 22.4. have and shall maintain in place throughout the term of this Agreement its own policies and procedures, including (but not limited to) adequate procedures under the Bribery Act 2010, to ensure compliance with the Relevant Requirements and will enforce them where appropriate;
- 22.5. promptly report to the other any request or demand for any undue financial or other advantage of any kind received by the such Party in connection with the performance of this Agreement; and
- 22.6. immediately notify the other Party (in writing) if a foreign public official becomes an officer or employee of such Party or acquires a direct or indirect interest in such Party (and warrants that it has no foreign public officials as officers, employees or direct or indirect owners at the date of this Agreement).
- 22.7. The Parties shall ensure that any persons associated with then and who are performing services in connection with this Agreement do so only on the basis of a written contract which imposes on and secures from such person terms equivalent to those imposed on the Parties in this Clause 22. The Parties shall be responsible for the observance and performance by such persons of the Relevant Requirements, and shall be directly liable to the other Party for any breach by such persons of any of the Relevant Requirements.
- 22.8. Breach of this Clause 22 shall be deemed a material breach of this Agreement.
- 22.9. For the purpose of this Clause 22, the meaning of foreign public official and whether a person is associated with another person shall be determined in accordance with section 7(2) of the Bribery Act 2010 (and any guidance issued under section 9 of that Act), sections 6(5) and 6(6) of that Act and section 8 of that Act respectively. For the purposes of this Clause 22, a person shall be associated with a Party if it is a subcontractor of that Party.

23. MISCELLANEOUS

- 23.1. If any part or any provision of this Agreement shall to any extent prove invalid or unenforceable in law, including the laws of the England, the remainder of such provision and all other provisions of this Agreement shall remain valid and enforceable to the fullest extent permissible by law, and such provision shall be deemed to be omitted from this Agreement to the extent of such invalidity or unenforceability. The remainder of this Agreement shall continue in full force and effect and the Parties shall negotiate in good faith to replace the invalid or unenforceable provision with a valid, legal and enforceable provision which has an effect as close as possible to the provision or terms being replaced.
- 23.2. No failure to exercise or delay in the exercise of any right or remedy which any Party may have under this Agreement or in connection with this Agreement shall operate

as a waiver thereof, and nor shall any single or partial exercise of any such right or remedy prevent any further or other exercise thereof or of any other such right or remedy.

- 23.3. Except as otherwise expressly provided for herein, the Parties confirm that nothing in this Agreement shall confer or purport to confer on any third party any benefit or any right to enforce any term of this Agreement for the purposes of Contracts (Rights of Third Parties) Act 1999.
- 23.4. This Agreement is not intended to establish, and shall not be construed by either Party in the future as having established, any form of business partnership or joint venture between themselves. Moreover, neither Party shall use the other Party's name, crest, logo or registered image for any purpose without the express permission of the other Party.
- 23.5. This Agreement may be executed in any number of counterparts and by the Parties on separate counterparts. Each counterpart shall constitute an original of the Agreement but all the counterparts together shall constitute one and the same Agreement.
- 23.6. As witness, the duly authorised representatives of the Parties have executed this Agreement after the Schedules on the date stated.

SCHEDULE 1

Aggregation Procedures

Part 1 – Persons Authorised to issue Instructions pursuant to Clause 4.2:-

Name of Authorised Person	Designation
TBC	
TBC	

Part 2 – Contact Details for Authorised Persons

Name of Authorised Person	Mobile No.	E-mail Address
TBC		
TBC		

Part 3 – The Aggregator's Contact Details for receiving Instructions

Telephone Number	Update
E-mail Address	Update
SMS	Update

Part 4 – GUS notices - file formats and validation information.

File Format	Short Messaging Service (SMS)
Contact Number	TBC
Required Fields	TBC

	MPAN (13 digit number)
	Start Time (dd/mm/yy HH:MM)
	End Time (dd/mm/yy HH:MM)
	Maximum Demand (MW)

SCHEDULE 2
Demand Response Services

The Demand Response Services are set out below in Part 1 of this Schedule 2 and the Charges payable to the Aggregator in respect of the same in Part 2.

Part 1

The Demand Response Services provided by the Aggregator will comprise the following:-

1. Availability Declarations

- 4.2 By 10:00 am each Friday of the Season the Aggregator shall issue to the Authorised Persons by e-mail the Site(s) that are unavailable to provide Demand Response in the week immediately following the issue of such notice (commencing on the Monday of such week).
- 4.3 If, after the issuing notification pursuant to paragraph 0 above, the Aggregator becomes aware of any changes to the availability of the Site(s) so notified, it will advise the Authorised Persons of such changes as soon as reasonably practicable.

5 Demand Response

- 5.1 The Customer(s) set out in Schedule 3 has/have agreed, to provide Demand Response and if called upon to do so shall pursuant to this Agreement reduce Demand at the Site to the Maximum Demand or below, during the Availability Window set out in paragraph 4.1 below.
- 5.2 Northern Powergrid can issue an Instruction Maximum as set out in Schedule 3 of this Agreement.
- 5.3 The Aggregator shall ensure that the agreed communication protocols set out in Clause 4.7 are monitored 1 (one) hour prior to and during the Availability Window, each day of the Season.
- 5.4 The Aggregator shall provide the Demand Response Services as more particularly set out in Clauses 3 and 4 of this Agreement.

6 Performance Monitoring

- 6.1 The Aggregator shall provide Metering Data from the Customer(s) Site(s) providing Demand Response as evidence of the response provided by Customer(s).

7 Periods of Availability

7.1 The table below details the Season and Availability Window for the Demand Response Services.

Season	TBC
Availability Window	Mon – Fri, excluding statutory Bank Holidays, 15:00 – 19:00

Part 2

Demand Response Price

Demand Response Price is set out below.

Demand Response Price / MW /day	£306
--	------

SCHEDULE 3

Customer's Participating in the Pilot

Site address	
MPAN	
Maximum Demand (MW)	
Average Demand (MW)	
Agreed Demand (MW)	
Response Time	20 minutes
Instruction Maximum	10
Reporting Deadline	12:00 (midday) on the day immediately following the provision of Demand Response.

SIGNED BY

For and on behalf of Northern Powergrid (Northeast) Limited

Print Name:

Position:

Date:

SIGNED BY

For and on behalf of Northern Powergrid (Yorkshire) Plc

Print Name:

Position:

Date:

SIGNED BY:

For and on behalf of [Aggregator Name]

Print Name:

Position:

Date:

Appendix C - I&C DSR 10 day average contract

DATED _____ 2013

NORTHERN POWERGRID (NORTHEAST) LIMITED

and

NORTHERN POWERGRID (YORKSHIRE) PLC

and

[AGGREGATOR NAME]

COMMERCIAL AGGREGATOR PILOT SCHEME AGREEMENT
HALF HOURLY INDUSTRIAL AND COMMERCIAL CUSTOMERS

relating to the Customer-Led Network Revolution Project

THIS AGREEMENT dated the _____ day of _____ 2013 is made

BETWEEN:-

- (1) NORTHERN POWERGRID (NORTHEAST) LIMITED (CRN 2906593) whose registered office is at Lloyds Court, 78 Grey Street, Newcastle upon Tyne, NE1 6AF ("**Northeast**");
 - (2) NORTHERN POWERGRID (YORKSHIRE) PLC (CRN 4112320) whose registered office is at Lloyds Court, 78 Grey Street, Newcastle upon Tyne, NE1 6AF ("**Yorkshire**"); and collectively "**Northern Powergrid**"; and
 - (3) [AGGREGATOR NAME] (CRN/SC []) whose registered office is at [] ("the "**Aggregator**")
- (each of Northern Powergrid and the Aggregator being a "**Party**", and collectively the "**Parties**").

BACKGROUND

- (A) Northeast and Yorkshire are licensed electricity distribution network operators who are participating in the Customer-Led Network Revolution Project (the "**Project**") which was established to consider the best means to minimise operating costs whilst simultaneously meeting Customer requirements to install greater levels of renewable generation and evaluate the possibilities of switching to lower carbon forms of heating and transport.
- (F) As part of the Project, Northern Powergrid wishes to consider how Customer load reduction and flexible distributed generation can be utilised as an alternative to electricity distribution network reinforcement. In order to consider this proposition, Northern Powergrid is seeking to establish a pilot scheme with the assistance of aggregators who would act as an intermediary between the Customer and the Northern Powergrid (the "**Pilot**").
- (G) The Aggregator is an experienced aggregator who currently participates in the Short Term Operating Reserve scheme operated by National Grid Electricity Transmission plc, upon which the Pilot is based, and wishes to participate in the Pilot with Northern Powergrid.

IT IS AGREED as follows:-

1. DEFINITIONS AND INTERPRETATION

1.1. The words and phrases below shall have the following meanings:

- | | |
|------------------------|---|
| "Affiliate" | means any subsidiary or parent undertaking of a Party or any company which is a subsidiary company of the ultimate parent undertaking of a Party where the expressions "parent undertaking" and "subsidiary" having the meanings ascribed thereto by section 1159 and 1162 of the Companies Act 2006 save that in relation to Northern Powergrid the term shall be restricted to its subsidiaries or parent undertakings that are registered in the UK; |
| "Agreed Demand" | means the amount of Demand Response to be provided by a Site for which Northern Powergrid has contracted, with the Aggregator as more particularly set out in Schedule 3, in MW; |
| "Apparatus" | means all equipment in which electrical conductors are used, supported or of which they may form a part; |

“Arising IPR”	means any Intellectual Property Rights created pursuant to this Agreement and the Pilot;
“Authorised Person”	means the persons listed in Part 1 of Schedule 1;
“Availability Price”	means those sums described as such and set out in Part 2 of Schedule 2;
“Availability Payment”	means the payment made by Northern Powergrid to the Aggregator in consideration for the Aggregator making available the Demand Response and the Demand Response Services during the Season pursuant to Clause 6.1;
“Availability Window”	means the time period(s) described as such in paragraph 4.1, Part 1 of Schedule 2;
“Background IPR”	means any Intellectual Property Rights, excluding Arising IPR, which are controlled or owned by a Party;
“Balancing and Settlement Code”	means the document of that name established by National Grid Electricity Transmission plc pursuant to its transmission licence and to which Northern and Yorkshire are signatories;
“Bank Holiday”	means any day Monday to Friday inclusive upon which banks in the UK are closed by law;
“Baseline Load”	means the arithmetic mean (average) of the Site’s measured Demand, in MW, for each Settlement Period in the Availability Window falling within each of the immediately preceding ten Business Days, excluding days where Instructions have been issued by Northern Powergrid;
“Business Days”	means any day Monday to Friday excluding public holidays in England and Wales;;
“Confidential Information”	means all information designated as such in writing, together with all other information which relates to the business, affairs, developments or personnel of a Party or information which may be reasonably regarded as the Confidential Information of the Party disclosing it (the “Disclosing Party”);
“Connection and Use of System Code”	means the document designated as such by the Secretary of State as amended from time to time;
“Customer”	means a person connected to an electricity distribution network owned or operated by Northern Powergrid;
“Demand”	means in relation to a Site, the maximum amount of electrical energy (MW) being consumed at such Site at a specific point in time;

“Demand Response”	means either a reduction in Demand or a level of Generation provided by Customers to the Aggregator in accordance with the agreement between them provided during a Response Period;
“Demand Response Services”	means the services more particularly described in Schedules 2 and 3;
“Distribution Code(s)”	means the Distribution Code established by an electricity distribution network operator pursuant to its license;
“End Time”	means in respect of an Instruction the time upon which the Response Period will end;
“Energy Delivered”	means in relation to each Site and for each Settlement Period (or part thereof) that is included in the Response Period that amount of the Agreed Demand provided at such Site and calculated in accordance with Clause 6.4, in MWh;
“Generating Unit”	means any Apparatus which produces electricity;
“Generation”	means the electrical output (in MW) of a Generating Unit;
“GUS”	means the Grand Unified Scheme network control system forming part of the electricity distribution network;
“Instruction”	means an instruction issued by an Authorised Person or if issued by GUS, in the file format, from the number and detailing the information set out in Part 4 of Schedule 1 on behalf of Northern Powergrid to the Aggregator pursuant to Clause 4.2;
“Instruction Maximum”	means the maximum number of days per Site for which the Aggregator must provide Demand Response in any Season as more particularly set out in Schedule 3;
“Intellectual Property Rights” or “IPR”	<p>means any and all of the following:-</p> <ul style="list-style-type: none"> (f) rights in inventions, patents, registered designs, design rights, know-how, trademarks and service marks (whether registered or not) and all rights in relation to any Internet domain name; (g) any trade, brand or business name and any distinctive sound used to differentiate the goods and services of a business; (h) utility models;

- (i) copyright (including all such rights in computer software and databases); and
- (j) any rights or forms of protection of a similar nature to those detailed above;

“Material” means an increase in fuel prices of more than 10% since the date of this Agreement;

“Metering Data” means the active power recorded in kWh for each Settlement Period to be provided by the Aggregator pursuant to Clause 5.1;

“Personal Data” has the meaning attributed to that expression in the Data Protection Act 1998;

“Reporting Deadline” means, the maximum time for the Aggregator to provide Metering Data in respect of each Site as evidence of the Demand Response provided during such event as set out in Schedule 3;

“Response Period” means the period of time, commencing on the Start Time and ending at the End Time as stipulated in the relevant Instruction;

“Response Time” means, in relation to an Instruction, the maximum period of time (in minutes) which is permitted to elapse from the issuing of an Instruction to the Aggregator until the moment the relevant Site(s) provides the Demand Response;

“Season” means the period of time in which Demand Response Services will be provided as more particularly detailed at paragraph 4.1, Part 1, Schedule 2;

“Settlement Period” has the meaning ascribed to it in the Balancing and Settlement Code;

“Site” means each of the Customer’s sites listed in Schedule 3, (as amended from time to time), in respect of which the relevant Customer and the Aggregator have entered into an agreement or other arrangement whereby on receipt of notification by the Aggregator such Customer will provide the agreed Demand Response;

“Start Time” means in respect of an Instruction the time the Response Period commences;

“Term” means the duration of this Agreement as more particularly set out in Clause 2;

“Utilisation Payment” means the sums payable by Northern Powergrid to the Aggregator for the Energy Delivered during the Response Period and calculated in accordance with Clause 6.2; and

“Utilisation Price” means the sums described as such and set out in Part 2 of Schedule 2.

1.2. In this Agreement, unless otherwise expressly provided or unless the context otherwise requires, references to:-

1.2.1. the singular include the plural and vice versa.

1.2.2. words denoting any gender shall include all genders.

1.2.3. a person includes any individual, firm, body corporate, association or partnership government body or any joint venture association or partnership (whether or not having legal personality).

1.2.4. Clauses and Schedules are to Clauses of, and Schedules to, this Agreement.

1.2.5. laws, statutory provisions and regulatory obligations shall include reference to any subordinate legislation made pursuant thereto and shall be construed as referring to those laws, provisions and subordinate legislation as respectively amended or re-enacted from time to time.

1.2.6. the Parties include their respective successors in title, permitted assigns and legal personal representatives.

1.3. The headings of this Agreement are for ease of reference only and are not part of this Agreement for the purposes of construction.

1.4. The Schedules form part of this Agreement and shall have effect as if set out in full in the body of this Agreement and accordingly any reference to this Agreement includes the Schedules.

2. TERM AND TERMINATION

2.1. This Agreement shall commence on 1 September 2013 and continue until 31 December 2014.

2.2. This Agreement may be terminated by either Party upon 1 (one) month prior written notice to the other Party.

3. PILOT SCHEME

3.1. The Aggregator and Northern Powergrid have entered into this Agreement to evaluate whether the provision of Demand Response Services can avoid the need to reinforce congested areas of Northern Powergrid's electricity distribution networks.

3.2. The Parties acknowledge and agree that the Demand Responses Services are provided as part of the Pilot and they anticipate they will agree changes to the same from time to time in accordance with Clause 3.4.

3.3. The Parties shall cooperate with each other in order to determine the appropriate level of Demand Responses Services required by Northern Powergrid and provided by the Aggregator. No change to this Agreement shall be effective unless agreed by the Parties in writing. Areas in which the Parties foresee such changes occurring are:-

3.3.1. amendments to the Season set out in Part 1 of Schedule 2;

- 3.3.2. amendments to the operating parameters currently set out in Part 2 of Schedule 2; and/or
- 3.3.3. amendments to the Agreed Demand for any Site.
- 3.4. The Parties anticipate that an Instruction could result in a Site(s) providing Demand Response for 10 consecutive working days once in a three year period and the Aggregator has used this example when discussing the Pilot with Customers.
- 3.5. If there is a Material change in fuel prices after the commencement date of this Agreement, the Parties shall review such change in order to determine whether changes will be made to the Utilisation Charges.

4. DEMAND RESPONSE SERVICES

- 4.1. In consideration for the Availability Payments calculated in accordance with Clause 6 the Aggregator has or shall enter into agreements with Customers to provide the Demand Response and the Demand Response Services during the Availability Windows in accordance with this Agreement. The Customers participating in the Pilot are set out in Schedule 3.
- 4.2. Northern Powergrid may from time to time issue Instructions to the Aggregator detailing the Site(s) that are to respond and the Response Period for which its response is required. The Response Period must fall within the Availability Window. Where a Response Period extends beyond a single Availability Window, it shall be taken to include only those Availability Windows which fall within the Response Period. Where the Response Period is continuing for more than 1 (one) Availability Window, Northern Powergrid shall by 11.00am each calendar day provide updates to the Aggregator on the anticipated Response Period.
- 4.3. After the receipt of an Instruction, the Aggregator will, within the Response Time designated in paragraph 7.1, Part 1, Schedule 2, acknowledge its receipt and that it has instructed the relevant Customer(s) Site(s) accordingly.
- 4.4. If any Customer(s) indicates in respect of any Site(s) that due to technical breakdown or other similar event, it is unable to provide the Agreed Demand, the Aggregator shall notify Northern Powergrid as soon as reasonably practicable that the Agreed Demand is unavailable, pursuant to Clause 1.1, Part 1, Schedule 2.
- 4.5. The Aggregator will not be entitled to receive Availability Payments in respect of Site(s) for which a notice has been issued pursuant to Clause 4.4 for the period starting on the date the Demand Response is unavailable until the Aggregator has, if so required, completed the non-performance process detailed in Clause 4.6 below.
- 4.6. If any Site(s) is/are not available to provide Demand Response and Demand Response Services, then Northern Powergrid shall have no obligation to make any Availability Payments until such time:
 - 4.6.1. as the Aggregator submits a written report detailing the reasons for such unavailability and the actions taken to ensure availability from a specified date and time, the form and content of which report must be acceptable to Northern Powergrid (acting reasonably); and
 - 4.6.2. If required by Northern Powergrid at its sole discretion, a full operational test verifying the capability of the Site(s) to deliver the Demand Response and Demand Response Services has been successfully

Northern Powergrid shall make Availability Payments commencing on the date and time set forth in the report provided pursuant to sub-Clause 4.6.1 or if operational test are required pursuant to sub-Clause 4.6.2 from the first Availability Window following successful completion of such tests whichever is the later to occur.

4.7. The Parties agree that, for the purpose of notifications and confirmations issued pursuant to this Clause 4, the forms of communication detailed below are acceptable:-

- 4.7.1. Modbus over TCP/IP over a VPN;
- 4.7.2. SMS;
- 4.7.3. telephone; and
- 4.7.4. e-mail.

4.8. The Response Period of an Instruction must not be less than 30 (thirty) minutes. Any Instructions not fulfilling this condition may be ignored.

4.9. Sites shall not participate in the Short Term Operating Reserve scheme operated by National Grid Electricity Transmission plc for the same Availability Window as is used for this Agreement. Sites shall be allowed to participate in Triad Demand management, with no penalties or other adverse effects for doing so imposed by this Agreement.

5. REPORTING

5.1. Following the provision of a Demand Response the Aggregator shall by the Reporting Deadline provide the Metering Data.

5.2. Any reports provided by the Aggregator, pursuant to Clause 5.1, shall be issued by e-mail to the Authorised Persons in CSV (Comma Separated Values) format.

6. PAYMENTS

6.1. An Availability Payment (AF_{sm}) shall be paid monthly by Northern Powergrid to the Aggregator which will be an amount calculated in accordance with the following formula (using the notation as defined in Clause 0):-

$$AF_{sm} = \sum_{j \in M_m} (AP_{sj} \times 0.5 \text{ hours} \times CM_{sj} \times FF_{sj} \times FM_{sj})$$

6.2. A Utilisation Payment (UF_{sm}) shall be paid monthly by Northern Powergrid to the Aggregator which will be an amount calculated in accordance with the following formula (using the notation as defined in Clause 0):-

$$UF_{sm} = \sum_{j \in M_m} (R_{sj} \times EP_{sj})$$

6.3. In Clause 6.1 and 6.2:-

$\sum_{j \in M_m}$ is the summation over all Settlement Periods j , in the set M_m of Settlement Periods in the Availability Windows;

AP_{sj} is the Availability Price, in £/MW/h, applicable in Settlement Period j contained in an Availability Window for Site s , taken to be the value specified in Part 2, Schedule 2;

CM_{sj} is the Agreed Demand, in MW, in respect of Site s , applicable in each Settlement Period j ;

- FF_{sj} is 0 in respect of each Settlement Period j , contained in an Availability Window where Agreed Demand is declared unavailable for Site s by the Aggregator or where Clause 6.4 provides that, in respect of Settlement Period j and Site s , the Aggregator will not be entitled to receive an Availability Payment, otherwise 1;
- FM_{sj} is 0 in respect of each Settlement Period j , contained in an Availability Window where Clause 13 (Force Majeure) applies in respect of Site s , otherwise 1;
- R_{sj} is the Energy Delivered, in MWh (being a volume not greater than the Agreed Demand multiplied by the duration of a Settlement Period, or when a Response Period commences during a Settlement Period, the relevant part thereof, in hours), by either the increase in Generation or the reduction in Demand by Site s in Settlement period j , in accordance with an Instruction, as determined by Clause 6.4; and
- EP_{sj} is the Utilisation Price, in £/MWh, applicable in Settlement Period j for Site s , taken to be the value specified in Part 2, Schedule 2.

- 6.4. With respect to an Instruction, the Energy Delivered, in MWh, for a Site and Settlement Period shall be calculated by subtracting the Site's metered consumption for the aforementioned Settlement Period from the Site's Baseline Load For the avoidance of doubt; metered consumption includes the aggregate of any Demand minus the aggregate of any Generation. It is acceptable for the metered consumption to be negative if the amount of Generation is greater than the amount of Demand at a point in time.
- 6.5. If, for a Settlement Period in an Availability Window for which an Instruction was given to a Site(s), the Energy Delivered at that Site(s) (as determined by Clause 6.4) falls below 90% of the Agreed Demand multiplied by the duration of a Settlement Period (or when a Response Period commences during a Settlement Period, the relevant part thereof) in hours, then the Aggregator will not be entitled to receive the Availability Payments in respect of that Settlement Period or any and subsequent Settlement Periods until the Aggregator pursuant to Clause 4.6 satisfies Northern Powergrid (acting reasonable) that the Site(s) is/are able to provide Demand Response.

7. INVOICING

- 7.1. For each month during the Season, the Aggregator shall issue a request for payment to Northern Powergrid in respect of the Availability Payments and Utilisation Payments incurred in that month on or before the 7th (seventh) day of the following month.
- 7.2. Northern Powergrid shall, within 4 (four) business days of receipt of the same, issue an order number which the Aggregator must quote on its invoice and either confirm to the Aggregator that the request for payment is correct or advise that the request for payment is incorrect and work with The Aggregator to resolve any outstanding issues.
- 7.3. In circumstances where a request for payment cannot be agreed, Northern Powergrid shall pay the undisputed part of the invoice and the balance shall be referred to dispute in accordance with Clause 18.
- 7.4. Properly rendered invoices, or undisputed parts thereof, shall be paid by Northern Powergrid within 30 days of receipt of the invoice.

8. IPR OWNERSHIP

- 8.1. All Background IPR belonging to a Party is and shall remain the exclusive property of that Party owning it (or, where applicable, the third party from whom its right to use the Background IPR has derived).
- 8.2. Subject to any existing third party obligations, each Party grants the other Party a royalty-free, non-transferable, non-exclusive, licence to use its Background IPR for the sole purpose of the performance of its obligations under this Agreement, but not for the purposes of commercial exploitation or otherwise.
- 8.3. Arising IPR shall vest and be owned by Northern Powergrid.
- 8.4. Northern Powergrid Limited hereby grants and agrees that it will grant to the Aggregator a non-exclusive, perpetual, royalty free, fully paid-up license to use such Arising IPR for its own internal purposes, but not for the purposes of commercial exploitation or otherwise.

9. IPR INDEMNITY

- 9.1. If any claim is made against or notice is received by a Party (the “**Defending Party**”), either by or from a third party alleging infringement of its Intellectual Property Rights by virtue of the Defending Party’s use of the Background IPR supplied to it by the other Party (the “**Indemnifying Party**”), the Defending Party shall inform the Indemnifying Party of the infringement (alleged or otherwise) by its Background IPR as soon as reasonably practicable upon such infringement coming to its notice.
- 9.2. Subject to Clauses 9.2.3 and 9.3, the Indemnifying Party will indemnify and hold harmless the Defending Party against all liability, losses, damages, costs, legal costs, professional and other expenses of any nature whatsoever incurred or suffered by the Defending Party in respect of any claim or action that the use of Indemnifying Party’s Background IPR in respect of its performance of the Project infringes the Intellectual Property Rights of any third party (an ‘**Intellectual Property Infringement**’) provided that the Defending Party:
 - 9.2.1. gives notice to the Indemnifying Party of any Intellectual Property Infringement forthwith upon becoming aware of the same;
 - 9.2.2. gives the Indemnifying Party the sole conduct of the defence to any claim or action in respect of an Intellectual Property Infringement and does not at any time admit liability or otherwise settle or compromise or attempt to settle or compromise the said claim or action except upon the express instructions of the Indemnifying Party; and
 - 9.2.3. acts in accordance with the reasonable instructions of the Indemnifying Party and gives the Indemnifying Party such assistance as it shall reasonably require in respect of the conduct of that defence.
- 9.3. In respect of any claim for which an indemnity is sought under this Agreement the Defending Party seeking such indemnity will:
 - 9.3.1. as soon as reasonably practicable after becoming aware of the claim provide the Indemnifying Party with reasonable details of it and thereafter provide in a timely manner such information relating to the claim as may reasonably be requested from time to time;
 - 9.3.2. not make, and use its reasonable endeavours to procure that there is not made, any admission of liability, except with the prior written consent of the Indemnifying Party, (such consent not to be unreasonably withheld or delayed);
 - 9.3.3. keep the Indemnifying Party reasonably informed of all material developments relating to the claim;
 - 9.3.4. use its reasonable endeavours to procure that the handling of the claim, including without limitation any resistance of or defence to it, is carried out and conducted in all

material respects in accordance with such reasonable written directions as may be given by the Indemnifying Party; and

- 9.3.5. at the option of the Indemnifying Party, relinquish the handling and control of the claim to the Indemnifying Party and thereafter use its reasonable endeavours to co-operate in the handling of the claim, including without limitation any resistance of or defence to it or not settle or compromise the claim, and procure that the claim is not settled or compromised, except with the prior written consent of the Indemnifying Party which consent shall not be unreasonably withheld or delayed.

10. CONFIDENTIALITY

- 10.1. A Party (the “**Receiving Party**”) shall keep confidential and shall not disclose to any third party other than its, or its Affiliates’, directors, officers or employees who need to know the Confidential Information, any Confidential Information disclosed to it or otherwise belonging to another Party or its Affiliates, save to the extent authorised by such other Party, or required by this Agreement.
- 10.2. The Receiving Party shall not, during the period of 2 (two) years after the termination of this Agreement, use any such Confidential Information for any purpose other than the carrying out of its obligations under this Agreement or other than in accordance with the terms of this Agreement.
- 10.3. The undertaking in Clause 10.2 above shall not apply to Confidential Information:
- 10.3.1. which, at the time of disclosure, has already been published or is otherwise in the public domain other than through breach of the terms of this Agreement or breach of any other obligation owed to a Party;
 - 10.3.2. which, after disclosure, is subsequently published or comes into the public domain by means other than an action or omission on the part of any of the Parties;
 - 10.3.3. lawfully acquired from third parties who had a right to disclose it with no obligations of confidentiality to any of the Parties; or
 - 10.3.4. is required to be disclosed by applicable law or court order or requested by Northern Powergrid’s regulatory body, which is empowered by Statute or Statutory Instrument, but only to the extent of such disclosure and the Receiving Party shall notify the Disclosing Party promptly of any such request.
- 10.4. When a Party is permitted to disclose Confidential Information to another person by the other Party then such Party shall secure that the recipients of any such Confidential Information shall enter into a confidentiality agreement on terms substantially similar to the terms of this Clause 10.

11. TERMINATION

- 11.1. If the following occurs in respect of either Party (the “**Defaulting Party**”):
- 11.1.1. the Defaulting Party commits a material breach of this Agreement, and the other Party serves written notice of such breach or default on the Defaulting Party and the Defaulting Party fails to remedy such default or breach within thirty days after receipt of such written notice; or
 - 11.1.2. the Defaulting Party passes or has passed in respect of it a resolution for its winding-up; or
 - 11.1.3. a court of competent jurisdiction makes an order for the Defaulting Party’s winding-up or dissolution or makes an administration order in relation to that Party; or
 - 11.1.4. the Defaulting Party has appointed a receiver over, or an encumbrance takes possession of or sells an asset or any part of the business of, that Party; or

11.1.5. the Defaulting Party makes an arrangement or composition with its creditors generally or makes an application to a court of competent jurisdiction for protection from its creditors generally; or

11.1.6. the Defaulting Party is unable to pay its debts;

then the other Party may, in addition to any other remedies which it may have at law or equity, give notice to the Defaulting Party terminating this Agreement in which case the provisions of Clause 15 (Continuing Obligations) shall apply.

11.2. Any such notices shall be effective as of the date of the receipt of such notice.

12. LIMITATION OF LIABILITY

12.1. Nothing in the Agreement limits a Party's liability for death or personal injury for fraud or fraudulent misrepresentation or for any other liability to the extent it may not be excluded or limited by law.

12.2. Subject to Clause 12.1, neither Party shall be liable under or in relation to the Agreement to the other for any special, indirect, consequential or pure economic loss, loss of turnover, profits or goodwill, whether or not the loss in question would arise in the ordinary course of events or was in the contemplation of the Parties as at the date of the Agreement, is reasonably foreseeable or otherwise.

12.3. Subject to Clauses 12.1 and 12.2 each Party's liability to the other (in aggregate) is limited to 1 (one) months Availability Charges.

12.4. Nothing in this Clause 12 shall prevent or restrict any Party from enforcing any obligation (including suing for a debt) owed to it under or pursuant to this Agreement.

13. FORCE MAJEURE

13.1. A Party shall not be liable for failure to perform its obligations under this Agreement, nor be liable to any claim for compensation or damage, nor be deemed to be in breach of this Agreement, if such failure arises from an occurrence or circumstances beyond the control of that Party.

14. NON-ASSIGNMENT

14.1. This Agreement or any of the rights or obligations hereunder may not be assigned or otherwise transferred or sub-contracted by any Party other than to their respective Affiliates, in whole or in part, without the express prior written consent of the other Party.

15. CONTINUING OBLIGATIONS

15.1. The provisions of Clause 6 (Payments), 7 (Invoicing), 8 (IPR Ownership), 9 (IPR Indemnity), 10 (Confidentiality), 12 (Limitation of Liability), 15 (Continuing Obligations), 16 (Governing Law), 18 (Dispute Resolution), 22 (Bribery Act) and 23 (Miscellaneous), shall survive termination of this Agreement.

16. GOVERNING LAW

16.1. This Agreement shall be governed by and construed in accordance with English Law and each Party agrees to submit to the exclusive jurisdiction of the English Courts as regards any claim or matter arising under this Agreement.

17. NO PARTNERSHIP

- 17.1. Nothing in this Agreement shall create or be deemed to create a partnership (within the meaning of the Partnership Act 1890) or to have created the relationship of principal and agent, a membership or any other legal entity between the Parties other than as specifically set out herein.

18. DISPUTE RESOLUTION

- 18.1. The Parties shall use good faith efforts to resolve any dispute, claim or proceeding arising out of or relating to this Agreement. In the event that any disputes cannot be resolved at this level then a director of the Parties who have authority to settle the same shall use good faith efforts to resolve the dispute. If the matter is not resolved through negotiation, it shall be settled as agreed by the Parties by mediation in accordance with the Centre for Dispute Resolution ("CEDR") Model Mediation Procedure (the "Model Procedure").
- 18.2. To initiate mediation a Party must give notice in writing to the other Parties to the dispute requesting mediation pursuant to the Model Procedure. A copy of the request shall also be sent to CEDR. The mediation shall be before a single, jointly agreed upon, mediator.
- 18.2.1. If the Parties in dispute are unable to select a mutually agreeable mediator within 60 days of a dispute being notified to the relevant directors, then either Party may refer the matter to the Courts in accordance with 18.2.2.
- 18.2.2. Failing resolution under 18.1, the matter shall be referred to the exclusive jurisdiction of the English Courts.
- 18.3. Nothing in this Clause 18 shall prevent any Party from taking immediate action in the Courts or seeking interlocutory relief (including, but not limited to, by way of an injunction) to protect its Confidential Information and Intellectual Property Rights.

19. ENTIRE AGREEMENT

- 19.1. This Agreement including its Schedules supersedes all other agreements and understandings, whether written or oral, between the Parties about the Pilot. This Agreement and its Schedules, which are incorporated into and form part of this Agreement, constitute the entire agreement between the Parties with regard to the Pilot.

20. NOTICES

- 20.1. Any notice to be given under this Agreement shall be sent by facsimile or first class recorded delivery or delivered personally to the following addresses:

Northern Powergrid (Northeast) Limited

For the attention of the Company Secretary

Lloyds Court, 78 Grey Street, Newcastle upon Tyne, NE1 6AF Lloyds Court

Northern Powergrid (Yorkshire) plc

For the attention of the Company Secretary

Lloyds Court, 78 Grey Street, Newcastle upon Tyne, NE1 6AF Lloyds Court

[Aggregator name]

For the Attention of []

[Aggregator address]

- 20.2. Any notices or agreed variations shall be served by recorded delivery.
- 20.3. For the avoidance of doubt, notices sent by e-mail shall not be deemed to be validly served for the purposes of this Clause 20.

21. PRECEDENCE CLAUSE

- 21.1. In the event of any conflict between the Agreement and the Schedules they will take precedence in the order set out below:

1. Terms and Conditions
2. Schedule 1
3. Schedule 2
4. Schedule 3

BRIBERY ACT

- 21.2. The Parties shall:

- 21.2.1. comply with all applicable laws, statutes, regulations, and codes] relating to anti-bribery and anti-corruption including but not limited to the Bribery Act 2010 (“**Relevant Requirements**”);
- 21.2.2. not engage in any activity, practice or conduct which would constitute an offence under sections 1, 2 or 6 of the Bribery Act 2010 if such activity, practice or conduct had been carried out in the UK;
- 21.2.3. have and shall maintain in place throughout the term of this Agreement its own policies and procedures, including (but not limited to) adequate procedures under the Bribery Act 2010, to ensure compliance with the Relevant Requirements and will enforce them where appropriate;
- 21.2.4. promptly report to the other any request or demand for any undue financial or other advantage of any kind received by the such Party in connection with the performance of this Agreement; and
- 21.2.5. immediately notify the other Party (in writing) if a foreign public official becomes an officer or employee of such Party or acquires a direct or indirect interest in such Party (and warrants that it has no foreign public officials as officers, employees or direct or indirect owners at the date of this Agreement).

21.3. The Parties shall ensure that any persons associated with them and who are performing services in connection with this Agreement do so only on the basis of a written contract which imposes on and secures from such person terms equivalent to those imposed on the Parties in this Clause 22. The Parties shall be responsible for the observance and performance by such persons of the Relevant Requirements, and shall be directly liable to the other Party for any breach by such persons of any of the Relevant Requirements.

21.4. Breach of this Clause 22 shall be deemed a material breach of this Agreement.

21.5. For the purpose of this Clause 22, the meaning of foreign public official and whether a person is associated with another person shall be determined in accordance with section 7(2) of the Bribery Act 2010 (and any guidance issued under section 9 of that Act), sections 6(5) and 6(6) of that Act and section 8 of that Act respectively. For the purposes of this Clause 22, a person shall be associated with a Party if it is a subcontractor of that Party.

22. MISCELLANEOUS

22.1. If any part or any provision of this Agreement shall to any extent prove invalid or unenforceable in law, including the laws of the England, the remainder of such provision and all other provisions of this Agreement shall remain valid and enforceable to the fullest extent permissible by law, and such provision shall be deemed to be omitted from this Agreement to the extent of such invalidity or unenforceability. The remainder of this Agreement shall continue in full force and effect and the Parties shall negotiate in good faith to replace the invalid or unenforceable provision with a valid, legal and enforceable provision which has an effect as close as possible to the provision or terms being replaced.

22.2. No failure to exercise or delay in the exercise of any right or remedy which any Party may have under this Agreement or in connection with this Agreement shall operate as a waiver thereof, and nor shall any single or partial exercise of any such right or remedy prevent any further or other exercise thereof or of any other such right or remedy.

22.3. Except as otherwise expressly provided for herein, the Parties confirm that nothing in this Agreement shall confer or purport to confer on any third party any benefit or any right to enforce any term of this Agreement for the purposes of Contracts (Rights of Third Parties) Act 1999.

22.4. This Agreement is not intended to establish, and shall not be construed by either Party in the future as having established, any form of business partnership or joint venture between themselves. Moreover, neither Party shall use the other Party's name, crest, logo or registered image for any purpose without the express permission of the other Party.

- 22.5. This Agreement may be executed in any number of counterparts and by the Parties on separate counterparts. Each counterpart shall constitute an original of the Agreement but all the counterparts together shall constitute one and the same Agreement.
- 22.6. As witness, the duly authorised representatives of the Parties have executed this Agreement after the Schedules on the date stated.

SCHEDULE 1

Aggregation Procedures

Part 1 – Persons Authorised to issue Instructions pursuant to Clause 4.2:-

Name of Authorised Person	Designation
TBC	
TBC	

Part 2 – Contact Details for Authorised Persons

Name of Authorised Person	Mobile No.	E-mail Address
TBC		
TBC		

Part 3 – The Aggregator's Contact Details for receiving Instructions

Telephone Number	Update
E-mail Address	Update
SMS	Update

Part 4 – GUS notices - file formats and validation information.

File Format	Short Messaging Service (SMS)
Contact Number	TBC
Required Fields	TBC

SCHEDULE 2

Demand Response Services

The Demand Response Services are set out below in Part 1 of this Schedule 2 and the Charges payable to the Aggregator in respect of the same in Part 2.

Part 1

The Demand Response Services provided by the Aggregator will comprise the following:-

1. Availability Declarations

- 7.2 By 10:00 am each Friday of the Season the Aggregator shall issue to Northern Powergrid by e-mail the Site(s) that are unavailable to provide Demand Response in the week immediately following the issue of such notice (commencing on the Monday of such week).
- 7.3 If, after the issuing notification pursuant to paragraph 0 above, the Aggregator becomes aware of any changes to the availability of the Site(s) so notified, it will advise Northern Powergrid of such changes as soon as reasonably practicable.

8 Demand Response

The Customer(s)

- 8.1 The Customer(s) set out in Schedule 3 has/have agreed, to provide Demand Response and if called upon to do so shall pursuant to this Agreement reduce Demand at the Site to the Maximum Demand or below, during the Availability Window set out in paragraph 4.1 below.
- 8.2 Northern Powergrid can issue an Instruction Maximum as set out in Schedule 3 of this Agreement.
- 8.3 The Aggregator shall ensure that the agreed forms of communication set out in Clause 4.7 are monitored 1 (one) hour prior to and during the Availability Window, each day of the Term.
- 8.4 The Aggregator shall provide the Demand Response Services as more particularly set out in Clauses 3 and 4 of this Agreement.

9 Performance Monitoring

- 9.1 The Aggregator shall provide Metering Data from the Customer(s) Site(s) providing Demand Response as evidence of the response provided by Customer(s).

10 Periods of Availability

10.1 The table below details the Season and Availability Window for the Demand Response Services.

Season	TBC
Availability Window	Mon – Fri, excluding statutory Bank Holidays, 15:00 – 19:00

Part 2

Availability and Utilisation Prices

The Table below details the Availability Price and the Utilisation Price.

Availability Price	£10/MW/h
Utilisation Price	£300/MWh

SCHEDULE 3

Customer's Participating in the Pilot

Site address	
MPAN	
Agreed Demand (MW)	0.
Response Time	20 minutes
Instruction Maximum	10
Reporting Deadline	12:00 (midday) on the day immediately following the provision of Demand Response.

SIGNED BY _____

For and on behalf of Northern Powergrid (Northeast) Limited

Print Name: _____

Position: _____

Date: _____

SIGNED BY _____

For and on behalf of Northern Powergrid (Yorkshire) Plc

Print Name: _____

Position: _____

Date: _____

SIGNED BY: _____

For and on behalf of [Aggregator name]

Print Name: _____

Position: _____

Date: _____

Appendix D – DSR Attitudinal Analysis

Table 10: Aggregator 1 participating in the trials

<p>1. Information about the Aggregator (e.g. what service to you provide)</p> <p>The Aggregator is the foremost commercial aggregator of Demand Side Services in the UK, providing demand-side reserve capacity to GB's Transmission System Operator (TSO), National Grid since 2008. The services provided to National Grid are:</p> <ul style="list-style-type: none"> • Primary Response: Frontline (Non-dynamic Frequency Response) • Secondary Response: STOR (Short Term Operating Reserve) and Footroom (Negative Reserve) • Tertiary Response: Triad Management (Winter peak management service)
<p>2. Why did you decide to participate in the trials?</p> <p>The Aggregator has provided knowledge, expertise, technology & support to Demand Side Management projects undertaken by other UK Distribution Network Operators (DNOs), including UK Power Network's Low Carbon London initiative (directly on the demand side management workstream and indirectly on the network planning operation tools workstream).</p> <p>In each of the DNO projects, the Aggregator utilised the system platform and operational processes & controls already in place, whilst gaining an insight into the specific constraints on a local level. CLNR project offered the Aggregator the opportunity to integrate with the CLNR ANM system (GUS), developing bespoke modules to support each of the project specific objectives.</p>
<p>3. What were the benefits of participation?</p> <p>The Aggregator has an obligation to ensure our Energy Partners (client sites) are offered the best return for their reserve services. Revenue available from LNCF trials increases the £/MW value of the capacity.</p> <p>The Aggregator has invested in growing the use of DSR services and understands that DNOs may be facing challenges which can be mitigated by local management of demand.</p>
<p>4. Did your participation provide the benefits you expected?</p> <p>In part. The delays in ANM (GUS) integration was disappointing in so far as the trials were then limited to one month.</p>
<p>5. What were your costs of participation?</p> <p>Additional overhead in Ops planning, estimated at 1 hour per week</p>
<p>6. Did your participation cost what you expected?</p> <p>Yes</p>

<p>7. Did you offer participants a choice of all three contract types?</p> <p>No</p> <p>If you did, what made them pick the option they chose? If not, how did you influence their choice?</p> <p>All EPs taking part in CLNR trials deferred to the Aggregator, to ensure that their site participation did not dilute the overall revenue potential from National Grid's balancing services.</p>
<p>8. What is your view of the contract in comparison with similar schemes currently in existence? Price, complexity, settlement, etc.?</p> <p>Overall, the contract was clear and well-defined for the Aggregator & EP sites and was welcomed as a clear & concise document. In comparison to other LNCF schemes, the contract was shorter and more clearly defined than most others.</p> <p>On the structure of contract terms, the participation price from CLNR was favourable to all EP sites, offering an availability and utilisation payment (one DNO scheme didn't offer the former).</p> <p>Settlement was an issue, with delays in remuneration, although this has been true of all but one of the DNO schemes. As an overarching-arching remark, settlement is hugely important to participating sites and all DNOs need to do more to ensure that payment processes are tight.</p>
<p>9. What were your views on the notification procedures regarding a) Your clients availability notification (if relevant); and b) Our call for a response?</p> <p>Both fine</p>
<p>10. If your clients notified any days as being unavailable, what were the reason for the unavailability?</p> <p>The reasons varied from site failures requiring parts, to longer term operational issues. It should be said that most of the "unavailability" was mid- to long- term, rather than days. This should be seen by CLNR as a positive sign, that "reliable sites" tend to be reliable.</p>
<p>11. If your clients were unable to provide a response on any day when notified as available, what were the reasons for their inability to respond?</p>
<p>12. What if anything would you have changed about the trial / contract?</p> <p>The integration/communication with GUS was a primary feature which didn't get the chance to be fully tested and this, along with other ANM initiatives, is a clear step forward for DNOs implementing DSR.</p>
<p>13. What would you wish to change if this service were to be provided commercially as an occasional service to Distribution Network Operators such as Northern Powergrid?</p> <p>Demand Side Response is growing and the share of DSR resources between the TSO and DNOs is an interesting question. The capacity exists to support both, and for a short-term opportunity, revenue will be key i.e. to attract DSR capacity away from provision of a grid-balancing service, the reward must be appropriate, particularly if DNO contracts are of a short duration.</p>

14. Would you consider participating in the provision of longer term demand side response services to Distribution Network Operators? Yes
15. Do you see any barriers that would need to be overcome, if any, to enable your participation in future DSR schemes with Distribution Network Operators? No

Table 11: Aggregator 3 participating in the trials

1. Information about the Aggregator (e.g. what service do you provide) Founded in 2002, the Aggregator is a utility consultancy bringing a multi-disciplined approach to the optimal procurement, planning and ongoing management of energy costs, usage and associated carbon emissions. DSR provides a positive and growing part of their commercial offering but is not their only business offering.
2. Why did you decide to participate in the trials? Clients already involved in other programmes such as STOR and Triad in the Northern Powergrid area and the trials provided a commercial opportunity to add to this portfolio.
3. What were the benefits of participation? The trials provided an opportunity to promote the potential of DSR and to provide additional revenues to their clients.
4. Did your participation provide the benefits you expected? Yes and it has meant being involved in the evolution of a new product.
5. What were your costs of participation? All 3 sites were already participating in other programmes so minimal set up costs were involved. Main costs were the time involved in agreeing the commercial details in the contracts. Some additional costs in manning the control centre for trial period outside triad period (i.e maintaining cover until 8:00 pm).
6. Did your participation cost what you expected? Yes
7. Did you offer participants a choice of all three contract types? If you did, what made them pick the option they chose? If not, how did you influence their choice? All 3 sites were contracted under the floor and daily payment mechanism. This contract type was recommended to the clients by the Aggregator as it was the most complimentary to their pre-existing triad participation.

Contract Type	Pros	Cons
Standard	<ul style="list-style-type: none"> • Can negotiate Utilisation Price so that at least the variable cost of provision can be recovered. • Applicable when programme operator (e.g. NPG) needs dynamic response from site (e.g. for system balancing) 	<ul style="list-style-type: none"> • Unable to participate in triad avoidance • Ability to deliver response depends on operations during Settlement Period prior to call - need consistent demand and operations to ensure delivery • Income predictability lower
10 day average	<ul style="list-style-type: none"> • Can negotiate Utilisation Price so that at least the variable cost of provision can be recovered. • Can have advance knowledge of baseline so can prepare site to provide response • Reduces risk from abnormal conditions on a particular day 	<ul style="list-style-type: none"> • Unable to participate in triad avoidance • Ability to delivery depends on operations during previous Business Days – need consistent demand and operations to ensure delivery; e.g. could be affected by weather • Income predictability lower • Most complex modelling and settlement arrangements
Floor and daily payment	<ul style="list-style-type: none"> • Straightforward • Predictable income • Compatible with triad avoidance activity • Reduces risk from abnormal conditions on a particular day • Applicable when programme operator wants a site to stay below a pre-set level of demand (e.g. managing fault conditions or capacity constraints) 	<ul style="list-style-type: none"> • Large number of runs increases variable cost of providing service
8. What is your view of the contract in comparison with similar schemes currently in existence? Price, complexity, settlement, etc.? The floor and daily fee is much simpler to work with and understand although it is more risky for securing a return on utilisation. The compatibility with triad avoidance is a significant benefit.		
9. What were your views on the notification procedures regarding a) your clients availability notification (if relevant) and b) our call for a response? Not aware of any issues.		
10. If your clients notified any days as being unavailable, what were the reason for the unavailability? Full availability		
11. If your clients were unable to provide a response on any day when notified as available, what were the reasons for their inability to respond? From our records, the sites provided response as required.		

12. What if anything would you have changed about the trial / contract?

As part of the trials we approached several parties connected to primary substations chosen by Northern Powergrid to market the trial and demand response generally. However, the only sites that participated were ones that were already involved in other demand response programmes.

The short duration of the trial and the uncertainty about future requirements meant that the trial was not in itself sufficiently valuable to encourage these parties to participate. Potential sites need to invest in infrastructure or process changes. Programmes offering incentives need to be enduring, so that there is an appropriate risk-reward balance for the response provider and the business case is approved.

Also, sufficient time is needed to be able to prepare a site. Where generators are involved, we expect to need 9 months to prepare a site, although a significant proportion of this time is waiting for connection quotes and upgrade works to be completed. This timescale also assumes that the client is engaged and positively supports the creation and use of site flexibility in this way.

13. What would you wish to change if this service were to be provided commercially as an occasional service to Distribution Network Operators such as Northern Powergrid?

Asset to be able to respond and participate in as many compatible schemes as possible and to be an enduring opportunity. The capacity market will create a significant incentive for avoiding the red DUOS period.

14. Would you consider participating in the provision of longer term demand side response services to Distribution Network Operators?

Yes depending on the commercial and operational terms.

15. Do you see any barriers that would need to be overcome, if any, to enable your participation in future DSR schemes with Distribution Network Operators?

As is presently the case it will need to be a bankable business case, i.e.

- Investment in kit, the investment required is site-specific, but often comprises:
 - For generators, control panel upgrades to enable synchronisation and remote control; connection upgrades to enable long-term parallel running; switchgear changes
 - For load reduction, control kit on equipment or process lines, often linking to a building management system
- Changes in processes and behaviours
- Sustainable / persistent benefit in order to justify investment

Table 12. Sites J, K and L Participating in the Trials

Q	A
1. Information about the participant (e.g. what is your main business)	A Water and Sewerage Company in the UK.
2. Information about how demand side response (DSR) was provided on the trial (e.g. standby generator, load turn-down, load rescheduling, etc.)	Standby Generation
3. Do you currently participate in any of the DSR schemes available (e.g. STOR, TRIAD avoidance, Frequency Response)	STOR, TRIAD Avoidance
If yes; a) please provide details; b) what were the differences to participating in these trials?	
4. Why did you decide to participate in the trials?	This was seen as a good opportunity to support the National Grid and also bring in further revenue to our company.
5. What were the benefits of participation?	Being part of a trial/pilot to investigate the use of DSR to support localised network management
6. Did your participation provide the benefits you expected?	Awaiting the trial finding to evaluate
7. What were your costs of participation?	With existing infrastructure in place to support DSR, the cost of participation was negligible. Due to unforeseen circumstances, we were unavailable for utilisation in March - had we participated in CLNR calls, there would have been a fuel cost to evaluate.
8. Did your participation cost what you expected?	Yes
9. Were you offered a choice of all three contract types (baseline, 10 day average or floor) and if so what made you choose your preferred option?	No, this decision was taken by the aggregator in line with current DSR arrangements
10. What is your view of the contract in comparison with similar schemes? Price, complexity, settlement, etc.?	No comment
11. What were your views on the notification procedures regarding a) your availability notification (if relevant) and b) our call for a response?	N/A - managed by aggregator in line with declaration to National Grid for STOR
12. If you notified any days as being unavailable, what was the reason for the unavailability?	Lack of maintenance on the assets required

Q	A
13. If you were unable to provide a response on any day when notified as available, what were the reasons for the inability to respond?	N/A
14. What if anything would you have changed about the trial / contract?	More frequent calls would have allowed better assessment of the trial
15. What would you wish to change if this service were to be provided commercially as an occasional service to a Distribution Network Operator such as Northern Powergrid?	The potential for DSR to support Northern Powergrid is important, as network stress is likely to increase over the next 3-5 years. As a customer of NPG, the support of schemes such as CLNR is important to us but any longer term scheme proposed needs to be aligned with the current National Grid demand side services. Conflict between schemes, whether commercial or operational, could create a confused market - and ultimately no better support of the issues it aims to address.
16. Would you consider participating in the provision of longer term demand side response services to Distribution Network Operators?	Yes - This is an extra revenue stream available to us and bolsters the importance of having internal standby generation available.
17. Do you see any barriers that would need to be overcome, if any, to enable your participation in future DSR schemes with Distribution Network Operators?	Ensure our business commits to keeping the assets available.
18. Do you have a company energy policy / strategy and if so how do you think the provision of DSR services does / would align with it?	We have significant price pressure to deal with in our next 5 year investment period. Our energy strategy states that we will look to manage our consumption at peak times and look to use our generation assets to deliver further value. DSR helps drive YW to ensure asset availability and also provides revenue to help bridge the gap.

Table 13. Site A participating in the trial

Q	A
1. Information about the participant (e.g. what is your main business)	A highly electro-intensive manufacturing business which produces and supplies Industrial Gases.
2. Information about how demand side response (DSR) was provided on the trial (e.g. standby generator, load turn-down, load rescheduling, etc.)	The DSR was provided through demand reduction through process interruption. This was achieved through a combination of load re-scheduling and turn-down.
3. Do you currently participate in any of the DSR schemes available (e.g. STOR, TRIAD avoidance, Frequency Response) If yes; a) please provide details; b) what were the differences to participating in these trials?	The Company is a highly electro-intensive business, who has participated in a number of schemes for a number of years, with the aim of lowering its cost base. All schemes have differences, but in the main characteristics were similar to i.e. STOR.
4. Why did you decide to participate in the trials?	Two reasons, a.) to take advantage of the revenue opportunity and b.) in order to support the development of DSR services through DNOs in general.
5. What were the benefits of participation?	See 4a) and hopefully 4b)
6. Did your participation provide the benefits you expected?	Yes, expected revenues were clear.
7. What were your costs of participation?	There were some rescheduling costs, but the risk to production which was incurred is difficult to quantify, and has a highly variable consequence number attached.
8. Did your participation cost what you expected?	Yes.
9. Were you offered a choice of all three contract types (baseline, 10 day average or floor) and if so what made you choose your preferred option?	In general, our sites tend to run at a variable baseline, and also respond to short term production requirements which can make prediction of load at, e.g. week ahead stage, difficult. As such, the floor agreement proved more suitable this time. Note that for Winter peaks, the costs associated with Triads mean that other DSR must be structured as to accommodate rather than exclude Triad management – otherwise it is difficult to commit.
10. What is your view of the contract in comparison with similar schemes? Price, complexity, settlement, etc.?	The contract terms were relatively concise and clear, particularly when compared to Grid schemes.

Q	A
11. What were your views on the notification procedures regarding a) your availability notification (if relevant) and b) our call for a response?	A.) This was an email only in the event of unavailability, which was not required. B.) was by text, which proved awkward as our shift team do not use mobiles, and do not check emails frequently enough to guarantee a response.
12. If you notified any days as being unavailable, what was the reason for the unavailability?	No notifications were made, but should the primary business urgently and unavoidably require production, then this would take precedence over DSR.
13. If you were unable to provide a response on any day when notified as available, what were the reasons for the inability to respond?	We take DSR programmes into account when managing production, so would hope to avoid a conflict. There was no issue in this trial, although should a conflict arise with the primary business (production), then the primary business would take precedence.
14. What if anything would you have changed about the trial / contract?	The communication protocol (text message) was acceptable for a trial, but would not suit our business longer term. Ideally we would wish for a continuous communications link to our control room. Instantaneous consumption data could flow back to the DNO.
15. What would you wish to change if this service were to be provided commercially as an occasional service to a Distribution Network Operator such as Northern Powergrid?	The communication protocols did not suit the company.
16. Would you consider participating in the provision of longer term demand side response services to Distribution Network Operators?	Yes.
17. Do you see any barriers that would need to be overcome, if any, to enable your participation in future DSR schemes with Distribution Network Operators?	Schemes must have a simple payment and penalty arrangement, and critically must allow consumers to participate with some flexibility to allow the impact on and risk to their primary business to be managed. At the larger end, there is a case for customer specific agreements to get maximum shared value, rather than trying to have a 'one size fits all' approach.
18. Do you have a company energy policy / strategy and if so how do you think the provision of DSR services does / would align with it?	We have an energy policy, and would take advantage of any DSR, provided that the conflict with and risks to the primary business can be managed.



For enquires about the project
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