



Making a positive difference  
for energy consumers

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Date: 19 December 2013

Dear Company Secretary,

**Project Direction ref: SGN / Robotics / 19 December 2013**

Southern Gas Networks (SGN) submitted the project Robotics on 9 August 2013 to be considered for funding through the Gas Network Innovation Competition (NIC). In this year's decision<sup>1</sup>, we selected the project for funding.

We have issued this Project Direction to SGN. It contains the terms to be followed by SGN as a condition of Robotics receiving funding through the Gas NIC. It must comply with these terms, which can be found in the schedule to this direction.

**Project direction**

Paragraph 5.66 of the Gas NIC Governance Document states that a Project Direction must:

- set out the Project-specific conditions that the Network Licensee is committing to in accepting funding;
- require the Network Licensee to undertake the Project in accordance with the commitments it has made in the Full Submission. Where appropriate, the Project Direction may therefore include extracts from the Full Submission or refer to specific sections of the Full Submission;
- set out the Approved Amount for the Project, that will form part of the calculation contained in the funding direction issued by the Authority under chapter 7 of the Governance Document;
- set out the Project budget that the Network Licensee must report against and how variances against the Project budget will be reported and approved; and
- the mechanism for the Network Licensee receiving the Approved Amount is set out in the Funding Direction.

These are described for Robotics in the schedule to this condition.

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<sup>1</sup> Please see here: <https://www.ofgem.gov.uk/ofgem-publications/84869/decisiononthefirstyearofthegasnetworkinnovationcompetition.pdf>

## **Decision**

Provided SGN complies with the NIC Governance Document and the schedule to this Project Direction, Robotics is deemed to be an Eligible NIC Project<sup>2</sup>.

This Project Direction constitutes notice pursuant to section 38A (Reasons for decisions) of the Gas Act 1986.

A handwritten signature in black ink, appearing to read 'Dora Guzeleva', is positioned above the name and title of the signatory.

**Dora Guzeleva**

Head of Networks Policy, Local Grids

**For and on behalf of the Authority**

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<sup>2</sup> Eligible NIC Project has the meaning given in definitions of the Gas Distribution licence.

## Schedule to Project Direction

### 1. TITLE

Project Direction ref: SGN / Robotics / 19 December 2013

### 2. PREAMBLE

This Project Direction issued by the Gas and Electricity Markets Authority (the "Authority") to SGN (the "Funding Licensee") pursuant to the Gas NIC Governance Document issued pursuant to Part E of Special Condition 1I (Network Innovation Competition) of the Gas Distribution Licence (the "Licence") sets out the terms to be followed in relation to Robotics (the "Project") as a condition of it being funded under the NIC and the Funding Return Mechanisms<sup>3</sup>.

Unless otherwise specified, defined terms in this Project Direction are defined in Appendix 1 of the Gas NIC Governance Document.

References to specific sections of the Funding Licensee's Full Submission in this Project Direction are, for ease of reference, made by referring to the section number in the Funding Licensee's Full Submission pro-forma.

### 3. ADEQUACY OF FUNDING AND FUNDING ALLOCATION

The Funding Licensee acknowledges that the budget allocations set out in appendix 1 as restricted in certain circumstances described below will allow it to fulfil its obligations under this Project Direction.

### 4. CONDITIONS PREDECENT

The Funding Licensee will not access any funds from the Project Bank Account until it has signed contracts with the Project Partner named in Table 1.

#### Table 1 Condition Precedent

ULC Robotics
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### 5. COMPLIANCE

The Funding Licensee must comply with Special Condition 1I and the NIC Governance Document (as may be modified from time to time in accordance with Special Condition 1I and as modified and/or augmented in respect of the Project by this Project Direction) and the Project Direction.

Any part of the Approved Amounts that the Authority determines not to have been spent in accordance with this Project Direction (or the Gas NIC Governance Document) is deemed to be Disallowed Expenditure.

Pursuant to Special Condition 1I Disallowed Expenditure is revenue received (whether by the Funding Licensee or another Licensee) under the NIC and Funding Return Mechanisms that the Authority determines not to have been spent in accordance with the provisions of the Gas NIC Governance Document or those of the relevant Project Direction.

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<sup>3</sup> the Funding Return Mechanism is defined in part C of Special Condition 1I.

Pursuant to paragraph 8.48 of the Gas NIC Governance Document, Disallowed Expenditure includes any funds that must be returned if the Project is halted without Ofgem's<sup>4</sup> permission, any funds that have not been spent in line with the approved Project Budget contained within the Project Direction, and any unspent funds on the completion of the Project.

## **6. APPROVED AMOUNT FOR THE PROJECT**

The Approved Amount is £6,531,699.54

## **7. PROJECT BUDGET**

The Project Budget is set out in Annex 1. The Funding Licensee must not spend more than 110% of any category total (e.g. "Labour") in Annex 1 without the Authority's prior consent (such consent is not to be unreasonably withheld).

The Funding Licensee will report on expenditure against each line under the category total in the Project Budget, and explain any projected variance against each line total in excess of 5% as part of its detailed report which will be provided at least every six months, in accordance with paragraph 8.17 of the Gas NIC Governance Document. Ofgem will use the reported expenditure and explanation to assess whether the funding has been spent in accordance with the Gas NIC Governance Document or with this Project Direction.

For the avoidance of doubt this reporting requirement does not change or remove any obligations on the Funding Licensee with respect to reporting that are set out in the Gas NIC Governance Document.

## **8. PROJECT IMPLEMENTATION**

The Funding Licensee must undertake the Project in accordance with the commitments it has made in the Full Submission approved by the Authority pursuant to the Gas NIC Governance Document and the terms of this Project Direction. These include (but are not limited to) the following:

- (i) undertake the Project in accordance with the description set out in Section 2 (Project Description);
- (ii) provide a Network Licensee Compulsory Contribution of £739,431.33;
- (iii) complete Elements 1, 2 & 3 of the Project on or before January 2016, and complete Element 4 by November 2017 (subject to Authority approval specified under condition 8);
- (iv) disseminate the learning from the Project at least to the level described in Section 5 (Knowledge Dissemination).

## **9. ELEMENT 4 DEVELOPMENT**

The Funding Licensee must, prior to continuing the development of Element ("Module") 4 beyond the Conceptual Stage as described in the Full Submission (Project Description) and Project Plan, provide a report to Ofgem which includes the following information -

- (i) The progress and development, including learning to date, of Modules 1, 2 and 3, as described in the Full Submission (Project Description);

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<sup>4</sup> Ofgem is the offices of the Gas and Electricity Markets Authority. The terms 'Ofgem' and 'Authority' are used interchangeably in this Project Direction.

- (ii) The learning gained through the Conceptual Design Stage (internal stage gate 13 in the SDRC) for Module 4, including any technical and functional specifications and designs for Module 4;
- (iii) A proposed methodology for the development of Module 4, as described in the Full Submission (Project Description). This must include a description of the technologies that will be used in Module 4. It must also include an explanation and justification of why these technologies have been chosen, based on the learning described in (i) and (ii);
- (iv) A description of the process and steps taken by the Funding Licensee to consult with other Network Licensees and interested third parties on whether, based on the information provided in (i), (ii) and (iii), proceeding past the Conceptual Design Stage and thus further developing Module 4 would provide the learning outlined in the Full Submission pro-forma. This must include a written consultation; and
- (v) The written responses to the written consultation described in (iv) together with summaries of all other feedback received. The Funding Licensee must describe the consideration it has given to the feedback provided by other Network Licensees. It should explain how the feedback has informed its approach to delivering Module 4 and how this feedback supports its request to either proceed with Module 4 or suspend the project.

The Funding Licensee will not access any funds from the Project Bank Account for the development of Module 4, other than £400.8k for the Conceptual Design Stage (internal stage gate 13 in the SDRC), until the Authority is satisfied that there is sufficient evidence and justification provided in the report mentioned in (iv) that the Funding Licensee and the other Network Licensees consider that Module 4 would provide the learning outlined in the Full Submission pro-forma. The Funding Licensee must receive approval from the Authority before it accesses funds to continue past Module 4 Conceptual Design Stage.

## **10. REPORTING**

Ofgem will issue guidance (as amended from time to time) about the structure and content of the reports required by paragraph 8.17 of the Gas NIC Governance Document. The Funding Licensee must follow this guidance in preparing the reports required by paragraph 8.17 of the Gas NIC Governance Document.

As required by paragraph 8.22 of the Gas NIC Governance Document, the Funding Licensee must inform the Authority promptly in writing of any event or circumstance likely to affect its ability to deliver the Project as set out in its Full Submission.

## **11. COST OVERUNS**

The maximum amount of Discretionary Funding that the Funding Licensee can request as additional funding for cost overruns on the Project is 0% of the Approved Amount.<sup>5</sup>

## **12. INTELLECTUAL PROPERTY RIGHTS (IPR)**

In Section 5 (Knowledge Dissemination) the Funding Licensee has stated that the Project does conform to the default IPR arrangements set out in Chapter Nine of the Gas NIC Governance Document and must therefore undertake the Project in accordance with the default IPR arrangements.

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<sup>5</sup> This is the amount requested by the Funding Licensee in its Full Submission.

### 13. SUCCESSFUL DELIVERY REWARD CRITERIA

The Project will be judged by the Authority for the purposes of the NIC Successful Delivery Reward against the Successful Delivery Reward Criteria set out in Table 3<sup>6</sup> below (that comply with paragraphs 5.26 – 5.29 of the Gas NIC Governance Document).

**Table 3. Successful Delivery Reward Criteria**

Successful Delivery Reward criterion	Evidence
<p><b>Development of Conceptual Designs (Element 1 &amp; 2) by 25th April 2014</b></p> <p>Research and conceptual design will have been performed into methods of repairing Wecco seals and mechanical joints with a robotic system.</p> <p>Various tools and methods for repair will be considered, with judgment criteria based on effectiveness, ease of deployment, technical feasibility and cost in line with the target price.</p> <p>SGN will have reviewed the proposed repair method, carried out a risk assessment and gap analysis against the identified performance specifications in order to determine what the off-site and on site testing success criteria will be.</p> <p>A detailed technical report outlining these findings and suggestions will be delivered by ULC Robotics to SGN.</p> <p>For the robotic platform, the design will have included consideration of pipe loading, wall press vs free weight, size requirements for no-blow vertical launching, wheel torque, traction, power transmission, pneumatics, electronics, form factor, manoeuvrability in the pipe, travel distance, and the ability to negotiate bends as desired. An estimation of a variance against the target price will have been carried out.</p> <p>Provided the method identified has the potential to be deemed an 'interim' repair as defined within SGN/PR/EM/74 part B, and the high level performance specifications are feasible, the project will progress.</p>	<p>A detailed technical report outlining these findings and suggestions will be delivered by ULC Robotics to SGN.</p> <p>Approval and sign off by the Project Director that the report defines the outputs required in Elements 1 and 2.</p> <p>All specifications, designs, risk assessments and supporting documentation to be documented in Project file.</p>
<p><b>Development of Conceptual Design (Element 4) by 14<sup>th</sup> December 2015</b></p> <p>Research and conceptual design will have been performed into methods of performing no-dig service replacement with a robotic</p>	<p>Delivery of a technical report that looks to provide a means of robotic no-dig service replacement.</p> <p>Publish the written consultation detailing the learning and progress until now from Element 1, 2 and 3 and the Conceptual Stage of Element 4.</p>

<sup>6</sup> These are the Successful Delivery Reward Criteria set out in the Funding Licensees Full Submission

<p>system.</p> <p>Various tools and methods will be considered, with judgment criteria based on effectiveness, ease of deployment, technical feasibility and cost in line with the target price. ULC Robotics will have drawn upon its past experience performing field service work related to gas services and will have referred to performance specifications provided by SGN.</p> <p>Considerations for the robot design will have included size requirements for manoeuvring inside the pipe or annular space, form factor, drive system and power transmission, pneumatic systems, electronic power requirements, tapping and fitting tools to be carried by the robot, service line testing, and travel distance.</p> <p>A report outlining these findings and suggestions will be delivered by ULC Robotics to SGN.</p> <p>SGN will review the proposed replacement method, carry out a risk assessment and gap analysis against the identified specifications (for example relevant sections of GIS/LPL22) in order to determine what the off-site and on site testing success criteria will be. This will include an independent assessment by one of SGN's technical service providers.</p> <p>Provided the method identified has the potential to be deemed an acceptable means of no-dig service replacement, the project will progress.</p>	<p>Submit the report (as specified under condition 8 of this Project Direction) to the Authority.</p> <p>Approval and sign off by Project Director depending on the outputs of the report.</p> <p>All specifications, designs and supporting documentation to be documented in the Project file</p>
<p><b>Source Vendor for Sensor (Element 3) by 25th July 2014</b></p> <p>ULC Robotics will have drawn on previous experience with researching and deploying sensors for pipe wall analysis for this task, and used the outline of performance requirements provided by SGN for guidance.</p> <p>After identifying an appropriate sensor technology, or combination of sensors for evaluating pipeline structural integrity, SGN will have confirmed the suitability of the sensor technology outputs as an indicator of pipe condition that can inform pipe risk.</p> <p>Following a suitability assessment an appropriate vendor will have been identified to provide the sensor at best price and within budget. ULC Robotics will have discussed lead times and manufacturing</p>	<p>Sensor technology evaluation accepted by Project Director.</p> <p>Project plan will be revised to incorporate lead times and manufacturing capabilities.</p> <p>All purchase orders will be documented in Project file and controlled by ULC Robotics.</p> <p>All invoices and transactions documented in Project file and controlled by Finance Manager.</p> <p>All discussions with the HSE will be documented in Project file i.e. minutes of meetings or email correspondence.</p>

<p>capabilities with the vendor related to specific components that may pose a concern. Once all of the requirements are satisfied, ULC Robotics will place a purchase order with the sensor manufacturer.</p> <p>If no suitable sensor technology is identified that has the potential to inform pipe risk, following the SGN and independent assessment, this element of the Project will be terminated.</p> <p>SGN will engage with the HSE and other stakeholders to keep informed as to the identified method and its potential to inform risk management.</p> <p>If successful, SGN will progress this Project forward.</p>	
<p><b>Configuration Testing with Robotic Platform (Element 3) by 28<sup>th</sup> August 2015</b></p> <p>The sensor module will have been integrated with the robotic platform developed under Element 1 and 2.</p> <p>The assembled robot will have been tested to ensure there are no problems controlling the system or acquiring sensor data.</p> <p>The sensor package will have been tested to determine if all components function as designed when integrated into the modular robotic platform.</p> <p>The robotic platform with the sensor module will have been deployed via the launch tube into the test pipe to determine if there are any issues with launching, travelling, or retrieval. Testing will have determined if the sensor module can operate in the pipe as part of the modular robotic platform and provide sensor data in the operational configuration without major issues. The combined system will have been tested through the full range of motion to test the full capability of the system.</p> <p>Minor modifications to improve form, fit, or function will have been incorporated at this stage.</p> <p>A report on the success of configuration testing will have been be delivered by ULC Robotics to SGN.</p> <p>If there are any difficulties with the configuration tests, ULC Robotics will provide recommendations for engineering</p>	<p>All relevant testing documentation will be readily available in the Project file.</p> <p>The Project Director will review and sign off the configuration report prior to progressing</p>



<p>work needed to solve the problem. SGN will review against the performance specification (for example, manoeuvrability, speed) to confirm before determining if the project is to progress forward.</p>	
<p><b>Tapping &amp; Fitting Tool Validation (Element 4) by 12th May 2017</b></p> <p><b><i>If approval is granted following the conceptual design review for element four;</i></b></p> <p>The tools used for tapping holes in the PE main and installing PE fittings will have been tested at ULC Robotics both in the test pipe and on the work bench. ULC Robotics will have selected a vendor capable of producing custom fittings and flexible service replacement tubing for this Project.</p> <p>The robot will have been inserted into the test pipe and will connect new PE services to the main line test pipe. Testing will have been used to demonstrate accurately locating the services, precisely tapping the holes, and placing the fitting securely. This process will have been repeated multiple times to ensure a robust, repeatable process is in place with predictable and reliable results.</p> <p>Any improvements noted during testing will have been incorporated until a robust, field-ready process is developed.</p> <p>ULC Robotics will deliver a report summarizing the results of this testing to SGN. If any problems are identified during testing, ULC Robotics will make recommendations for engineering work needed to solve the problem.</p>	<p>Test report will be approved and signed off by Project Director.</p> <p>All test data and demonstrations will be stored in the Project file.</p>
<p><b>Launch Robot (Element 1 &amp; 2) by 4th December 2015</b></p> <p>The entire system, including the robot, launch tube, and required support equipment, will have been shipped to the UK from ULC Robotics New York facilities.</p> <p>SGN will have selected sites suitable for deployment of the robot and prepare the necessary opening notices, traffic management, excavations, mains drilling and valve installation.</p> <p>All of the components will have been unpacked and tested to ensure they are functioning properly prior to being deployed at SGN sites.</p>	<p>Shipping sign off and delivery documentation available in Project file.</p> <p>All Network Planning analysis and designs to be documented in Project file.</p> <p>Method statement and approvals available in Project file.</p> <p>Photos will be taken during the launch both externally and internally. These will be filed in the Project folder.</p> <p>GDNs invited to site to witness launch of robot into main.</p>

<p>After following all safety procedures in accordance with SGN's Safety Management Framework and Safe Control of operations permitry prepared, registered and authorized by SGN, the launch tube will have been mounted and the robot deployed in the main.</p> <p>Provided the launch is successful, the Project will progress and robotic inspection and sealing operations will commence.</p>	
<p><b>Launch Robot (Element 3) by 4<sup>th</sup> December 2015</b></p> <p>The entire system, including the robot, launch tube, and required support equipment, will have been shipped to the UK from ULC Robotics New York facilities.</p> <p>SGN will have selected sites suitable for deployment of the robot and prepare opening notices, traffic management, excavations, mains drilling and valve installation.</p> <p>ULC Robotics team of engineers and robot operators will have arrived in the UK and prepared the equipment for operations. All of the components will have been unpacked and tested to ensure they are functioning properly prior to being deployed at SGN sites.</p> <p>After following all safety procedures, in accordance with SGN's Safety Management Framework and Safe Control of operations permitry prepared, registered and authorized by SGN, the launch tube will have been mounted and the robot will be deployed in the main. Operational or logistical issues may delay the actual date of launching.</p> <p>The completion of this stage gate will have been measured by the successful deployment of the robot in the main. If any problems are identified during deployment, ULC Robotics will make recommendations for engineering work needed to solve the problem.</p> <p>SGN will have made a decision on whether to proceed to the next stage.</p>	<p>Shipping sign off and delivery documentation available in Project file.</p> <p>All Network Planning analysis and designs to be documented in Project file.</p> <p>Method statement and approvals available in Project file.</p> <p>Photos will be taken during the launch both externally and internally. These will be filed in the Project folder.</p> <p>GDNs invited to site to witness launch of robot into main.</p>
<p><b>Launch Robot (Element 4) by 13<sup>th</sup> October 2017</b></p> <p><b><i>If approval is granted following the conceptual design review for element four;</i></b></p>	<p>Shipping sign off and delivery documentation available in the Project file.</p> <p>All site location information, including photos and analysis will be made available in the Project file.</p>

<p>The entire system, including the robot and required support equipment, will have been shipped to the UK from ULC Robotics New York facilities.</p> <p>SGN will have selected sites suitable for deployment of the robot and prepared the necessary excavations.</p> <p>All of the components will have been unpacked and tested to ensure they are functioning properly prior to being deployed at SGN sites.</p> <p>After following all safety procedures, the robot will have been deployed in the main.</p> <p>Operational or logistical issues have the potential to delay the actual date of launching; the completion of this stage gate should be measured by the successful deployment of the robot in the main.</p> <p>If any problems are identified during deployment, ULC Robotics will have to make recommendations for engineering work needed to solve the problem. At any point SGN will have the option to stop the project.</p> <p>The project will progress when SGN are satisfied that the robot has been safely launched into the main.</p>	<p>Method statements and approvals available in Project file.</p> <p>Photos will be taken during the launch both externally and internally. These will be filed in the project folder.</p> <p>GDNs invited to site to witness launch of robot into main.</p>
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The maximum amount of the NIC Successful Delivery Reward (which will not exceed the Licensee Compulsory Contribution) that the Project will be eligible for is £739,431.33

#### **14. PROJECT PLAN**

The Project Plan appended at Annex 2 replaces the plan included in the Full Submission.

#### **15. USE OF LOGO**

The Funding Licensee and Project Partners, External Funders and Project Supporters<sup>7</sup> may use the NIC logo for purposes associated with the Project but not use the Ofgem or Ofgem E-Serve logos in any circumstances.

#### **16. AMENDMENT OR REVOCATION**

As set out in the Gas NIC Governance Document and this Project Direction, this Project Direction may be amended or revoked under the following circumstances:

- (i) if the Funding Licensee considers that there has been a material change in circumstance that requires a change to the Project Direction, and the Authority agrees (paragraph 8.23 of the Gas NIC Governance Document); or
- (ii) if Ofgem agrees to provide Contingency Funding, which requires the re-issue of the Project Direction (paragraph 8.42 of the Gas NIC Governance Document); or

<sup>7</sup> As listed in Box 1.5 in Section 1 of the Full Submission pro-forma.

- (iii) if the Funding Licensee applies for Discretionary Funding to cover a decrease in Direct Benefits and the Authority decides it would be in the best interest of customers to make changes to the Project Direction before the Discretionary Funding would be awarded (paragraph 8.42 of the Gas NIC Governance Document).

## **17. HALTING OF PROJECTS**

This Project Direction is subject to the provisions contained in paragraphs 8.30 to 8.34 of the Gas NIC Governance Document relating to the halting of projects. By extension, this Project Direction is subject to any decision by the Authority to halt the Project to which this Project Direction relates and to any subsequent relevant Funding Direction issued by the Authority pursuant to Special Condition 1I.

In the event of the Authority deciding to halt the Project to which this Project Direction relates, the Authority may issue a statement to the Funding Licensee clarifying the effect of that halting decision as regards the status and legal force of the conditions contained in this Direction.

### **NOW THEREFORE:**

In accordance with the powers contained in the Gas NIC Governance Document issued pursuant to Part E of Special Condition 1I of the Licence, the Authority hereby issues this Project Direction to the Funding Licensee in relation to the Project.

This constitutes notice of reasons for the Authority's decision pursuant to section 38A (Reasons for decisions) of the Gas Act 1986.

## ANNEX 1: PROJECT BUDGET

<b>Cost Category</b>	<b>Cost</b>
<b>Labour</b>	5566.648
<b>Equipment</b>	716.345
<b>Contractors</b>	163.944
<b>IT</b>	59.240
<b>IPR Costs</b>	39.600
<b>Travel &amp; Expenses</b>	583.940
<b>Payments to users</b>	0.000
<b>Contingency</b>	276.883
<b>Decommissioning</b>	0.000
<b>Other</b>	0.000
<b>Total</b>	<b>7,406.600</b>

## **ANNEX 2: Project Plan**

The revised Project Plan for the Opening up the Gas Market Project is contained on the following page.







