# FUSION NIC submission 2017 - Q & A log

| Question No. | From | Proforma section | Criteria | Question | Date question asked | Date response required | Follow up to Question # | Confidential (Y/N) |
|---|---|---|---|---|---|---|---|---|
| 1 | CO | 4 | a) Enviro+consumer bens | In the cost analysis there is an assumption of a uniform cost of [redacted] per reinforcement, presumably to create an equivalent 16MW of additional capacity. What is that cost based on and how does that vary for different network types?<br>Furthermore, is it assumed in the CBA that the demand growth will be uniform across the network or will it be focussed on urban areas? | 22 August 2017 | 24 August 2017 | | |
| 2 | CO | n/a | b) Value for money | How has the learning from projects such as SSE's ReZone (or any of the other SSE projects on the Orkneys or Shetland) influenced the project and if so, how? | 22 August 2017 | 24 August 2017 | | |
| 3 | CO | n/a | b) Value for money | A key to the market being efficient and providing value is recruitment. Does the SP model identify the minimum recruitment for the market to be effective, i.e. providing better value than conventional reinforcement? | 22 August 2017 | 24 August 2017 | | |
| 4 | CO | n/a | b) Value for money | Who will be the "neutral" facilitator of the market? How was the cost of this service tested to ensure that it is good value? | 22 August 2017 | 24 August 2017 | | |
| 5 | CO | n/a | g) Robust methodology/ ready to implement | a. Has consideration been given of whether a cloud-based solution is suitable to host information with a UK Government security classification?<br>b. What cloud platform is proposed to be used and will the cloud provider need to demonstrate that the data is hosted in the UK?<br>c. USEF code is open source so how will the project implement and ensure cyber security and prevent intrusion? | 22 August 2017 | 24 August 2017 | | |
| 6 | NC | n/a | b) Value for money | In our feedback following the ISP stage we said - "In order to provide the best value for money to Network Customers, you may want to investigate the feasibility of combining your project with the two other projects looking at the Distribution Network Operator to DSO transition". Please can you explain what actions you have taken to address this specific piece of feedback. | 22 August 2017 | 24 August 2017 | | |
| 7 | SS | n/a | c) Generates new knowledge | How will the learning from FUSION be fed back into National Grid's review of its balancing services, and vice versa? | 24 August 2017 | 29 August 2017 | | |

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| 8 | SS | n/a | g) Robust methodology/ready to implement | How will you ensure participants can be active in both DNO flexibility and SO balancing services, and how will the use of services be prioritised between the two? | 24 August 2017 | 29 August 2017 | | |
| 9 | SS | n/a | g) Robust methodology/ ready to implement | How can FUSION be rolled out to areas where aggregators do not exist? How will flexibility providers be able to be contracted without aggregators? | 24 August 2017 | 29 August 2017 | | |
| 10 | JM | n/a | Multiple | Please provide a copy of the Full Submission Spreadsheet which is not password protected. | 24 August 2017 | 29 August 2017 | | |
| 11 | CO | n/a | b) Value for money | Can you please provide the estimated man days for each work package broken down for SP, each project partner and contractor with the relevant day rates for each party? | 24 August 2017 | 29 August 2017 | | |
| 12 | JA | n/a | f) Relevance and timing | Please provide a map of the outputs of the various DSO transition projects that have been funded through LCN Fund and NIC (please also include the ERDF Cornwall project). Within this map please show what is unique about Fusion. Please also show where you see there being scope for collaboration with other DSO projects. | 24 August 2017 | 29 August 2017 | | |
| 13 | NC | n/a | a) Enviro+consumer bens | Your submission shows the financial benefits of the proposed trial method versus conventional reinforcement. Please explain why conventional reinforcement is the most efficient method in use today. Have you considered other methods to address the problem, eg ANM or DSR. Within the Poyry report (which accompanied the Innovation Review) you contributed data to indicates 37% of the methods trialled under the LCN Fund are ready for use in business as usual and a further 41% are ready for use in the right circumstances. This would imply that there are more efficient methods available to licensees than traditional reinforcement. | 24 August 2017 | 29 August 2017 | | |
| 14 | NC | n/a | d) Is innovative | Within your submission you explicitly reference the EVOLUTION proposal that was not awarded funding through the NIC in 2015. You subsequently registered a NIA project of the same name in December 2015 that looked to undertake similar work. Please explain:<br><br>a) What the differences are between FUSION and the proposal for the EVOLUTION NIC project?<br>b) What learning has been gained from the NIA project which would be further developed in the proposed FUSION project?<br>c) What are the differences between the NIA EVOLUTION project and the work you propose to undertake through FUSION? | 31 August 2017 | 05 September 2017 | | |
| 15 | EP | n/a | e) Partners and ext. funding | Please explain why you have not partnered with the Network System Operator for the trial? Please provide more information on how you intend to work with the SO during the trial. | 05 September 2017 | 07 September 2017 | | |

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| 16 | EP | n/a | c) Generates new knowledge | How different is the market proposed within the trial to the one being tested as part of TDI 2.0? | 05 September 2017 | 07 September 2017 | | |
| 17 | EP | n/a | g) Robust methodology/ ready to implement | Please provide information on how you will ensure the market being trialled within the project will be reflective of GB as a whole? | 05 September 2017 | 07 September 2017 | | |
| 18 | EP | n/a | Multiple | How will the project interface with 'off the shelf technologies' bought by consumers to provide network flexibility?' Will consumers need to purchase specific new equipment before they can participate within the trial? | 05 September 2017 | 07 September 2017 | | |
| 19 | EP | n/a | c) Generates new knowledge | We note you are trialling a market platform which is very similar to the one being developed by the ENA Open Networks project. Please outline the key differences between the arrangements being tests as part of the trial and those being developed by the ENA | 05 September 2017 | 07 September 2017 | | |
| 20 | EP | n/a | Multiple | We note this is the second Innovation Trial proposed to resolve the Network Constraints at St Andrews, the first being the Flexible Networks project. Please clarify one, how this site was identified and the measures you took to ensure it offers value for money to GB Consumers and two; how you have ensured you do not double count the potential benefits offered by both trials? | 05 September 2017 | 07 September 2017 | | |
| 21 | EP | n/a | c) Generates new knowledge | Will there be a standard contract for new flexible connections for customers in the trial area wishing to participate in the market? If not, will the project be developing a standard contract? | 05 September 2017 | 07 September 2017 | | |
| 22 | EP | n/a | c) Generates new knowledge | Will the trial be developing a linking module between the market platform and Network Operating system? | 05 September 2017 | 07 September 2017 | | |
| 23 | EP | n/a | d) Is innovative | Whilst we note your response to question 6 states you intend to work with the other projects investigating the DNO-DSO transition please provide more information on how the project will interact with these projects/ ensure none of the learning is duplicated? | 05 September 2017 | 07 September 2017 | | |
| 24 | NC | n/a | g) Robust methodology/ ready to implement | Why didn't you wait until the conclusion of the Open Networks Consultation process before developing this submission? | 05 September 2017 | 07 September 2017 | | |
| 25 | EP | n/a | a) Enviro+consumer bens | Please can you confirm whether the carbon benefits only include CO2? If not please explain how the final figure was built up. | 12 September 2017 | 14 September 2017 | | |
| 26 | EP | n/a | a) Enviro+consumer bens | Please could you confirm whether the carbon benefits are listed in metric or imperial tonnes? To avoid confusion please ensure the correct spelling is used consistently in the resubmission | 12 September 2017 | 14 September 2017 | | |

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| 27 | EP | n/a | g) Robust methodology/ ready to implement | Please provide a written example of how the proposed market would work from the consumer angle | 12 September 2017 | 14 September 2017 | | |
| 28 | EP | n/a | g) Robust methodology/ ready to implement | Please elaborate on how the stakeholder forum will work - who is on it, what role does it have within the project, who will chair and how are domestic and industrial consumers represented? | 12 September 2017 | 14 September 2017 | | |
| 29 | EP | n/a | c) Generates new knowledge | Please provide more evidence that East Fife is representative of the GB as a whole - is the customer profile representative of the GB demographics? How will you upscale the learning to ensure it reflects the GB demographic? | 12 September 2017 | 14 September 2017 | | |
| 30 | EP | n/a | g) Robust methodology/ ready to implement | Please provide a 1 or 2 page summary of how the framework has been deployed in the Netherlands. | 12 September 2017 | 14 September 2017 | | |
| 31 | EP | n/a | g) Robust methodology/ ready to implement | Please provide information on the maintanance/ support required for the market platform. How much will this cost, who will be responsible for it's upkeep and how will it work? | 12 September 2017 | 14 September 2017 | | |
| 32 | EP | n/a | b) Value for money | How would the USEF model work with other software programmes not used in the trial? | 12 September 2017 | 14 September 2017 | | |
| 33 | EP | n/a | b) Value for money | Please could you confirm whether it will cost [redacted] to convert the USEF rules into a framework for the GB network? Is this a one off cost? | 12 September 2017 | 14 September 2017 | | |
| 34 | RH | n/a | g) Robust methodology/ ready to implement | Has there been discussion in the ENA on the suitability of USEF as an enduring model? What views were given? | 12 September 2017 | 19 September 2017 | | |
| 35 | RH | n/a | g) Robust methodology/ ready to implement | Could you provide further detail on how Fusion intends to further effective coordination in DSO and SO access to distributed services (eg managing conflicts and optimising synergies)? How will this be delivered through the project design? | 12 September 2017 | 19 September 2017 | | |
| 36 | RH | n/a | g) Robust methodology/ ready to implement | How does the USEF platform as described, relate to the models set out in the Appendix of the Commercial Principles for Contracted Flexibility paper? How does the project propose to incorporate developing thinking, and manage the risk of redundancy as industry views evolve? | 12 September 2017 | 19 September 2017 | | |
| 37 | RH | n/a | g) Robust methodology/ ready to | What are the range of constraint types the project design is focused on addressing? Will it look at enabling the use of flexibility to support connection and DG driven constraints, as well as demand driven constraints? | 12 September 2017 | 19 September 2017 | | |

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| | | | implement | | | | | |
| 38 | RH | n/a | b) Value for money | The submission implies that you are focussing on DSR. Is this correct, if so please could you explain the justification behind the decision to focus on a market for DSR, rather than all forms of flexibility? | 12 September 2017 | 19 September 2017 | | |
| 39 | RH | n/a | g) Robust methodology/ ready to implement | To what extent will the design enable peer to peer trading? | 12 September 2017 | 19 September 2017 | | |
| 40 | RH | n/a | c) Generates new knowledge | Does the project envisage the platform will be DSO run, or will it generate learning on the potential role of independent parties here, and any implications for DSO actions needed? | 12 September 2017 | 19 September 2017 | | |
| 41 | RH | n/a | Multiple | What work is intended to take place on the cyber security considerations associated with the market design? | 12 September 2017 | 19 September 2017 | | |
| 42 | NC | 9 | Multiple | How applicable will the report that to be delivered through Project Deliverable 1 be to the rest of GB. If it is not applicable to the rest of the GB the proposed percentage appears high. Please provide a justification that the proposed percentage of funding associated with this deliverable is appropriate. | 14 September 2017 | 19 September 2017 | | |
| 43 | NC | 9 | Multiple | Given that the project is about the demonstrating that USEF can be used in GB the proposed funding associated with Project Deliverable 3 appears low. Please provide a justification that the proposed percentage of funding associated with this deliverable is appropriate. | 14 September 2017 | 19 September 2017 | | |
| 44 | NC | 9 | Multiple | Please provide more detail on what will actually be delivered as Project Deliverable 6. Please provide a justification that the proposed percentage of funding associated with this deliverable is appropriate. | 14 September 2017 | 19 September 2017 | | |
| 45 | NC | 9 | Multiple | Project deliverable 7 appears to be an important deliverable. Please provide a justification that the proposed percentage of funding associated with this deliverable is appropriate. | 14 September 2017 | 19 September 2017 | | |

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| 46 | CO | n/a | Multiple | In response to question 41 you provided a diagram referenced 'Fusion Q41 DNO data interfaces'. Can you please clarify the following:<br>• Will PowerOn have any function other than status monitoring or will it play an active role in managing the DMZ scheme? If the latter, how will the integrity of the scheme be verified, e.g. how will any interactions with existing PowerOn sequential switching schemes be prioritised?<br>• There appears to be no link between the BSP level metering data and an Aggregator's input. What will the Aggregators input to the scheme be (aggregated metering data? network switch status?) and how will it be verified?<br>• The USEF requires a platform to operate on so where will it reside? | 05 October 2017 | 10 October 2017 | 41 | |
| 47 | RH | n/a | Multiple | Please could you confirm whether you are planning to submit a bid to the BEIS Flexibility Markets Tender in October? | 05 October 2017 | 10 October 2017 | | |
| 48 | EP | n/a | g) Robust methodology/ ready to implement | Please provide written clarification of how many outages you expect to manage throughout the life of the project. | 05 October 2017 | 10 October 2017 | | |
| 49 | EP | n/a | b) Value for money | As discussed within the bilateral, please provide information on any agreements you have reached with St Andrews regarding any future discount they will provide after the trial | 05 October 2017 | 10 October 2017 | | |
| 50 | EP | n/a | g) Robust methodology/ ready to implement | As discussed, please provide more information on how the arrangements will work for providers of flexibility with exclusive arrangements with SO? | 05 October 2017 | 10 October 2017 | | |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

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|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 1 |
| Question date | 22nd August 2017 | Answer date | 24th August 2017 |
| Submission section question relates to | Section 4 | | |
| Topic | Environment and consumer benefits | | |
| Question | In the cost analysis there is an assumption of a uniform cost of [redacted] per reinforcement, presumably to create an equivalent 16MW of additional capacity. What is that cost based on and how does that vary for different network types?<br><br>Furthermore, is it assumed in the CBA that the demand growth will be uniform across the network or will it be focussed on urban areas? | | |
| Notes on question | | | |
| Answer | The assumptions and calculations made in the CBA have been developed through sensitivity analysis and are believed to demonstrate a prudent approach and associated results.<br><br>[redacted] per reinforcement is the cost for the counterfactual, i.e. the conventional reinforcement to create the same additional capacity as constructing 2x 33kV primary substations.<br><br>The costing elements are evidence-based from a 2017 report commissioned by the University of St Andrews. and compiled by SP Distribution Fife and Central District Planning Engineers: | | |

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| | <table><tr><th>One 33kV primary substation cost</th><td>[redacted]</td></tr><tr><td>underground cable*</td><td>[redacted]</td></tr><tr><td>new primary substation at 33kV, including tranformer, circuit breakers and control boards</td><td>[redacted]</td></tr><tr><td>civil works for the substation</td><td>[redacted]</td></tr></table><br>*Cable length in the feasibility study has an average cost of [redacted] per km. Note that this is based on the real cost of a largely rural cabling route; therefore, costs are conservative relative to more costly urban cable laying. The average cable length between a Grid Supply Point and a primary substation in SP Distribution is [redacted]. This is multiplied by the cost per km, resulting in the value of [redacted].<br><br>Therefore, the total of the counterfactual two 33kV primary substations is [redacted]*2=[redacted]<br><br>Regarding the load growth, it has been assumed in the CBA that the demand growth will be uniform across the network by using the TRANSFORM model on which SP Distribution's current settlement is based, and is accepted by the industry and the regulator for load related forecast. |
| Attachments | |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

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|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 2 |
| Question date | 22nd August 2017 | Answer date | 24th August 2017 |
| Submission section question relates to | N/A | | |
| Topic | Value for money | | |
| Question | 1) How has the learning from projects such as SSE'S ReZone (or any of the other SSE projects on the Orkneys or Shetland) influenced the project and if so, how? | | |
| Notes on question | | | |
| Answer | In developing FUSION, SP Distribution has drawn upon experiences from a number of projects being taken forward through the NIA/NIC funding mechanism.<br><br>In developing FUSION, we have considered the commercial interface between a DNO and a flexibility providers being trialled through projects such as CLASS, Low Carbon London, and Entire as well as SSEs Congestion Management Zones (CMZ) trials.<br><br>Regarding SSE's project ReZone, a fundamental aspect of this project was using embedded generation and storage to maintain security of supply where electricity supplies may be cut-off by faults and planned work. However, the starting principle of how this engagement would be formalised was through bilateral arrangements, similar to most projects being taken forward in this space, between the DNO and the flexibility provider.<br><br>The key differentiating factor of FUSION to prior projects discussed is that, whilst they are trying to achieve a similar objective of allowing the DNO to access network flexibility to manage and achieve overall network security, the mechanism by which we will seek to engage and procure flexibility services will be through an independent market process. | | |

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| | As a DNO, SP Distribution recognise that the requirement to engage and procure demand-side response and serve the local distribution network represents only one aspect of the many wider balancing service markets which flexibility providers such as energy suppliers, aggregators and larger demand and generation customers can operate within. We have no desire to exclude those entities from engaging in those wider markets, and therefore seek to develop a framework that will provide the greatest opportunity to provide economic value for both the DNO, and to provide a route to the DNO market for flexibility providers who may engage in providing flexibility to serve multiple markets. This is achieved through procurement of flexibility services in a structured, open and economically driven flexibility market.<br><br>In conclusion, FUSION states that learning developed from the many projects, is that flexibility services to date have been exclusively and/or bilaterally contracted between market actors. FUSION goes beyond these principles, instead commoditising flexibility and developing an open and transparent flexibility market, whereby best value will be generated for GB customers through a competitive and accessible process. |
| Attachments | |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

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|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 3 |
| Question date | 22nd August 2017 | Answer date | 24th August 2017 |
| Submission section question relates to | N/A | | |
| Topic | Value for money | | |
| Question | A key to the market being efficient and providing value is recruitment. Does the SP model identify the minimum recruitment for the market to be effective, i.e. providing better value than conventional reinforcement? | | |
| Notes on question | We assume that the term "recruitment" here is meant to refer to market liquidity, and that the term "SP model" is meant to refer to the FUSION project. Please advise if we have misinterpreted these terms. | | |
| Answer | The objective of FUSION is to demonstrate that flexibility procured through a local demand-side flexibility market can be deployed as an efficient alternative to DNO network reinforcement. To demonstrate this, FUSION investigates (1) whether there is sufficient local flexibility potential to resolve network constraints in East Fife, and (2) whether the deployment of this flexibility through a market structure is more economic than conventional reinforcement.<br><br>Within FUSION, the local flexibility potential will be evaluated in Work Package 2, which will map out local flexibility market liquidity and inform the feasibility and scope of the trials in Work package 5.<br><br>FUSION has engaged with stakeholders in the region to understand the interest of flexibility providers in participating in a local flexibility market. Liquidity has been found in all approached stakeholders, including the University of St Andrews with over [redacted] of flexibility; SAC Consultants have access to over [redacted] of flexibility from the agricultural sector; Fife Council | | |

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| | have indicated their interest in both commercial and domestic flexibility provision; Bright Green Hydrogen have also indicated their interest in flexibility provision. On the basis of this evidence, FUSION believes there is ample flexibility available to unlock though a local flexibility market. Further detailed assessments will fully evaluate regional flexibility value.<br><br>Through trials in Work package 5, project FUSION will demonstrate whether local flexibility can be an economic alternative to reinforcement, given the liquidity of the local market. Through competitive tendering, project FUSION will discover the local market price for flexibility, which must be between the opportunity costs of the provider and the opportunity costs (of network reinforcement) of the DNO, to be economic. |
| Attachments | |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

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|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 4 |
| Question date | 22nd August 2017 | Answer date | 24th August 2017 |
| Submission section question relates to | N/A | | |
| Topic | Value for money | | |
| Question | Who will be the "neutral" facilitator of the market? How was the cost of this service tested to ensure that it is good value? | | |
| Notes on question | | | |
| Answer | The term neutral market facilitator in the FUSION FSP does not refer to a role or service to be provided by an organisation. The term is meant to reflect the USEF framework's capability to facilitate a neutral market by standardising the processes and communication protocols necessary for trading flexibility locally. It is neutral in the sense that USEF's standards, processes and protocols are universal, as well as in that it provides unbiased market access for all market participants.<br><br>For the purposes of the trial in project FUSION, SP Distribution will facilitate the flexibility market procurement platform, i.e. the platform through which SP requests (through competitive tendering) flexibility and selects bids from flexibility providers (including aggregators, suppliers, and end-users). Tender results will be published to ensure transparency of the market outcome.<br><br>The flexibility procurement platform is cloud-based. The development and implementation of this procurement platform will be competitively tendered for within FUSION. To inform the potential costs, FUSION has consulted ICT, | | |

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| | a software firm and founding member of the USEF foundation, and obtained an indicative cost of [redacted] for the duration of the project. This cost reflects previous investment in, and learnings from, the USEF framework, as well as being based on ICT's implementation of related platforms in the EnergieKoplopers project, a smart energy field trial in Heerhugowaard, The Netherlands.<br><br>As part of the public consultation process in Work Package 3, project FUSION will investigate different options for flexibility trading platforms in the context of GB-wide implementation. |
| Attachments | |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

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|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 5 |
| Question date | 22nd August 2017 | Answer date | 24th August 2017 |
| Submission section question relates to | N/A | | |
| Topic | Robust methodology/ready to implement | | |
| Question | a. Has consideration been given of whether a cloud-based solution is suitable to host information with a UK Government security classification?<br>b. What cloud platform is proposed to be used and will the cloud provider need to demonstrate that the data is hosted in the UK?<br>c. USEF code is open source so how will the project implement and ensure cyber security and prevent intrusion? | | |
| Notes on question | FUSION has consulted ICT, a founding member of the USEF Foundation and contributor to prior USEF innovation projects, on a guidance only basis regarding this question. Input from ICT can be made available on request. | | |
| Answer | a) The development and implementation of the cloud-based procurement platform will be competitively tendered for within FUSION. The invitation to tender will specify that the platform must comply with UK Government security classifications.<br><br>To inform the design of the platform, including (cyber) security requirements, FUSION has consulted ICT, a software firm and founding member of the USEF foundation. As a reference: ICT offers a USEF implementation in the Microsoft Azure Cloud. Microsoft's Azure Blueprint for the UK Government shows how Azure has implemented the 14 individual Cloud Security Principles published by | | |

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| | the National Cyber Security Centre, supporting workloads with information designated as UK OFFICIAL.[1] Microsoft's Azure is G-Cloud certified.<br><br>b) The final platform selection is subject to a competitive tendering process. As part of this process we will include data hosting requirements.<br><br>For reference, and as indicated in question (a), ICT offers a USEF implementation in the Microsoft Azure Cloud. Microsoft offers its cloud platform in 36 regions including two locations in the UK[2] and can ensure that customer data is protected and used in a transparent manner. Microsoft can guarantee that sensitive data is kept within a specific region.<br><br>We will define similar specifications for the platform to be tendered in project FUSION.<br><br>c) Open source is not related to cyber security issues. Most cyber security measures rely on open source techniques. USEF follows the principle of privacy and security by design to mitigate the risk of privacy and security issues. The **USEF privacy and security guidelines**[3] require all participants to be able to securely transmit and authenticate messages. A receiver must also be able to protect itself from malicious senders. USEF's code is fully compliant with the USEF privacy and security guidelines and includes a security layer that contains all provisions for message security. USEF uses libsodium to encrypt messages.<br><br>ICT Group, that hosts the USEF code, complies to the ISO 27001 information security standard.<br><br>Further, Within SP Energy Networks, dialogue has taken place between FUSION and the Head of Systems UK Cyber-Security, and with the SP Energy Networks Business Continuity Manager. As a result, FUSION will be developed in line with existing SP Energy Networks data security protocols in compliance with UK Government security classifications. |
| Attachments | |

[1] https://azure.microsoft.com/en-gb/blog/azure-blueprint-supports-the-uk-government-s-cloud-security-principles/
[2] https://azure.microsoft.com/en-gb/regions/
[3] *USEF: The privacy and security guidelines*, available at: https://www.usef.energy/download-the-framework/

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

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| Project code | SPD/EN/03 | Question Number | 6 |
| Question date | 22nd August 2017 | Answer date | 24th August 2017 |
| Submission section question relates to | N/A | | |
| Topic | Value for money | | |
| Question | In our feedback following the ISP stage we said - "In order to provide the best value for money to Network Customers, you may want to investigate the feasibility of combining your project with the two other projects looking at the Distribution Network Operator to DSO transition". Please can you explain what actions you have taken to address this specific piece of feedback. | | |
| Notes on question | | | |
| Answer | FUSION has actively sought and engaged in constructive dialogue with project managers for TRANSITION and EFFS, both through industry events such as the ENA R&D Managers roundtable in early June and WPD's Balancing Act Conference on 11th May; and through bilateral engagement and discussion following feedback at the ISP stage.<br><br>Through considered and reasoned dialogue, all parties concluded that the scopes and approaches taken by FUSION, TRANSITION and EFFS were significantly unique following external calls and project partner selection to warrant individual project development.<br><br>Notwithstanding, all projects have expressed an intent to undertake constructive collaboration in three principal areas:<br><br>1) Developing a foundation of functional requirements to develop the DSO role in GB. The consultation and review process can be co-ordinated in collaboration between FUSION, TRANSITION and EFFS.<br><br>2) Project trials can be coordinated to complement each other, and to | | |

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| | facilitate interoperability through data exchanges between DSO systems.<br><br>3) Knowledge dissemination activities will be shared where work has been undertaken collaboratively.<br><br>Work through FUSION, TRANSITION and EFFS will contribute to the ENA Open Networks to support the enduring development of DSO solutions.<br><br>FUSION has also engaged in bilateral meetings with UKPN regarding the project. This extensive engagement highlighted common project interests, a desire to maintain inclusive cooperation, and for DNOs to engage in stakeholder events. |
| Attachments | |

# *Supplementary Answer Form*

## Project: FUSION

Tick if this answer has been provided verbally: ☐

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|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 7 |
| Question date | 24th August 2017 | Answer date | 29th August 2017 |
| Submission section question relates to | c) generates new knowledge | | |
| Topic | | | |
| Question | How will the learning from FUSION be fed back into National Grid's review of its balancing services, and vice versa? | | |
| Notes on question | | | |
| Answer | Balancing services are a major application for flexibility, and thus National Grid is a major stakeholder in establishing a flexibility market in the UK that allows DNOs to use flexibility disclosed by demand-side response and local generation.<br><br>Project deliverable 7 specifically produces a report on flexibility control, and will be fed into National Grid's ongoing services reviews, and will be delivered though the ENA Open Networks Forum.<br><br>FUSION has directly engaged with National Grid, both through teleconferences with National Grid's Innovation Strategy Manager in June, and through liaison via the Energy Networks Association.<br><br>National Grid have been sent a copy of the full FUSION submission, and have expressed an interest in nominating a member to sit on the FUSION Steering Group, providing an excellent mean to share learning between FUSION and National Grid regarding balancing services.<br><br>In the ENA working group 1, National Grid have further committed to | | |

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| | engage on a neutral manner with FUSION. FUSION will maintain an enduring relationship with National Grid regarding balancing services.<br><br>As one of the main users of flexibility, National Grid will be invited to participate in the stakeholder forum activities planned as part of project FUSION.<br><br>In addition, project FUSION will develop a public consultation, to solicit input from all relevant stakeholders in shaping the design of the GB flexibility market. As part of this process, the role and position of SO balancing services within the GB market will be investigated, and we anticipate National Grid's input in this area specifically. |
| Attachments | |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

| Project code | SPD/EN/03 | Question Number | 8 |
|---|---|---|---|
| Question date | 24th August 2017 | Answer date | 29th August 2017 |
| Submission section question relates to | Robust methodology/ready to implement | | |
| Topic | | | |
| Question | How will you ensure participants can be active in both DNO flexibility and SO balancing services, and how will the use of services be prioritised between the two? | | |
| Notes on question | | | |
| Answer | DNO flexibility services and SO balancing services are sometimes, but not always, mutually exclusive.<br><br>Where DNO and SO flex services are mutually exclusive, for instance because of incompatible functional requirements, these services compete on the basis of price. Market participants are active in the market for both services in the sense that both options are open to them. Once a market participant contracts a flexibility service with one party, it is bound by the requirements of this service (for example: the conditions for supplying emergency power to the SO) as defined in this contract. The USEF framework provides product definitions as well as contractual specifications as a basis for these arrangements. Through the consultation process planned in FUSION, these definitions and specifications will be refined for the GB system.<br><br>DNO and SO flex services may also be compatible, so that market participants can provide both simultaneously. For example: An aggregator offering emergency power to the SO can offer the same capacity to a DSO for an N-1 compliance service (e.g. using local generation to support the local grid in case of a fault or maintainance). This requires a measure of co-ordination between the DNO and the SO, so that if either one activates the flexible capacity, the other is informed. By sharing the flexibility resource, its cost to the DNO and SO can be reduced. The USEF framework provides the | | |

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| | principles of this type of arrangement. |
| Attachments | |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

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|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 9 |
| Question date | 24th August 2017 | Answer date | 29th August 2017 |
| Submission section question relates to | Robust methodology/ready to implement | | |
| Topic | | | |
| Question | How can FUSION be rolled out to areas where aggregators do not exist? How will flexibility providers be able to be contracted without aggregators? | | |
| Notes on question | | | |
| Answer | Note that there is a distinction between the aggregator role as defined in the USEF framework, and aggregator businesses as they currently exist and operate in the UK.<br><br>The aggregator role in USEF is any party that invests in making flexibility available, where this is technically and economically feasible. This role can be fulfilled by (1) independent aggregator businesses, (2) supply companies, and (3) flex-providers (end-users) themselves. Any one of these three parties can in principle participate in the flexibility market, subject to practical and economic considerations.<br><br>The aggregator role can exist anywhere, but it is possible that in some areas there is no flexible capacity, or it has not been made available. This may signify that flexibility is not technically or economically feasible. In such areas, there is no flexibility to participate in the market, even though the market framework is available. | | |
| Attachments | | | |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

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|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 10 |
| Question date | 24th August 2017 | Answer date | 29th August 2017 |
| Submission section question relates to | N/A | | |
| Topic | Multiple | | |
| Question | Please provide a copy of the Full Submission Spreadsheet which is not password protected | | |
| Notes on question | | | |
| Answer | Please find attached a fully editable version of the Full Submission Spreadsheet. | | |
| Attachments | FUSION_Full_Submission_Spreadsheet - REDACTED | | |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

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|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 11 |
| Question date | 24th August 2017 | Answer date | 29th August 2017 |
| Submission section question relates to | N/A | | |
| Topic | Value for money | | |
| Question | Can you please provide the estimated man days for each work package broken down for SP, each project partner and contractor with the relevant day rates for each party? | | |
| Notes on question | | | |
| Answer | Please find attached a fully editable breakdown of work packages and tasks by man days with associated day rates for SP Distribution and all project partners. | | |
| Attachments | FUSION_man_days_and_day_rates - REDACTED | | |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

| | | | |
|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 12 |
| Question date | 24th August 2017 | Answer date | 29th August 2017 |
| Submission section question relates to | N/A | | |
| Topic | Relevance and timing | | |
| Question | Please provide a map of the outputs of the various DSO transition projects that have been funded through LCN Fund and NIC (please also include the ERDF Cornwall project). Within this map please show what is unique about FUSION. Please also show where you see there being scope for collaboration with other DSO projects. | | |
| Notes on question | | | |
| Answer | FUSION is critically aware of the funding and innovation work undertaken in the UK within the DSO transition theme, and is formulated to fill specific unknowns and gaps in current UK specific knowledge and understanding. The following provides summarises our considerations.<br><br>*<br><br>Currently, no funded NIC/LCNF project has sought to develop a structured, competitive flexibility market to resolve distribution network constraints. FUSION seeks to undertake this task, and will harness learning from other projects in developing flexibility services to resolve network issues.<br><br>Flexibility projects to date, as developed by DNOs in the UK, have used direct contractual agreements with flexibility providers or aggregators. This has resulted in a non-transparent market, with limited visibility over cost arrangements, creating a potential for market imbalance. Projects C2C, CLASS (using voltage control demand response), TDI2.0 and FALCON fall in this category. In FUSION, the DNO procures flexibility through competitive tendering, meaning that flexibility providers compete to provide flexibility to | | |

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| | the DNO, as well as that DNO flexibility competes with other flexibility services, such as TSO flexibility, allowing savings to be passed on to GB electricity customers.<br><br>Multiple projects have sought to create models for distribution demand flexibility. Project Entire has developed a model whereby WPD have stacked services, incorporating some of the remit of aggregators by partnered with Kiwi Power, one specific aggregator, and developed Flexible Power Ltd. FUSION has undertaken an on-site visit, and has developed a strong understanding of the project and learning. FUSION has opted to facilitate the distribution network as a route to market for any capable aggregator or flexibility provider, creating an open market environment, thereby demonstrating both learning and clear differentiation from this project.<br><br>*<br><br>The Cornwall Energy Market (CEM) project, does not create a competitive flexibility market so much as a smart energy system, in which the energy use of connected customers is optimised against carbon emissions, renewable generation and local system costs. The project's structure and objectives strongly resemble the PowerMatching City project (2009), which formed the basis for development of the USEF framework used in FUSION.<br><br>Like PowerMatching City, CEM is investing in technology and developing the processes and (IT) systems required to aggregate and optimise local load. USEF assigns the responsibility of these systems to aggregators and standardises the interaction with other market participants, creating a competitive market.<br><br>The CEM is effectively developing an aggregator role as defined within the USEF framework, and as such will fit well within the USEF-based flexibility market developed in FUSION. Findings from the CEM can be captured through the FUSION stakeholder forum and consultation, and be used to refine the USEF reference implementation for GB.<br><br>*<br><br>Other DSO projects have sought to investigate active network management (ANM). SSE's ReZone project used energy generation and storage to provide temporary islanded generation supply under fault conditions. An outcome of learning from this project is the ability to harness local generation management to relieve network constraints; however, FUSION goes beyond learning from ReZone, facilitating a neutral market by allowing market actors to request for flexibility from the DNO, thereby not undertaking direct contracting, and producing value for GB customers.<br><br>Other ANM projects act to monitor networks and send appropriate signals to disconnect either the generator and/or demand to protect and maintain the electricity supply security through agreed contracted terms. FUSION realises the benefits of access to distribution assets to balance the network; however, seeks to release further value through facilitating a competitive market in place of direct contracting.<br><br>*<br><br>Regarding NIC 2017 proposals, FUSION has actively sought and engaged in |

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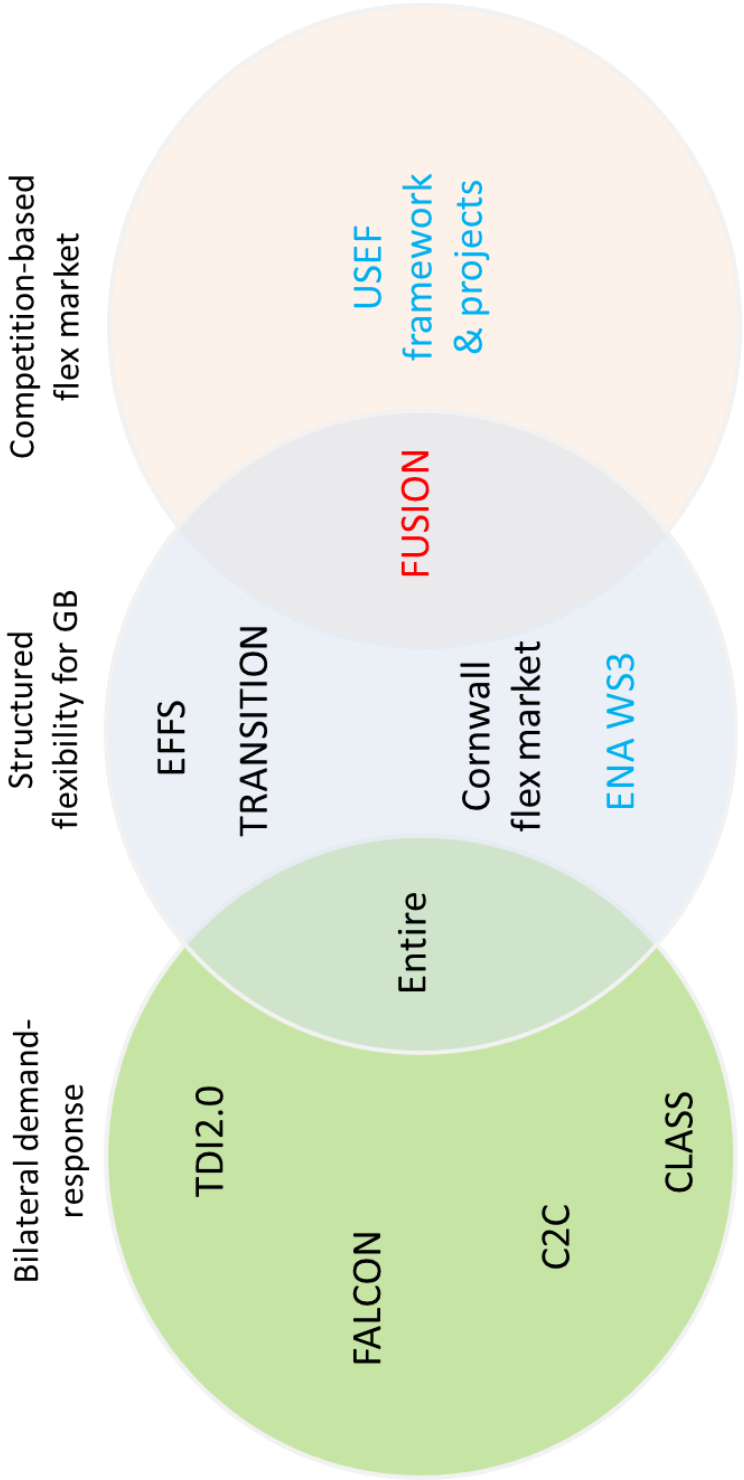
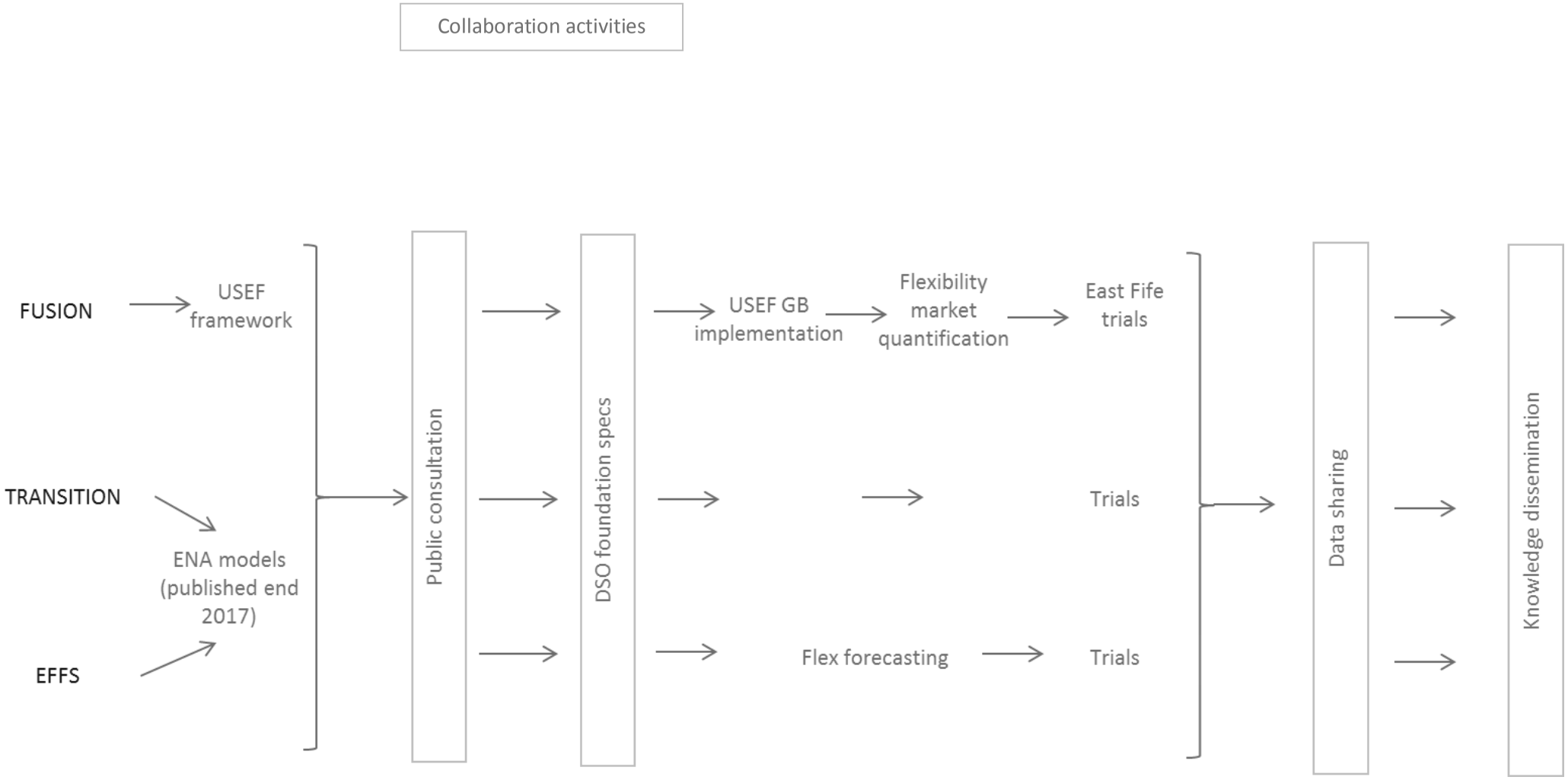
| | constructive dialogue with project managers for TRANSITION and EFFS. Through well-reasoned discussion, agreement was found that each project was significantly differentiated to warrant independent project development based on their DSO approach, partner engagement, and model development.<br><br>Notwithstanding the differences between NIC projects, there is consensus that elements of each project can be undertaken collaboratively to provide value for money for GB customers. Three principal areas for collaboration are:<br><br>1) Undertaking a consultation and review process on DSO and demand-side response, and thereby developing a foundation of functional requirements to develop the DSO role in GB.<br>2) Project trials will be coordinated to complement each other. FUSION are aware that both EFFS and TRANSITION are developing ENA working group outcomes expected in late 2017; when these are available and presented by EFFS and TRANSITION, details on model interoperability will be developed, allowing testing and data exchanges between DSO systems.<br>3) Knowledge dissemination activities will be shared where work has been undertaken collaboratively.<br><br>Throughout, all projects seek to integrate learning and knowledge sharing through ENA Open Networks, thereby assimilating and coordinating all learning outcomes.<br><br>FUSION, TRANSITION and EFFS have agreed in principle to seek and coordinate an approach to project collaboration, and to coordinate shared activities thereby passing on savings to the GB customer, with the aim of developing a collaboration approach before Q2 of 2018.<br><br>DSO innovation projects are outlined in the attachment, figure 1, clearly denoting the innovation value of FUSION as the only project developing, implementing and validating a competition-based flexibility market.<br><br>Interactions between current DSO/demand-side response projects are outlined in figure 2, denoting shared collaborative activities.<br><br>*<br><br>Further, it is worth noting the harnessed funding outside of the NIC/LCN streams. FUSION develops USEF, a framework that has been developed in Europe has seen investments of over £19m to generate its current Technology Readiness Level. FUSION can now extend the progress already made, and can undertake trials in the UK energy system with knowledge that the framework has received robust investigation to date, adding weight to project delivery readiness. |
| Attachments | Question 12 attachment: DSO projects learning and innovation map, and DSO project collaboration map |

# Attachment: FUSION Q12 - DSO projects learning and innovation map, and DSO project collaboration map




Collaboration activities
FUSION
USEF framework
TRANSITION
ENA models (published end 2017)
EFFS
Public consultation
DSO foundation specs
USEF GB implementation
Flexibility market quantification
East Fife trials
Trials
Flex forecasting
Trials
Data sharing
Knowledge dissemination

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

| | | | |
|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 13 |
| Question date | 24th August 2017 | Answer date | 29th August 2017 |
| Submission section question relates to | N/A | | |
| Topic | Environment and consumer benefits | | |
| Question | Your submission shows the financial benefits of the proposed trial method versus conventional reinforcement. Please explain why conventional reinforcement is the most efficient method in use today. Have you considered other methods to address the problem, eg ANM or DSR. Within the Poyry report (which accompanied the Innovation Review) you contributed data to indicates 37% of the methods trialled under the LCN Fund are ready for use in business as usual and a further 41% are ready for use in the right circumstances. This would imply that there are more efficient methods available to licensees than traditional reinforcement. | | |
| Notes on question | | | |
| Answer | FUSION has undertaken a prudent CBA, and has noted the guidance provided by Ofgem specifying the requirement to ensure value for money by considering alternative techniques to traditional reinforcement, including alternative innovation projects. FUSION therefore seeks to maximise the innovation outcome by integrating and leveraging the findings from previous innovation projects, as also highlighted in the Poyry report.<br><br>During the course of proposal development, significant considerations have been given to the recent outcome from innovation projects, in particular the Flexible Networks Project[4] (funded under LCNF-Tier 2). This was undertaken in St Andrews, and found that through Real Time Thermal Rating, an additional 20% capacity can be unlocked; this is integrated in FUSION, allowing this uplift before flexibility demand is triggered, thus demonstrating learning from prior projects. | | |

[4] SP Energy Networks, Flexible Networks Closedown Report, available at: http://www.smarternetworks.org/Files/Flexi_Networks_for_a_Low_Carbon_Future_160425145639.pdf

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| | [redacted]<br><br>• The University of St Andrews commissioned a feasibility study to investigate the impact of their Sustainable Power and Research Campus (SPARC) in Guardbridge at a former paper mill site. Associated load growth is projected at [redacted] by 2027. [redacted]<br>• The FIFEplan[5] outlines key Strategic Development Areas, including the West of St Andrews, featuring: 1090 new homes; 10ha Science Park, 8ha employment land; 5ha Business Park; Hotel and Care Home accommodation; 3 Retail Hubs.<br><br>[redacted]<br><br>[redacted] FUSION offers a high value alternative to this traditional resolution, and defers reinforcements. |
| Attachments | |

[5] Fife Council, *FIFEplan: Fife Local Development Plan, Modified Proposed Plan,* February 2017. Available at: http://lpconsult.fife.gov.uk/portal/fife_ldp/fifeplan_-_adopted_plan_13/adopted_fifeplan?pointId=4395822

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

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|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 14 |
| Question date | 31st August 2017 | Answer date | 5th August 2017 |
| Submission section question relates to | N/A | | |
| Topic | Innovative | | |
| Question | "Within your submission you explicitly reference the EVOLUTION proposal that was not awarded funding through the NIC in 2015. You subsequently registered a NIA project of the same name in December 2015 that looked to undertake similar work. Please explain:<br><br>a) What the differences are between FUSION and the proposal for the EVOLUTION NIC project?<br><br>b) What learning has been gained from the NIA project which would be further developed in the proposed FUSION project?<br><br>c) What are the differences between the NIA EVOLUTION project and the work you propose to undertake through FUSION?" | | |
| Notes on question | | | |
| Answer | **a) What the differences are between FUSION and the proposal for the EVOLUTION NIC project?**<br><br>Following the unsuccessful EVOLUTION NIC in 2015 which sought to establish a flexibility market to support GBSO, SP Distribution responded positively and constructively to feedback from Ofgem and the Expert Panel, and undertook further work to strengthen project design. SP Distribution noted that the EVOLUTION proposal is 'one of great interest and strongly encourage further development in this area', and 'We support SPD's claims that enabling the role of the DSO would benefit low carbon generators and therefore facilitate the low carbon energy sector'. | | |

SP Distribution then pursued this concept under NIA with the same name in December 2015, in particular taking a strategic approach to address the concerns on the original proposal readiness.

Accordingly, FUSION is far more structured and well-stablished, having developed a sound business case, based on the deployment a USEF-based flexibility market in East Fife. Notable differences in project design show:

- FUSION is focussed on mitigating distribution network constraints
- FUSION develops a flexibility market with a systems approach through competition
- The use of USEF in application to GB flexibility needs
- The thorough stakeholder engagement in the proposal and project delivery
- Clear project deliverables and learning outcomes
- Development through the ENA Open Networks industry forum
- Ability to build on SP Distribution's DSO Vision

**b) What learning has been gained from the NIA project which would be further developed in the proposed FUSION project?**

The EVOLUTION NIA project has produced strategic learning, creating a solid foundation that is carried forwards in a well-structured proposal under FUSION, specifically:

- SP Distribution consulted on and published its DSO Vision, outlining future DSO developments.
- SP Distribution has been fundamental in developing the ENA Open Networks forum for industry DSO developments – SP Distribution sits on the steering board providing strategic direction.
- An internal DSO steering board has been established to coordinate strategic developments, leading to the FUSION NIC proposal.
- Market structure has been investigated and developed.
- Trial sites for future projects have been reviewed, leading to the development of FUSION in East Fife.
- Stakeholder engagement has been coordinated, to review industry and participant interest in the establishment of a flexibility market and participation in trials. FUSION utilises the stakeholder engagement channels created through EVOLUTION to ensure appropriate project relevance and delivery.
- The EVOLUTION NIA has taken in to account industry developments from Ofgem and other stakeholders, and has responded through appropriate forums; FUSION builds on this engagement.

As a result, EVOLUTION NIA project has developed strong foundations for future proposals; FUSION has built on these to undertake a fully scoped project capable of delivering benefits to GB customers.

**c) What are the differences between the NIA EVOLUTION project and the work you propose to undertake through FUSION?"**

Principally, the EVOLUTION NIA project has undertaken strategic

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| | developments regarding DSO flexibility markets; FUSION has harnessed these developments to create a well-structured and focussed proposal capable of delivering GB benefits.<br><br>FUSION implements and trials a USEF-based flexibility market to address local network constraints. This deliverable builds from the strategic nature of the EVOLUTION NIA. The implementation and operational emphasis of FUSION contrasts with the foundational work undertaken through EVOLUTION, demonstrating clear benefits from the NIA project, and the logical progression of NIA to NIC projects. |
| Attachments | |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

| | | | |
|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 15 |
| Question date | 5th September 2017 | Answer date | 7th September 2017 |
| Submission section question relates to | n/a | | |
| Topic | Partners and ext. funding | | |
| Question | Please explain why you have not partnered with the Network System Operator for the trial? Please provide more information on how you intend to work with the SO during the trial. | | |
| Notes on question | Please note our answers to questions 7 and 8, in which we have elaborated on engagement with GBSO during the FSP development phase, as well as on the compatibility of DNO and TSO flexibility services. | | |
| Answer | The trial in FUSION is not designed to directly serve GBSO flexibility requirements; FUSION seeks to develop a local flexibility market to mitigate distribution network constraints. Accordingly, FUSION is distribution network oriented. That said, if FUSION is able to demonstrate that a USEF-based flexibility market can be applied in GB, we would expect the GBSO to access local flexibility through it.<br><br>GBSO is a key stakeholder in a GB flexibility market, and the co-ordination of DNO and TSO flexibility services is a key element of such a market.<br><br>As described in our answer to Q7, we have engaged with GBSO during the FSP development process, and rather than becoming a partner in FUSION, GBSO have elected to interact with all DSO NIC projects through the ENA Open Networks project. Further, GBSO will interact with FUSION through the stakeholder forum with Cian McLeavey-Reville, Innovation Strategy Manager at GBSO, representing GBSO; Mr. Ian Pashley, Markets and Balancing Development Manager, will sit on the steering board of FUSION. Notably, Mr. Ian Pashley is also representing the GBSO at Open Networks initiative. | | |
| Attachments | | | |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

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|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 16 |
| Question date | 5th September 2017 | Answer date | 7th September 2017 |
| Submission section question relates to | N/A | | |
| Topic | Generates new knowledge | | |
| Question | How different is the market proposed within the trial to the one being tested as part of TDI 2.0? | | |
| Notes on question | | | |
| Answer | TDI 2.0 is designed to only provide reactive power for GBSO, by harnessing flexibility assets in the distribution network. TDI2.0 seeks to resolve compatibility between DNOs and GBSO through coordinated rules and bilateral arrangements; FUSION by contrast develops an open competitive market-based approach, enabling the market equilibrium value of flexibility to develop, creating an economically efficient outcome. | | |
| Attachments | | | |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

| | | | |
|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 17 |
| Question date | 5th September 2017 | Answer date | 7th September 2017 |
| Submission section question relates to | N/A | | |
| Topic | Robust methodology/ready to implement | | |
| Question | Please provide information on how you will ensure the market being trialled within the project will be reflective of GB as a whole? | | |
| Notes on question | | | |
| Answer | FUSION develops, implements and trials a local flexibility market in East Fife. The market will act to resolve network constraint issues caused by load growth[redacted] Key principles listed below ensure that the project is reflective of GB as a whole, and ensure learning is valid and applicable for all DNOs:<br>• [redacted]<br>• The project partner consortium includes two aggregators; reflecting the national interest and commercial applicability of FUSION across GB.<br>• Through stakeholder engagement, market participants have shown strong interest in FUSION; this supports national interest as reflected in recent Ofgem reports[6] [7].<br>• The public consultation will include stakeholders from across GB, and will take in to account their views and requirements. | | |

[6] Ofgem/BEIS (2016), *A smart, flexible energy system - A call for evidence*.

[7] Ofgem, *Upgrading Our Energy System: Smart Systems and Flexibility Plan*, 2017, available at: https://www.ofgem.gov.uk/publications-and-updates/upgrading-our-energy-system-smart-systems-and-flexibility-plan

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| | • The public consultation will seek to review and develop flexibility product descriptions for a range of distribution network issues.<br>• Learning generated through FUSION will be made available to all DNOs and other stakeholders, and will feed in to the ENA Open Networks project.<br>• The GB implementation of a USEF-based market developed through FUSION will be adoptable across GB. |
| Attachments | |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

| | | | |
|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 18 |
| Question date | 5th September 2017 | Answer date | 7th September 2017 |
| Submission section question relates to | N/A | | |
| Topic | Multiple | | |
| Question | How will the project interface with 'off the shelf technologies' bought by consumers to provide network flexibility?' Will consumers need to purchase specific new equipment before they can participate within the trial? | | |
| Notes on question | | | |
| Answer | FUSION creates a market that is agnostic to both technologies and participants. All technologies that offer load flexibility are therefore compatible and operable within FUSION and the USEF-based local flexibility market.<br><br>Specifically, universal technology interfaces have been developed by both systems and aggregator partners PassivSystems and Origami and are compatible with existing flexibility assets. These will not therefore have to be developed within FUSION.<br><br>For both the industrial and commercial and domestic sectors, the control solutions presented by Origami Energy and PassivSystems are vendor agnostic and have been developed to work with a broad range of different asset types. [redacted]<br><br>Trial participants do not need to purchase any additional equipment to benefit from the control systems. Therefore, FUSION does not expect any new investments or assets to be required. | | |

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| | Further, participation in the USEF-based local flexibility market is managed through automated aggregation platforms with no requirement for active participation from the consumer.<br><br>Other aggregators that wish to partake in the flexibility market trial will be expected to adhere to the same technology agnostic approach. |
| Attachments | |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

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|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 19 |
| Question date | 5th September 2017 | Answer date | 7th September 2017 |
| Submission section question relates to | N/A | | |
| Topic | Generates new knowledge | | |
| Question | We note you are trialling a market platform which is very similar to the one being developed by the ENA Open Networks project. Please outline the key differences between the arrangements being tests as part of the trial and those being developed by the ENA. | | |
| Notes on question | • FUSION is trialling a market framework, which requires a platform for operation.<br>• The ENA act as an industry body for strategic development. Contributing partners may develop models or platforms. | | |
| Answer | SP Energy Networks recognises the value of the work undertaken by the ENA, and is one of the principal members that initiated the Open Networks project. Along with Ofgem and fellow DNO/TO companies, SP Energy Networks sits on the steering board of Open Networks. In addition, SP Energy Networks is leading one of the five workstreams (Charging) and co-lead another two workstreams. In summary, the ENA Open Networks project represents collaborative industrial efforts to strategically define, design and steer how industry will transform.<br><br>FUSION is focused and structured to put theory on flexibility market into practice, providing specific trial evaluation and learning to inform the ENA Open Networks and all DNOs.<br><br>By developing USEF, a project mature market framework that could be used across GB, FUSION accelerates learning and focusses on key deliverables. Further, by specifically working on a USEF-based local flexibility market, risks associated with deliverables are reduced, to the benefit of GB | | |

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| | consumers.<br><br>FUSION therefore realises and delivers a flexibility market, and informs the ENA Open Networks project. FUSION reports to the ENA Open Networks project and will coordinate wider stakeholder engagement and knowledge sharing through the industry forum. |
| Attachments | |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

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|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 20 |
| Question date | 5th September 2017 | Answer date | 7th September 2017 |
| Submission section question relates to | N/A | | |
| Topic | Multiple | | |
| Question | We note this is the second Innovation Trial proposed to resolve the Network Constraints at St Andrews, the first being the Flexible Networks project. Please clarify one, how this site was identified and the measures you took to ensure it offers value for money to GB Consumers and two; how you have ensured you do not double count the potential benefits offered by both trials? | | |
| Notes on question | | | |
| Answer | East Fife has been selected as trial area for FUSION, which includes St Andrews, which was the trial site of the Flexible Networks innovation project.<br>[redacted]<br>[redacted] These have used the learnings and outputs of the Flexible Networks project, notably a 20% uplift in headroom through real time thermal rating, as the counterfactual and baseline scenario. [redacted]<br>The trial in East Fife offers value for money to GB consumers because [redacted] | | |

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| | [redacted] the project includes nationally operating aggregators, demonstrating applicability across GB; participant interest in FUSION in East Fife is reflective of national interest in competitive flexibility markets; a national public consultation will take place; learning from FUSION will be made available to all DNOs through the ENA Open Networks project; and a GB implementation plan for a USEF-based flexibility market will be developed through FUSION.<br><br>Given that the outcomes of Flexible Networks are used as the counterfactual, benefits from FUSION are not double counted. |
| Attachments | |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

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|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 21 |
| Question date | 5th September 2017 | Answer date | 7th September 2017 |
| Submission section question relates to | n/a | | |
| Topic | c) Generates new knowledge | | |
| Question | Will there be a standard contract for new flexible connections for customers in the trial area wishing to participate in the market? If not, will the project be developing a standard contract? | | |
| Notes on question | | | |
| Answer | FUSION will explore benefits related to network connections, and will focus on contracts for the provision of flexibility through explicit mechanisms.<br><br>Contracts for new connections on a flexible, demand-side response basis will be explored through the public consultation process.<br><br>Separately, template contracts for the provision of flexibility in the USEF-based market will be developed through FUSION, as outlined in project deliverable 4. | | |
| Attachments | | | |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

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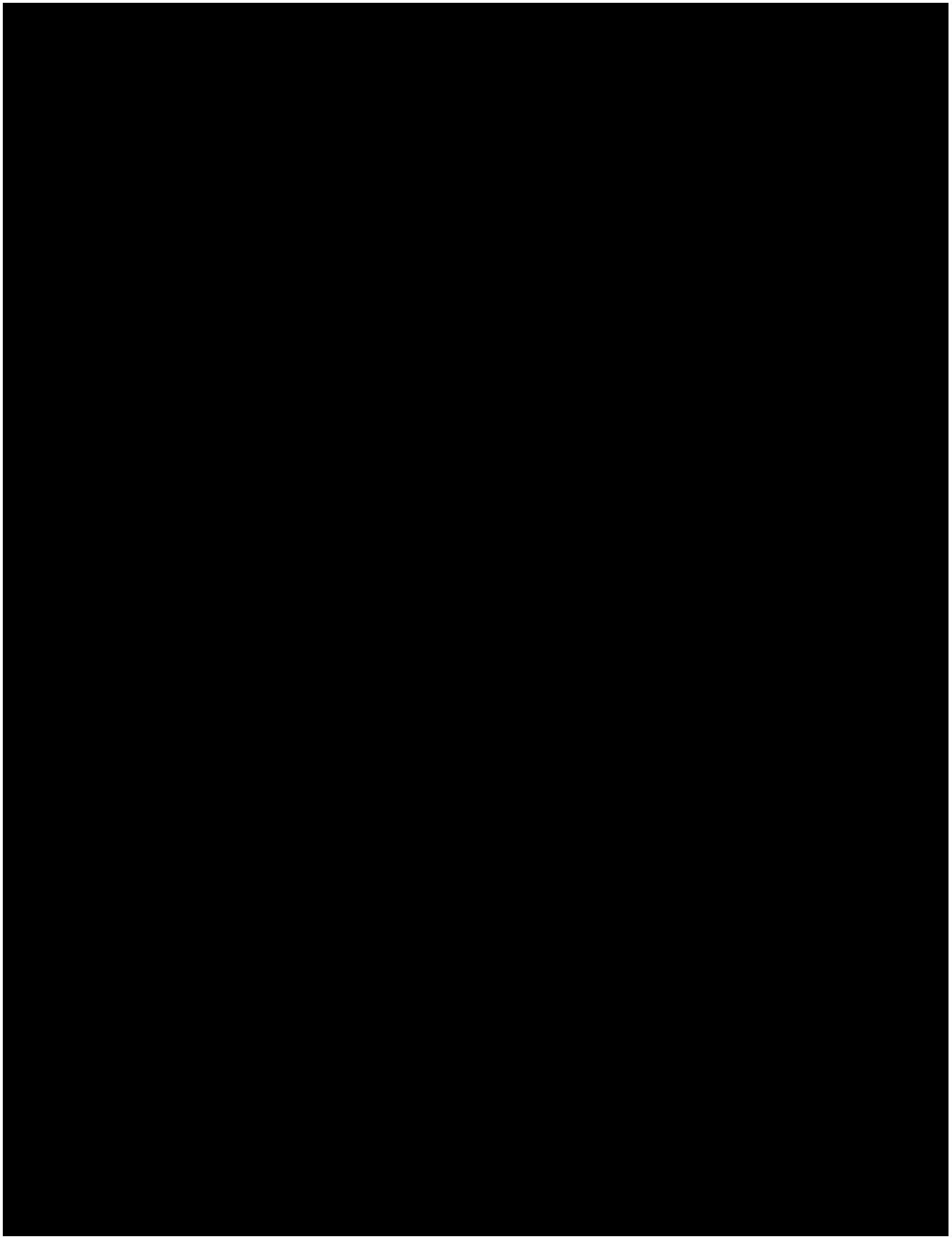
|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 22 |
| Question date | 5th September 2017 | Answer date | 7th September 2017 |
| Submission section question relates to | n/a | | |
| Topic | c) Generates new knowledge | | |
| Question | Will the trial be developing a linking module between the market platform and Network Operating system? | | |
| Notes on question | We understand this question to refer to interactions between the procurement platform and the SP Distribution internal systems; not interfaces with GBSO systems. | | |
| Answer | Yes, an interface between the procurement platform and the DNO systems will be developed. This will enable data exchanges for flexibility requirements, and will act to establish and embed the flexibility systems within the DNO: Intellectual Property developed will be publically available for all DNOs.<br><br>Interfaces will include the DNO calculations of required flexibility – this information is fed into the market platform where this flexibility is acquired. DNO processes like long and short term forecasting, grid planning, monitoring, maintenance, settlement, all will interact with the congestion management process – and therefore with the platform.<br><br>FUSION is designed to accommodate ongoing developments from other projects and the ENA Open Networks project, and will incorporate learning from these into FUSION developments wherever possible.<br><br>An overview of interfaces with DNO internal systems with the procurement platform can be found in the attached diagram. | | |
| Attachments | FUSION_DNO_data_interfaces | | |



# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

| | | | |
|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 23 |
| Question date | 5th September 2017 | Answer date | 7th September 2017 |
| Submission section question relates to | N/A | | |
| Topic | Is innovative | | |
| Question | Whilst we note your response to question 6 states you intend to work with the other projects investigating the DNO-DSO transition please provide more information on how the project will interact with these projects/ ensure none of the learning is duplicated? | | |
| Notes on question | | | |
| Answer | FUSION has collaborated with other DSO projects in its development and will continue to do so wherever possible to coordinate activities to remove duplication.<br><br>FUSION will interact directly with project managers of EFFS and TRANSITION, and will support a structured collaboration approach to coordinate shared activities. This will ensure enduring dialogue between project, sharing learning to incorporate feedback from projects at the earliest opportunity, and for ongoing project management discussions.<br><br>FUSION will collaborate on core activates to ensure activities and learning is not duplicated, these areas are:<br><br>• The public consultation on flexibility market design. Where the consultation can be coordinated, this will minimise repetition.<br>• The consultation analysis and development of a foundation of functional requirements.<br>• Trial management. Collaboration will ensure trials are complementary. This is contingent on the specific direction of trials to | | |

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| | be undertaken by EFFS and TRANSITION.<br>• Knowledge dissemination. Shared learning can be coordinated to remove duplication.<br><br>FUSION will also interact with other DSO projects via the ENA Open Networks project, ensuring appropriate project coordination. |
| Attachments | |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

| | | | |
|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 24 |
| Question date | 5th September 2017 | Answer date | 7th September 2017 |
| Submission section question relates to | N/A | | |
| Topic | Robust technology and ready to implement | | |
| Question | Why didn't you wait until the conclusion of the Open Networks Consultation process before developing this submission? | | |
| Notes on question | | | |
| Answer | SP Energy Networks recognise the value of the work undertaken by the ENA. We are one of the principal members that initiated the Open Networks project and along with Ofgem, fellow DNO/TO companies, sits on the steering board of Open Networks.<br><br>FUSION has been developed now as the most timely and low risk opportunity to present real life data on how compeitive markets can deliver economic flexibility to DNOs. FUSION is therefore a critical contribution to industry learning on competitive flexibility markets. The learning from this will be a key component in the development of the RIIO ED2 agreement.<br><br>Flexibility for the DNO is being investigated by the ENA Open Networks, as well as from Ofgem and BEIS where the USEF framework was highlighted. Through these investigations, it is likely that no one market model will be determined through analysis to be optimal, and therefore on-site trials will be a required proof for the Open Networks project.<br><br>There is also no guarantee that the ENA will arrive at a universally accepted and agreed approach to the roles, responsibilities and market facilitation of a DSO on initial consultation. This is more likely to be an ongoing iterative | | |

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| | process. Therefore, it would not be suitable to wait indefinitely to submit and progress project ready trials such as FUSION, a key supporting workstream/proof of the concepts being developed under Open Networks.<br><br>FUSION presents a flexibility market framework at a mature starting point for GB trial and implementation, and aligns with the ENA, Ofgem and BEIS view on future flexibility markets. FUSION is therefore not counter to the Open Networks project; rather it will contribute and provide insight to the ENA, and could adapt to the outcomes of the Open Networks project. |
| Attachments | |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

| | | | |
|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 25 |
| Question date | 12th September 2017 | Answer date | 14th September 2017 |
| Submission section question relates to | N/A | | |
| Topic | a) Environment and consumer benefits | | |
| Question | Please can you confirm whether the carbon benefits only include CO2? If not please explain how the final figure was built up. | | |
| Notes on question | | | |
| Answer | We confirm that carbon benefits in FUSION are based on **$tCO_2e$**, which includes other greenhouse gases expressed as $CO_2$ relative to their global warning potential. This is in line with 'The Carbon Plan'[8], published by the Department for Energy and Climate Change (DECC).<br><br>Carbon benefits are calculated in the Ofgem approved NIC Cost-Benefit Analysis spreadsheet, and are based on carbon benefits from two principal sources:<br><br>• Reduced losses associated with network reinforcement<br>• Whole system benefits based on reduced use of generation, transmission and distribution networks.<br><br>SP Distribution has taken on board guidance from the Expert Panel, and will adjust the Cost-Benefit Analysis, including $CO_2$ benefits, accordingly. | | |
| Attachments | | | |

[8] DECC, *The Carbon Plan: Delivering our Low Carbon Future*. Available at: https://www.gov.uk/government/publications/the-carbon-plan-reducing-greenhouse-gas-emissions--2

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

| | | | |
|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 26 |
| Question date | 12th September 2017 | Answer date | 14th September 2017 |
| Submission section question relates to | N/A | | |
| Topic | a) Environment and consumer benefits | | |
| Question | Please could you confirm whether the carbon benefits are listed in metric or imperial tonnes? To avoid confusion please ensure the correct spelling is used consistently in the resubmission. | | |
| Notes on question | | | |
| Answer | Carbon benefits in FUSION are calculated in metric tonnes (1000kg). | | |
| Attachments | | | |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

| Project code | SPD/EN/03 | Question Number | 27 |
|---|---|---|---|
| Question date | 12th September 2017 | Answer date | 14th September 2017 |
| Submission section question relates to | N/A | | |
| Topic | g) Robust methodology/ready to implement | | |
| Question | Please provide a written example of how the proposed market would work from the consumer angle. | | |
| Notes on question | | | |
| Answer | Please refer to the attached diagram.<br><br>The USEF-based flexibility market is designed to maximise customers' value from flexibility, by allowing them to select the route to market, the value proposition to take to market, and the details of the service.<br><br>Aggregators compete for customer services through innovative value propositions designed to meet specific customer requirements. There are numerous options, and can be based on financial, low carbon, technical and social preferences. Customers choose to engage with aggregators based on their preferred value proposition. End users that are not flexible or do not choose to be flexible are not affected.<br><br>The preferred aggregator carries out a site evaluation to confirm the technical characteristics of the site's flexibility and inform the terms and conditions of service. If agreement with the customer is reached, the aggregator will also install the communications and control equipment required to 'unlock' site flexibility and bring it into its portfolio. [Note that larger customers may choose to take the aggregator role themselves and undertake the required investments].<br><br>The aggregator then offers the customer's flexibility into the market as part of its portfolio, competing with other aggregators to provide a range of | | |

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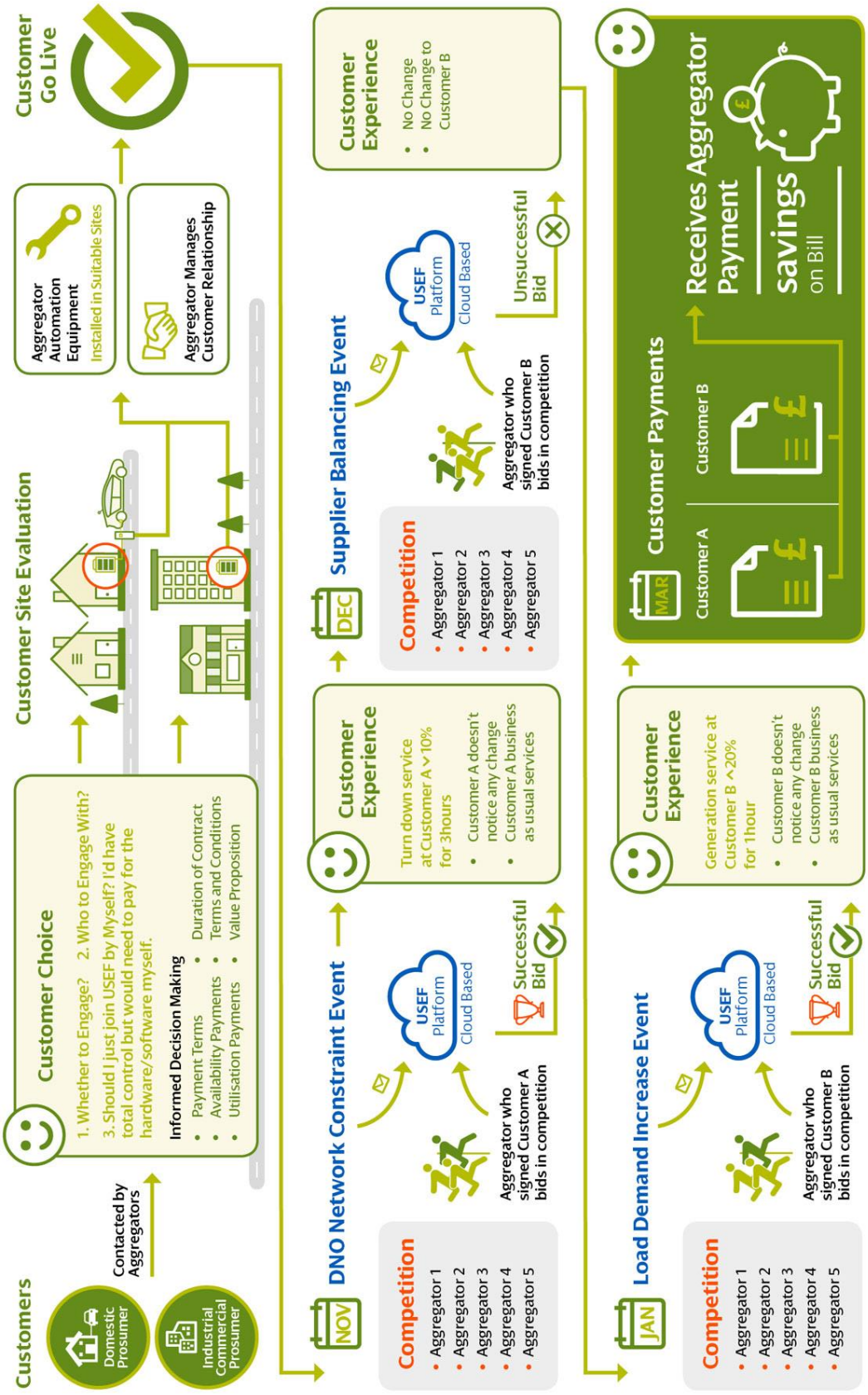
| | services to users of flexibility (e.g. TSO, DSO, suppliers). As a matter of principle, the service takes account of individual customers' specific requirements, for instance to avoid any noticeable impact on customer experience (be it business or household) or to compensate customers for any impacts as agreed in their contract.<br><br>Customers may be compensated for their service in a number of ways, reflecting the value proposition and contract with the aggregator, but the principle ways would be through lower energy bills and direct payments from aggregators. |
| Attachments | FUSION Q27 - FUSION customer journey in a USEF-based flexibility market |

# Attachment: FUSION Q27 – FUSION customer journey in a USEF-based flexibility market



# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

| | | | |
|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 28 |
| Question date | 12th September 2017 | Answer date | 14th September 2017 |
| Submission section question relates to | N/A | | |
| Topic | g) Robust methodology/ready to implement | | |
| Question | Please elaborate on how the stakeholder forum will work - who is on it, what role does it have within the project, who will chair and how are domestic and industrial consumers represented? | | |
| Notes on question | | | |
| Answer | The stakeholder forum is an enduring forum for the duration of FUSION. It is separate in purpose and execution to the FUSION steering group within the project governance.<br><br>FUSION is customer-centric, and therefore devotes specific attention to the stakeholder forum. The Stakeholder forum is designed to develop a two way dialogue with all relevant stakeholders to both inform parties of project development, and to receive input into the project on an ongoing basis.<br><br>Stakeholder management is undertaken in a structured fashion, with professional support from SP Energy Networks Stakeholder Engagement and Communication Team, who have a wealth of experience in stakeholder management. This includes expertise in hosting strategic stakeholder panels, access to TRACKTIVITY ® software to manage stakeholder engagement, feedback and reporting, ability to contact hard to reach stakeholder groups, access to third party framework contractors to facilitate and organise stakeholder engagement sessions, and the use of innovative technology to enable stakeholder engagement (webinars, live-streaming, online community forums).<br><br>The stakeholder forum has a view to hold workshops on a quarterly basis; | | |

this will be reviewed on an ongoing basis to ensure appropriate engagement in a timely manner for the project. For example, multiple workshops will be undertaken during the trial participant recruitment phase of the project. Likewise, workshops will be based around specific themes relevant to the project, as listed below:

- Flexibility concepts through a market-based framework
- USEF framework development
- Flexibility quantification in East Fife
- Public consultation awareness
- Trial participant engagement and recruitment
- Trial design
- Undertaking the trial
- Feedback from the trial
- Knowledge dissemination
- GB reference framework for USEF

The makeup of participants in the stakeholder forum is contingent on content. Notwithstanding, three specific groupings are detailed by their geographical scale. Notably, these all include representatives of domestic and industrial consumers. Invitees will be developed from the stakeholder databases held within SP Distribution, both within the Fife and Central District, nationally, and internationally. Stakeholder management will be based on mature processes within SP Energy Networks.

Local scale, focus on East Fife project development – invited participant include:

- Local government – Fife Council
- Local government – East Fife Locality Managers
- Local government – social housing residents panel members
- Local industrial prosumers – developed through Fife and Central district stakeholder management
- Scottish Enterprise
- Scottish Government
- Local agricultural prosumers – developed through SAC Consulting stakeholder management
- National Farmers Union representative
- Citizens Advice Bureau representative
- Energy Networks Association
- Association of Decentralised Energy
- Aggregators
- GBSO
- Energy Suppliers
- House builders
- Community organisations
- Fife Rotary Club
- East Fife Chamber of Commerce
- East Fife Hotels and Golf course managers

| | |
|---|---|
| | National scale, focus on energy flexibility management – invited participants include:<br>• All DNOs<br>• GBSO<br>• TOs<br>• Energy Networks Association<br>• Aggregators<br>• National industry advisory councils<br>• National Citizens Advice Bureau representative<br>• Energy Suppliers<br>• Ofgem<br>• BEIS<br>• Scottish Government<br>• Scottish Enterprise<br>• National Government representatives<br>• GDNs<br>• Association of Decentralised Energy<br>• House builders<br>• Energy based NGOs<br><br>International scale, focus on international learning and engagement – invited participants include:<br>• USEF foundation<br>• International DSOs<br>• International regulators<br>• ENTSO-Es<br>• Innovation project developers<br><br>Throughout, the forums will be chaired by SP Distribution FUSION project management. |
| Attachments | |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

| | | | |
|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 29 |
| Question date | 12th September 2017 | Answer date | 14th September 2017 |
| Submission section question relates to | N/A | | |
| Topic | c) Generates new knowledge | | |
| Question | Please provide more evidence that East Fife is representative of the GB as a whole - is the customer profile representative of the GB demographics? How will you upscale the learning to ensure it reflects the GB demographic? | | |
| Notes on question | | | |
| Answer | [redacted]<br><br>The trial will draw on local energy customers groups, both industrial and domestic.<br><br>A thorough analysis of demographics data from the Office of Market Statistics[9] demonstrates that Fife is reflective of GB as a whole, and reflects the general populous. (Fife is used as the most accurate geographical entity for East Fife). Data analysis is found in the attached report: Report of Fife Demographics. The report also highlights data from Tunbridge Wells, an affluent town in the South East, and Tyne and Wear, a deindustrialised region of the North East. This inter-comparison gives a rich context to the data, further demonstrating the validity of Fife as a suitable location for an innovation trial, with a clear ability to scale up to GB.<br><br>Economic activity data demonstrates that Fife is reflective of GB, and is a | | |

[9] UK Office of Labour Market Statistics, data available at: https://www.nomisweb.co.uk/

valid study site. Economic activity figures suggest that there will be a similar level of economic engagement with FUSION in Fife as at a GB level.

Unemployment data are strikingly similar between GB and Fife, denoting that the population have a similar access to jobs in Fife as in GB as a whole, and therefore similar ability to engage in innovation project. Further analysis shows Fife as more reflective than other areas used for inter-comparison, as shown in figure 1, below.

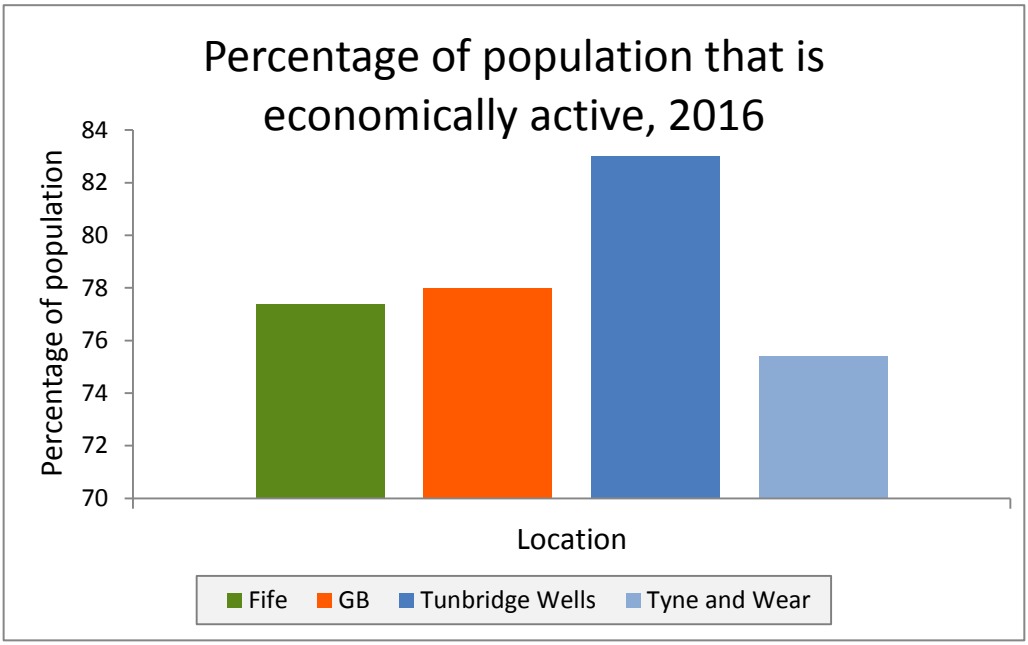



**Figure 2. Inter-comparison on economically active populations in Fife, GB, Tunbridge Wells and Tyne and Wear.**

Business count data shows that Fife is reflective of GB businesses, and FUSION will be able to access similar business types for on-site trials in Fife as those found in GB as a whole.

Occupations and earnings clearly reflect GB, as shown in figures 2 and 3; this highlights the ability of FUSION to firstly find similar affluence, buying power and aspiration in Fife as those at GB level. Accordingly, FUSION will be able to trial a market where participants' interest and ability to join the market reflect that found at the GB level.

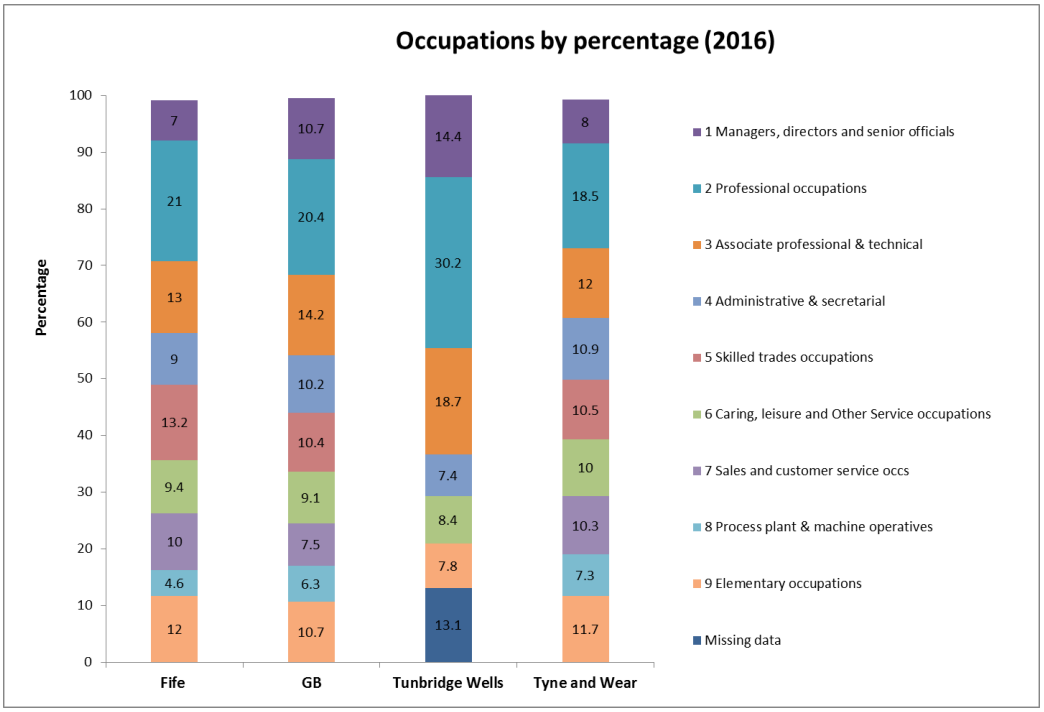



**Figure 3. Occupations by percentage of the population. Notably, Fife reflects GB in numerous areas including: professional occupations; associate professional and technical; administrative and secretarial; caring, leisure and other service occupations; process plant and machine operatives.**

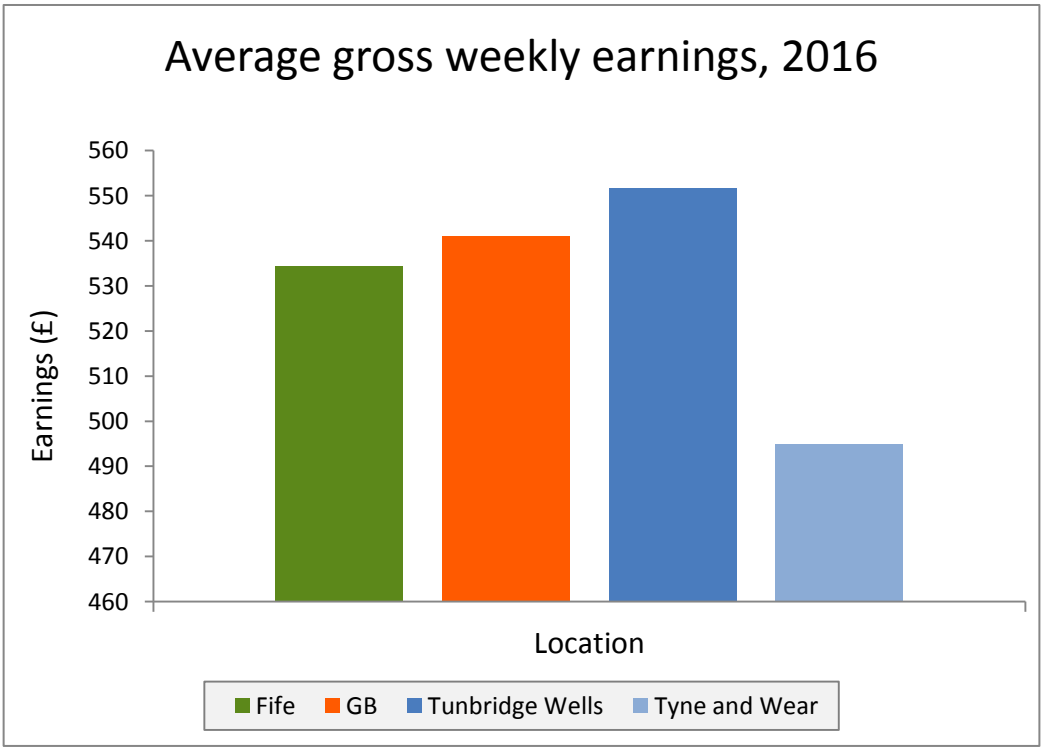



**Figure 4. Average gross weekly earnings inter-comparison. Fife reflects GB, demonstrative similar buying power and affluence levels.**

| | |
|---|---|
| | Further, the FUSION is designed to generate a GB implementation plan for USEF. Throughout, significant effort and resources are committed to ongoing national stakeholder management, and public consultation. These elements ensure that national consumer groups are given ample opportunity to discuss, critique, and influence FUSION and a USEF implementation plan. |
| Attachments | FUSION Q29 - Report on Fife Demographics<br><br>FUSION Q29 - Fife demographics data |

# Attachment: FUSION Q 29 - Report on Fife Demographics

Data are collected from the Official Labour Markets Statistics database, https://www.nomisweb.co.uk/. Data used here are for 2016.

Data are based on the Local Authority area for Fife, the nearest dataset for East Fife. Data are compared to GB, as well as Tunbridge Wells, an affluent town in the South east, and Tyne and Wear, a large, less affluent deindustrialised region in the North East of England. These inter-comparisons offer a richer context to the Fife data, allowing greater understanding of demographics and representativeness of Fife.

Fife is highly variable, and encompasses deindustrialised regions on the Levenmouth coast, large industrial sites, and the affluent university town of St Andrews. Accordingly, it is able to offer a thorough cross-section of the GB population, giving is a respectable representativeness of GB as a whole.

Fife population:

**Table 1. Fife and GB population data, 2016**

| Population | | |
|---|---|---|
| | Fife | GB |
| All people | 370,300 | 63,785,900 |
| Males | 179,600 | 31,462,500 |
| Females | 190,800 | 32,323,500 |

Fife is reflective of the GB populous in terms of economically active people. This reflects localised variations in the distribution of data across the region. Overall, the economic activity of the population is reflective of GB.

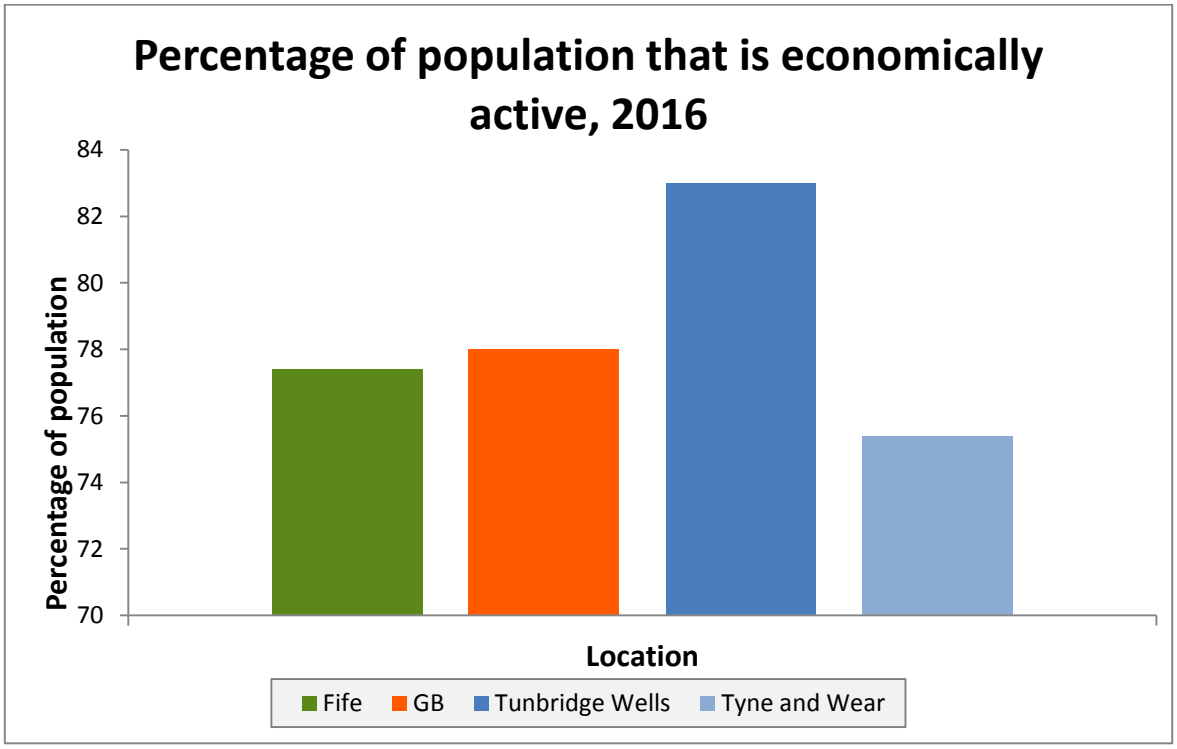



**Figure 5. Percentage of economically active population.**

Unemployment figures further reflect GB as a whole. Notably, variations in unemployment levels in Tunbridge Wells and Tyne and Wear demonstrate the validity of Fife as a representative of GB, as shown in figure 2.

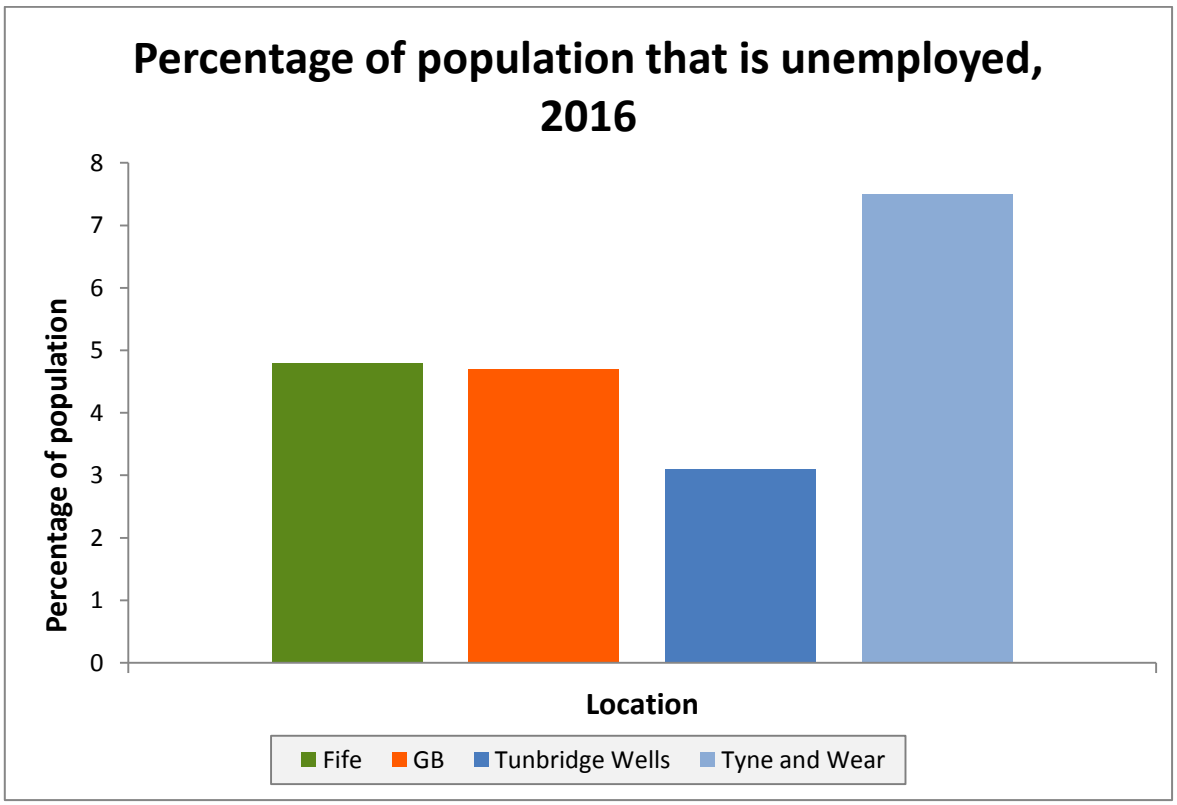



**Figure 6. Unemployment rates, 2016.**

Business types in Fife demonstrate that industrial and commercial activity is largely reflective of GB. Business count data uses figures from the Inter-Departmental Business Register (IDBR). As per GB, micro-businesses are most common, followed by small, medium and large businesses. Charts in figure 3 highlight the parallels of the business community in Fife and that of GB as a whole.

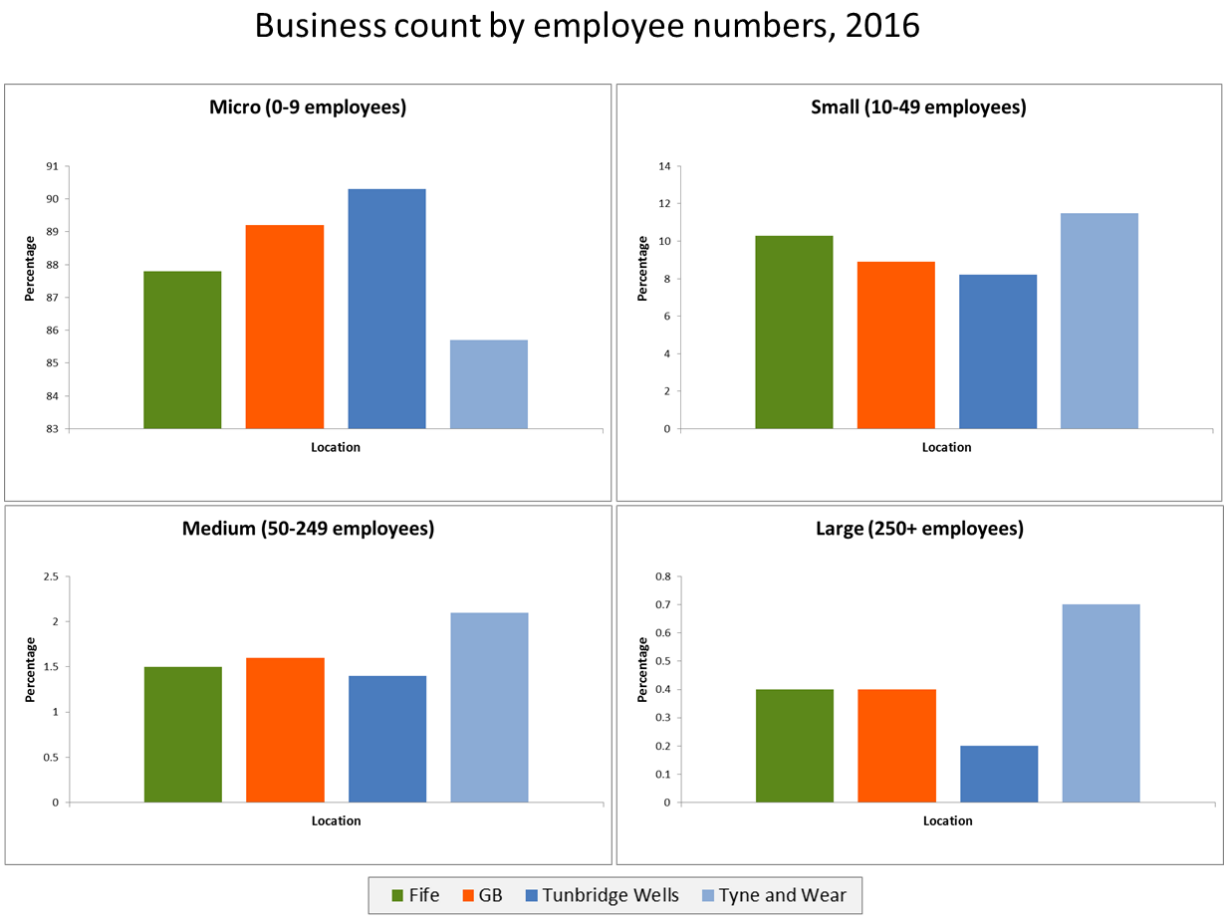



**Figure 7. Business count data by employee numbers.**

Occupational data demonstrates that Fife, notwithstanding a degree of localised variability, is comparable and similar to GB figures, as shown in figure 4. In particular, similarities in professional occupations, professional and technical, administrative, leisure, and machinery operatives demonstrates that the cross-section of employment in Fife is reflective of GB. Accordingly, business types, sites and premises can be expected to represent those found across GB.

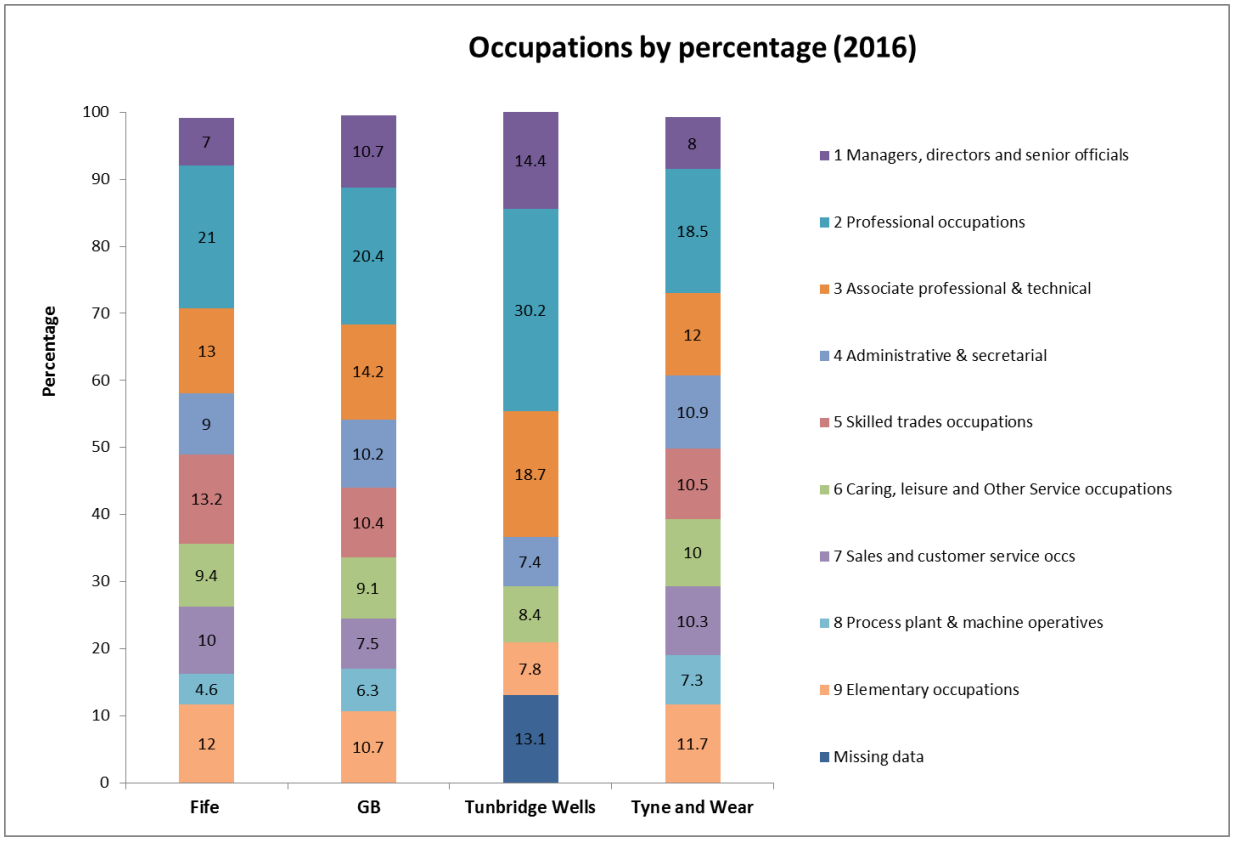



**Figure 8. Occupation types, by percentage of the population, 2016.**

Earnings in Fife are reflective of GB, as shown in figure 5. This demonstrates that a similar, affluence level, buying power, and professional earning aspiration levels can be found in Fife relative to GB.

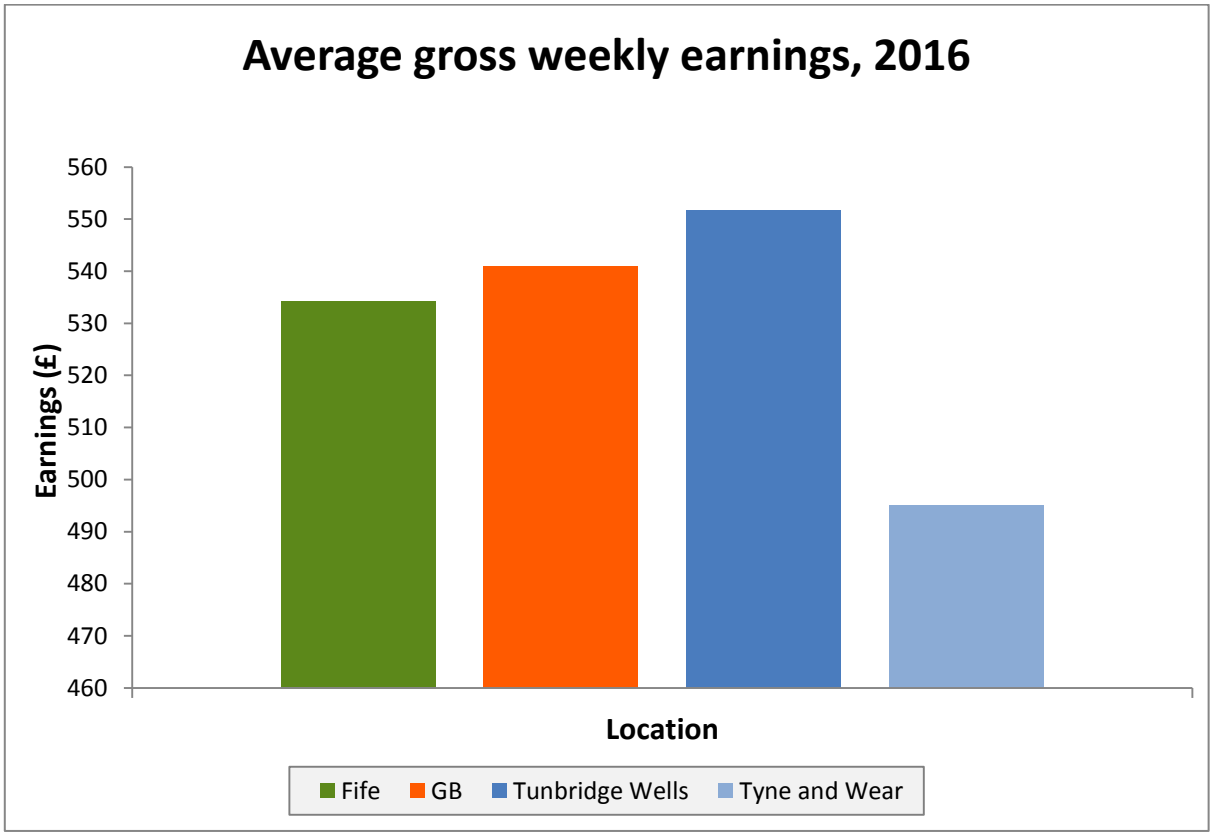



**Figure 9. Average gross weekly earnings.**

# Attachment: FUSION Q29 - Fife demographics data

Data from: UK Office of labour market statistics
https://www.nomisweb.co.uk/

| Statistic | Fife | GB | Tunbridge Wells | Tyne and Wear |
|---|---|---|---|---|
| **Population** | | | | |
| All people | 370,300 | 63,785,900 | 117,100 | 1,128,800 |
| Males | 179,600 | 31,462,500 | 57,800 | 555,700 |
| Females | 190,800 | 32,323,500 | 59,300 | 573,100 |
| | | | | |
| **All people %** | | | | |
| **Economically active %†** | **77** | **78** | **83** | **75** |
| **In employment %†** | **73.7** | **74.2** | **81.2** | **69.6** |
| Employees %† | 64.9 | 63 | 62 | 62.4 |
| Self employed %† | 8.4 | 11 | 19 | 6.8 |
| **Unemployed %(model-based)§** | **4.8** | **5** | **3** | **7.5** |
| | | | | |
| **Economically inactive %** | | | | |
| **Total** | **22.6** | **22** | **17** | **24.6** |
| Student | 17.9 | 26.3 | 40.8 | 24.6 |
| looking after family/home | 20.6 | 24.7 | # | 22.4 |
| temporary sick | | 2 | # | 2.6 |
| long-term sick | 29.1 | 22.1 | # | 29.1 |
| discouraged | # | 0.4 | # | # |
| retired | 16.6 | 13.4 | # | 14.3 |
| other | 12.8 | 11.1 | # | 6.5 |
| | | | | |
| **Work type %** | | | | |
| **Soc 2010 major group 1-3** | **41.4** | **45.5** | **63.2** | **39** |
| 1 Managers, directors and senior officials | 7 | 10.7 | 14.4 | 8 |
| 2 Professional occupations | 21 | 20.4 | 30.2 | 18.5 |
| 3 Associate professional & technical | 13 | 14.2 | 18.7 | 12 |
| **Soc 2010 major group 4-5** | **23** | **20.7** | **14.3** | **21.5** |
| 4 Administrative & secretarial | 9 | 10.2 | 7.4 | 10.9 |
| 5 Skilled trades occupations | 13.2 | 10.4 | # | 10.5 |
| **Soc 2010 major group 6-7** | **19.6** | **16.7** | **14.7** | **20.5** |
| 6 Caring, leisure and Other Service occu | 9.4 | 9.1 | 8.4 | 10 |
| 7 Sales and customer service occs | 10 | 7.5 | # | 10.3 |
| **Soc 2010 major group 8-9** | **16.4** | **17.1** | **7.8** | **19.2** |
| 8 Process plant & machine operatives | 4.6 | 6.3 | ! | 7.3 |
| 9 Elementary occupations | 12 | 10.7 | 7.8 | 11.7 |
| | | | | |
| **Earnings** | | | | |
| **Gross weekly pay** | | | | |
| Full-time workers | 534.3 | 541 | 551.7 | 495 |
| Male full-time workers | 574.9 | 581.2 | 571.8 | 522.2 |
| Female full-time workers | 479.6 | 481.1 | 477.7 | 433.4 |
| **Hourly pay - excluding overtime** | | | | |
| Full-time workers | 13.64 | 13.66 | 13.95 | 12.36 |
| Male full-time workers | 14.31 | 14.25 | 14.37 | 12.98 |
| Female full-time workers | 12.94 | 12.84 | 12.25 | 11.5 |
| | | | | |
| **UK Business Counts (2016)** | | | | |
| **Enterprises %** | | | | |
| Micro (0 to 9) | 87.8 | 89.2 | 90.3 | 85.7 |
| Small (10 to 49) | 10.3 | 8.9 | 8.2 | 11.5 |
| Medium (50 to 249) | 1.5 | 1.6 | 1.4 | 2.1 |
| Large (250+) | 0.4 | 0.4 | 0.2 | 0.7 |
| | | | | |
| **Employee jobs by industry** | | | | |
| B : Mining and quarrying | 0.2 | 0.2 | 0 | 0 |
| C : Manufacturing | 11.4 | 8.3 | 5.7 | 10.3 |
| D : Electricity, gas, steam and air condit | 0.5 | 0.4 | 0 | 0.7 |
| E : Water supply; sewerage, waste mana | 0.9 | 0.7 | 0.3 | 0.3 |
| F : Construction | 6.1 | 4.6 | 2.5 | 4.2 |
| G : Wholesale and retail trade; repair of r | 16.7 | 15.8 | 18 | 13.4 |
| H : Transportation and storage | 2.7 | 4.7 | 1.6 | 4 |
| I : Accommodation and food service activ | 7.6 | 7.2 | 5.7 | 7.1 |
| J : Information and communication | 2.7 | 4.2 | 4.1 | 4.2 |
| K : Financial and insurance activities | 3 | 3.6 | 7.4 | 2.7 |
| L : Real estate activities | 0.7 | 1.7 | 1.6 | 1.7 |
| M : Professional, scientific and technical | 4.5 | 8.4 | 19.7 | 6.1 |
| N : Administrative and support service ac | 3.8 | 8.9 | 6.6 | 9 |
| O : Public administration and defence; c | 9.8 | 4.4 | 1 | 7.1 |
| P : Education | 9.1 | 9.2 | 7.4 | 9.9 |
| Q : Human health and social work activiti | 15.2 | 13.3 | 13.1 | 14.9 |
| R : Arts, entertainment and recreation | 2.7 | 2.4 | 1.1 | 2.1 |
| S : Other service activities | 2.3 | 2 | 2.5 | 2.1 |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

| | | | |
|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 30 |
| Question date | 12th September 2017 | Answer date | 14th September 2017 |
| Submission section question relates to | N/A | | |
| Topic | g) Robust methodology/ready to implement | | |
| Question | Please provide a 1 or 2 page summary of how the framework has been deployed in the Netherlands. | | |
| Notes on question | | | |
| Answer | The basis for the USEF framework was laid in the **PowerMatching City**[10] project (PMC), the world's first smart energy system with distributed intelligence and multi-goal and multi-actor optimisation algorithms. PMC was recognised by the United Nations in 2012 as one of the world's 100 most sustainable projects.<br><br>Phase 1 of PMC (2009) introduced active demand and supply devices to a forty-household neighbourhood in Groningen to demonstrate two custom energy services, that either optimised their energy use patterns to achieve minimal costs levels or to strive for self-sufficiency by maximising the use of locally produced (renewable) energy.<br><br>Phase 2 of PMC (2012) was aimed at developing novel market mechanisms and energy services that would add value for different actors in the energy system by aggregating available flexibility on a neighbourhood level.<br><br>The outcomes of Phase 2 demonstrated that to maximise the potential value of flexibility, a market needed to be created based on commonly defined roles, process and agreements, along with specification of data exchange | | |

[10] http://www.powermatchingcity.nl/site/pagina.php?id=41

protocols, interfaces and controls. This led to the creation of the **Smart Energy Collective (SEC)**[11], a consortium of industry partners collaborating on smart energy innovation projects, and ultimately, the creation of the **USEF foundation and framework**[12].

The SEC has to date completed the following innovation projects in which the USEF framework was implemented: [13]

- **Energiekoplopers (Heerhugowaard):**

The first implementation and test of the USEF flexibility market. Smart appliances were installed in 203 households, enabling flexible electricity consumption. These were controlled by an IT system that switched appliances on and off automatically. The project showed that a flexibility market works and offers benefit for all parties involved by resolving future problems in the energy system, for example by preventing network congestion.

- **ProSECCo (Hoogdalem):**

Combining decentral PV generation with storage in fifty households. Investigating the potential for full electrification of household energy requirements as well as self-sufficiency by collectively generating and storing electricity, while controlling demand to match availability. The project aimed to determine the economic viability of DSO flexibility products and services as well as the feasibility of deploying flexibility to alleviate network constraints and reduce or avoid network investments.

ProSECCo successfully implemented USEF-based software and processes and demonstrated the viability of USEF's Market-based Co-ordination Mechanism (MCM).

- **Smart Offices Eneco World (Rotterdam):**

This project unlocked flexibility in the headquarters of Eneco, a Dutch energy supplier, to control demand. It was aimed at finding the maximum amount of flexibility that can be unlocked and maximising the value of that flexibility against price movements on the wholesale market, while maintaining comfort for employees.

The project found that utilizing flexibility can reduce energy costs of a modern office by 5% or more and demonstrated that USEF-based priority control enables aggregation of flexibility sources while meeting specific user service requirements.

- **All-electric Households (Goes):**

In this project, a new housing development was integrated with a closed energy system, which explored the technical and economic feasibility of seasonal flexibility through solar heat collectors and an underground ice buffer. The project succeeded in demonstrating the technical feasibility of seasonal flexibility and USEF roles and processes, but also uncovered that

[11] http://www.smartenergycollective.com/site/pagina.php?id=44
[12] https://www.usef.energy/
[13] https://www.usef.energy/app/uploads/2016/12/End-report-prosecco.pdf

| | |
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| | within the trial area, seasonal flexibility had little economic value to the local distribution grid.<br><br>Following conclusion of the SEC projects at the end of 2016, the Dutch distribution network operator Liander commenced **Project DYNAMO**[14], to develop a flexibility market based on the USEF framework. The project launches the USEF-based flexibility market from pilot projects to BAU at Liander. Liander has implemented USEF core processes and the flexibility procurement platform, and is currently in the phase of tendering flexibility, but the results are not yet available. |
| Attachments | |

[14] https://www.liander.nl/nieuws/2016/11/04/liander-zoekt-marktpartijen-voor-flexibiliteitsmarkt-energie

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

| | | | |
|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 31 |
| Question date | 12th September 2017 | Answer date | 14th September 2017 |
| Submission section question relates to | N/A | | |
| Topic | g) Robust methodology/ready to implement | | |
| Question | Please provide information on the maintenance/support required for the market platform. How much will this cost, who will be responsible for it's upkeep and how will it work? | | |
| Notes on question | The market platform itself is tendered for in FUSION. Maintenance and support for the market platform itself does not include software integration costs at SP Distribution. These are, however, detailed below for the avoidance of doubt. | | |
| Answer | SP Distribution is planning to carry out public tendering for an USEF compliant market platform. During the proposal stage, vendors have been engaged to provide initial quote for providing such a market platform.<br><br>FUSION has consulted ICT, a software firm and founding member of the USEF foundation. As a reference: ICT offers an USEF implementation in the Microsoft Azure Cloud. ICT offers a full hosted service, including maintenance and support. ICT's service organization complies to the ITIL standard. Typically a service Level Agreement (SLA) is agreed upon, which contains specific agreements on service level(s), response times, 24/7 support, maintenance cycles, upgrades, documentation management, KPI's etc. An indicative cost level for this support is [redacted] for the duration of the project. A further [redacted] is estimated for associated cloud based hosting.<br><br>*<br><br>The sum costs of integrating the market platform with SP Distribution systems is [redacted]. This includes:<br><br>• Cyber security and configuring Network technical Services [redacted] | | |

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| | • Trial platform evelopment costs at SP Distribution [redacted]<br>• Flexibility forecasting modelling [redacted]<br><br>The stakeholder forum will ensure that systems developments are applicable across a range of users, ensuring value for money. Knowledge generated will be captured and disseminated through appropriate channels. |
| Attachments | |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

| | | | |
|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 32 |
| Question date | 12th September 2017 | Answer date | 14th September 2017 |
| Submission section question relates to | N/A | | |
| Topic | g) Robust methodology/ready to implement | | |
| Question | How would the USEF model work with other software programmes not used in the trial? | | |
| Notes on question | | | |
| Answer | The USEF framework is technology agnostic, and is therefore designed to fit on top of existing energy markets and hence, assumes interfaces with the underlying processes in the energy domain. To this end, the USEF implementation identified so-called Pluggable Business Components, as a placeholder for role-specific business logic. This business logic is implemented in the USEF environment, but typically requires interfacing with existing software systems. Examples are load flows in DSO networks, trading decisions for the Aggregator, or portfolio management for energy suppliers. USEF works with (secure) web-service based interfaces to external systems.<br><br>As USEF is open source, it can be further tuned to achieve optimal interoperability with existing systems and/or customisation to local standards.<br><br>SP Distribution uses PowerOn system as part of distribution operation. Specific technology readiness can be developed around the PowerOn system; however, alternative software solutions will be examined and relevant compatibility explored. The stakeholder forum will be used to examine software integration needs for flexibility procurers. Industry will have significant input into the technology readiness stage of the project; further, this may highlight areas for efficiencies owing to alternative technologies, including industry developments such as those within the ENA | | |

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| | Open Networks. |
| Attachments | |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

| | | | |
|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 33 |
| Question date | 12th September 2017 | Answer date | 14th September 2017 |
| Submission section question relates to | N/A | | |
| Topic | b) Value for money | | |
| Question | Please could you confirm whether it will cost [redacted] to convert the USEF rules into a framework for the GB network? Is this a one off cost? | | |
| Notes on question | [redacted] is the sum costs of WPs 3 and 4. These work packages include work additional to the conversion of USEF into a GB framework.<br><br>The answer states the cost of conversion of USEF into a GB framework; and additionally explains the costs of WPs 3 and 4. | | |
| Answer | The sum cost of work packages 3 and 4 is [redacted] (USEF fit to UK; Technology readiness).<br><br>The content of these work packages goes beyond that required to convert the USEF rules and regulations into a framework for GB, and goes on to develop and implement the technology and processes required to undertake the trial in Fusion.<br><br>The sum cost of adapting the USEF framework to meet GB legal and regulatory requirements, and fit with the GB energy market structure, is [redacted], as shown in the attached spreadsheet.<br><br>This sum is based on the following activities that can be directly attributed to the development and adaptation of the USEF framework:<br><br>• Undertake due diligence exercise of USEF to the GB legal and regulatory framework [redacted]<br>• Undertake due diligence exercise of USEF to the GB market structure, flexibility valuation and pricing [redacted]<br>• Develop draft USEF implementation [redacted] | | |

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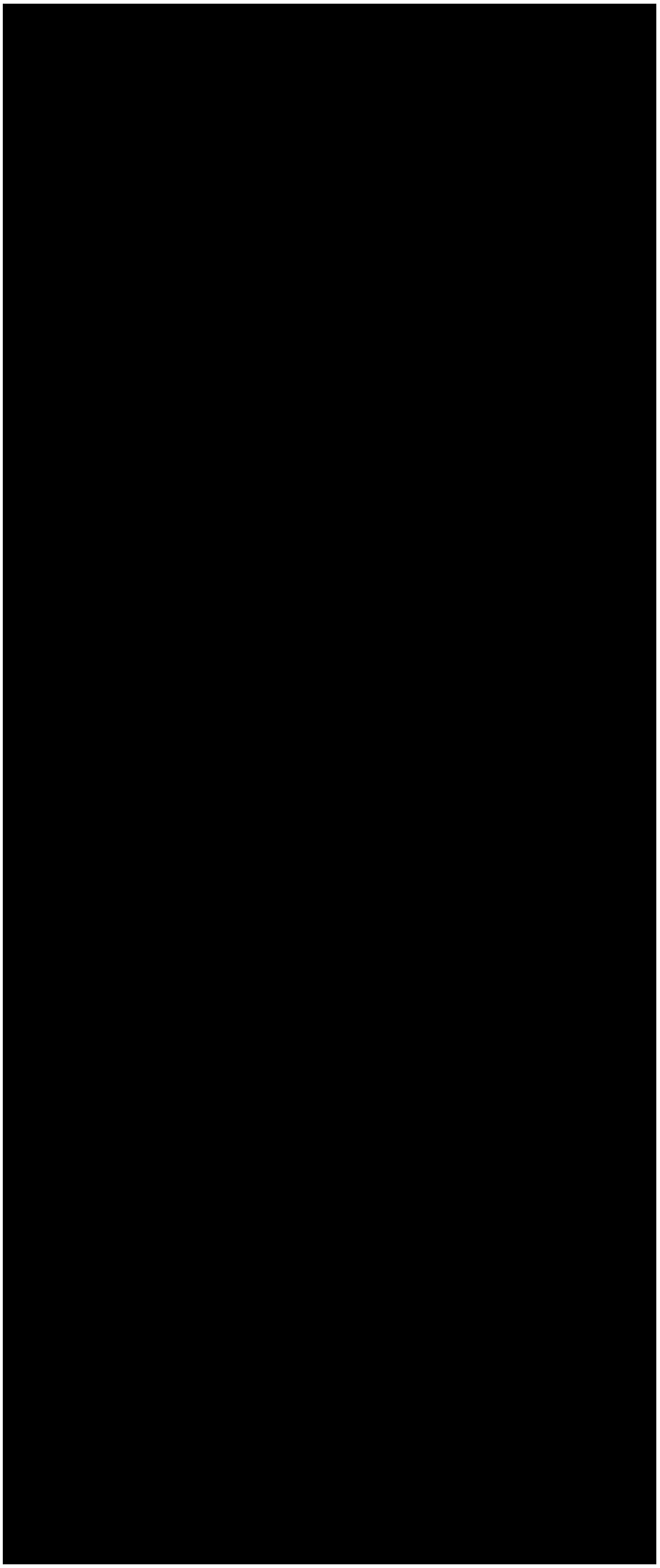
| | • Adjust USEF roles, processes and structure in accordance with the results of the public consultation [redacted]<br>• Design and implement new roles required for GB USEF implementation (e.g. MDC, BRP, CRO, ARP) [redacted]<br>• Refine the USEF GB implementation plan suitable for GB roll-out [redacted]<br><br>The [redacted] total cost for above activities is a one-off cost.<br><br>*<br><br>The sum cost of WPs 3 and 4 is [redacted], as shown in the attached spreadsheet.<br><br>WP 3 is designed to develop USEF for the UK market, and includes due diligence and a public consultation exercise. It includes the first iteration of a USEF framework for GB.<br><br>WP4 is designed to develop the technology and commercial readiness to undertake a live USEF-based flexibility market trial. It includes adjustments to the USEF implementation, and the technology implementation at aggregators and at the DNO. Technology readiness is critical to establishing how systems can adopt a USEF-based flexibility market. Costs are developed based on market engagement and are budgeted due to the innovation risk, and the activities being undertaken outside of current business-as-usual. Learning will be captured and shared for wider industry development |
| Attachments | FUSION Q33 - USEF framework costs |

# Attachment: FUSION Q33 – USEF framework costs



# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

| Project code | SPD/EN/03 | Question Number | 34 |
|---|---|---|---|
| Question date | 12th September 2017 | Answer date | 19th September 2017 |
| Submission section question relates to | N/A | | |
| Topic | g) Robust methodology/ready to implement | | |
| Question | Has there been discussion in the ENA on the suitability of USEF as an enduring model? What views were given? | | |
| Notes on question | | | |
| Answer | FUSION (with its strong delivery focus on a USEF-based flexibility market) is an integrated part of the flexibility market model scoping exercise under ENA. SP Energy Networks is one of the key members and is part of the steering group of Open Networks Initiative. There are currently five work streams under Open Networks. SPEN is leading the Charging workstream, and co-leading the DNO/DSO transition workstream. It has been agreed between licensees during 2017 NIC preparation stage that (SSEN, WPD and SPEN) will coordinate and inform Open Networks.<br><br>SPEN has taken extra and proactive steps regarding collaboration and coordination with ENA (Open Networks):<br><br>1. On invitation, SP Energy Networks delivered a presentation to ENA Workstream 1 (Data between DSO-TSO) on the principles of FUSION.<br>2. SP Energy Networks has set up a dialogue with GBSO to communicate this proposal and the GBSO has nominated the same members of staff [Cian McLeavey-Reville and Ian Pashley] to sit on FUSION stakeholder forum and steering committee as for Open Networks.<br>3. SP Energy Networks has set up a dialogue mechanism with other DNOs during the full proposal preparation and identified the joint | | |

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| | activities on stakeholder engagement and knowledge sharing under Open Networks.<br>4. Northern Power Grid, who is also sitting on the ENA steering board, supports the view that FUSION is supplementing Open Networks with FUSION's strong delivery focus.<br>5. SP Energy Networks is working closely with EA Technology, who is contractor of ENA on DSO model scoping, who agree that FUSION is one of the candidates for enduring arrangement.<br>6. The USEF foundation are in dialogue with the ENA, and are preparing a return to the current consultation on flexibility market arrangements. |
| Attachments | |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

| Project code | SPD/EN/03 | Question Number | 35 |
|---|---|---|---|
| Question date | 12th September 2017 | Answer date | 19th September 2017 |
| Submission section question relates to | N/A | | |
| Topic | g) Robust methodology/ready to implement | | |
| Question | Could you provide further detail on how FUSION intends to further effective coordination in DSO and SO access to distributed services (eg managing conflicts and optimising synergies)? How will this be delivered through the project design? | | |
| Notes on question | | | |
| Answer | 1. FUSION makes use of the USEF framework that specifies the interaction between all relevant market parties, including the DSO-SO interaction. One important feature of USEF is the customer oriented approach. USEF is placing key responsibilities with the prosumer role, such as the following:<br><br>• The aggregator role (defined in USEF as the aggregator business, supplier, or customer) keeps the DSO informed of local flexibility deployment and takes accountability for the consequences of flex deployment on the distribution network (for instance where this leads to congestion);<br>• The aggregator informs the NETSO of (changes in) load on the system due to flex deployment, and taking on indirect accountability (balance responsibility) under the balancing mechanism.<br><br>Taking account of these responsibilities, USEF provides guidance on the design of DSO and NETSO flexibility products and services, to maximise the value of flexibility, given the need to balance the interests of all stakeholders.<br><br>2. Within FUSION, the scope and definition of products, roles and | | |

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| | responsibilities will be further developed in the stakeholder engagement, due diligence and consultation processes, to tailor the USEF reference implementation to the GB system requirements. These processes will take account of the ENA consultation, the findings from Ofgem's Smart Systems and Flexibility plan, as well as findings from other ongoing innovation projects. |
| | |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

| | | | |
|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 36 |
| Question date | 12th September 2017 | Answer date | 19th September 2017 |
| Submission section question relates to | N/A | | |
| Topic | g) Robust methodology/ready to implement | | |
| Question | How does the USEF platform as described, relate to the models set out in the Appendix of the Commercial Principles for Contracted Flexibility paper? How does the project propose to incorporate developing thinking, and manage the risk of redundancy as industry views evolve? | | |
| Notes on question | Commercial Principles for Contracted Flexibility is an ENA paper, which can be found at: http://www.energynetworks.org/assets/files/electricity/futures/Open_Networks/ON-WS1-P4%20Commercial%20Paper%20(Final%20Draft)-170816-final.pdf | | |
| Answer | USEF is our attempt to trial the principles set out within the above named document. In particular, building on the two commercial models:<br><br>Model 5 (Joint Dispatch) and Model 6 (Parallel DER Route to Market).<br><br>Both the models described in the ENA paper and USEF address the same objectives and challenges, among which the most important:<br><br>- DNOs need to become an active participant in the markets for flexibility, rather than a passive asset owner;<br>- This flexibility needs to be allocated to the different stakeholders in an efficient way, with access to all parties.<br><br>The models described in the ENA paper are oriented towards DSO/NETSO coordination and less towards possible synergies with coordination between other stakeholders. USEF is an implementation of a hybrid between model 5 (Joint Dispatch) and model 6 (Parallel DER Route to Market), which does take this into account. | | |

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| | Within USEF, the term Aggregator includes individual end-users, commercial organisation and supplier companies, as outlined within the answers to Q9. Accordingly, an individual customer will have the capacity to manage their own generation and demand profiles. USEF further developed the role of Aggregator to undertake critical responsibilities in the flexibility market.<br><br>In USEF, regarding model 5, the 'Joint dispatch' is coordinated by aggregators that have contracts with multiple stakeholders, including end-users. Flexibility products are defined to create as much synergy as possible.<br><br>In USEF, the information exchange between NETSO and DSOs in model 6, is taken care of by aggregators.<br><br>USEF aims to offer sufficient incentives and risk management opportunities to aggregators to establish a business and engaging end users to entice them to offer flexibility. It also offers opportunities for DSOs to design additional products outside the direct interest of the NETSO.<br><br>FUSION has been developed based on the ongoing dialogue with ENA and industrial partners. Significantly, FUSION incorporates an agile approach: multiple iterations of the USEF implementation plan for GB represent the evolving nature of the project, de-risking any model redundancy. From technical perspective, the specifications will be agile and able to accommodate evolving requirements. The dedicated work package on Stakeholder Engagement facilitates a feedback mechanism to take on board industry developments from the ENA and other industrial stakeholders; outcomes/changes to the trial; and evaluations of USEF on an ongoing basis. |
| Attachments | |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

| | | | |
|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 37 |
| Question date | 12th September 2017 | Answer date | 19th September 2017 |
| Submission section question relates to | N/A | | |
| Topic | g) Robust methodology/ready to implement | | |
| Question | What are the range of constraint types the project design is focused on addressing? Will it look at enabling the use of flexibility to support connection and DG driven constraints, as well as demand driven constraints? | | |
| Notes on question | | | |
| Answer | FUSION has been developed based on specific network case studies [redacted] These include:<br><br>1) Insufficient Capacity within the 33kV Over Head Line Network<br>2) Insufficient Capacity at the 33/11kV Local Primary Substation<br>3) Insufficient Capacity during 11kV Alternative Running Arrangements<br>4) Insufficient Capacity at the Local Secondary Substation<br><br>For the purposes of the trial and CBA, FUSION will focus on case studies 1 and 2 based on network constraints.<br><br>During Work Package 3, USEF fit to the UK, work will be undertaken to develop flexibility product descriptions for all case studies. This will result in USEF-based structures to alleviate a range of network constraints.<br><br>Case studies 1 and 2 are driven by load growth, including from new connections. As part of FUSION, new connections (both demand and generation) developed on a flexible basis will be explored and assessed. This work will also be undertaken as part of work package 3, USEF fit to the UK. Further, the public consultation in this work package will inform discussion on new connection contracts under flexibility arrangements. | | |
| Attachments | | | |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

| | | | |
|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 38 |
| Question date | 12th September 2017 | Answer date | 19th September 2017 |
| Submission section question relates to | N/A | | |
| Topic | b) Value for money | | |
| Question | The submission implies that you are focussing on DSR. Is this correct, if so please could you explain the justification behind the decision to focus on a market for DSR, rather than all forms of flexibility? | | |
| Notes on question | | | |
| Answer | FUSION focusses on demand-side response for flexibility.<br><br>This is appropriate for the neutral market that will be facilitated. A USEF-based flexibility market enables demand-side response in the distribution network to serve the needs of multiple procuring parties. Demand-side response will facilitate a trial under the USEF-based market framework.<br><br>Demand-side response within FUSION encompasses multiple forms of flexibility including demand and generation management, for example generation turn-on, as shown in figure 1, below. These forms of flexibility will be explored under FUSION.<br><br>Figure 1 (next page). | | |

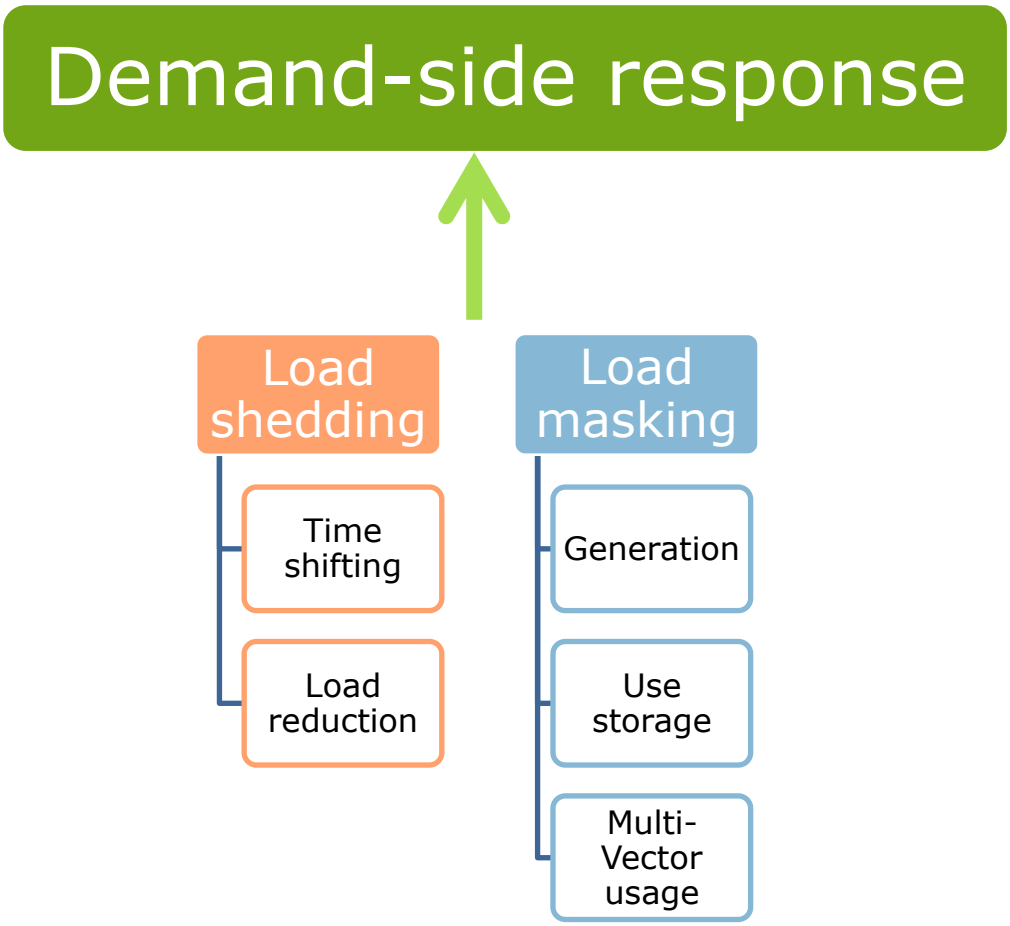


**Figure 10. Forms of flexibility in demand-side response.**

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| Attachments | |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

| | | | |
|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 39 |
| Question date | 12th September 2017 | Answer date | 19th September 2017 |
| Submission section question relates to | N/A | | |
| Topic | g) Robust methodology/ready to implement | | |
| Question | To what extent will the design enable peer to peer trading? | | |
| Notes on question | | | |
| Answer | The USEF framework is designed to foster innovation and the development of new services by market participants – principally aggregators. USEF can therefore accommodate peer-to-peer trading or energy exchange by aggregators (as defined in the answer to question 9) who may develop peer-to-peer based services as an added value for customers and a competitive advantage in the market. The USEF framework itself was developed based on the findings of the PowerMatching City project, which revolved around peer-to-peer energy exchange between end-users within an interconnected smart energy network.<br><br>Notwithstanding, the focus of FUSION will be on USEF adaptation to GB, and therefore not trial peer-to-peer trading. | | |
| Attachments | | | |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

| | | | |
|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 40 |
| Question date | 12th September 2017 | Answer date | 19th September 2017 |
| Submission section question relates to | N/A | | |
| Topic | c) Generates new knowledge | | |
| Question | Does the project envisage the platform will be DSO run, or will it generate learning on the potential role of independent parties here, and any implications for DSO actions needed? | | |
| Notes on question | | | |
| Answer | For the purposes of the FUSION trial, the flexibility procurement platform will be managed by the DNO, SP Energy Networks in this case. This is to enable a trial to be undertaken. The flexibility procurement platform will be maintained at arms-length during the trials.<br><br>*FUSION will specifically develop knowledge for an independent party to maintain the role of neutral market facilitator post-FUSION*. This work will be undertaken through work package 3, USEF fit to the UK, within the due diligence and gap analysis, and in the public consultation.<br><br>Actions for the DSO will be developed within FUSION. This includes learning on the processes and specifications for the DSO to maintain compliance and coordination with a USEF-based flexibility market. Learning and specifications will be fully available and published, as per the NIC governance. | | |
| Attachments | | | |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

| Project code | SPD/EN/03 | Question Number | 41 |
|---|---|---|---|
| Question date | 12th September 2017 | Answer date | 19th September 2017 |
| Submission section question relates to | N/A | | |
| Topic | Multiple | | |
| Question | What work is intended to take place on the cyber security considerations associated with the market design? | | |
| Notes on question | | | |
| Answer | Cyber security is a serious and well-understood consideration in the design implementation of a flexibility market.<br><br>FUSION has been developed with full visibility from SP Energy Networks internal IT and cyber security management, who have approved the proposed project which is in line with internal governance and guidance, as well as national and international security protocols.<br><br>The flexibility market design includes a flexibility procurement platform, specifically is cloud based. This will be developed in alignment with the SP Energy Networks Cloud Services Security Specifications, published 28th March 2017. As detailed in the response to question 5, this platform will be fully compliant with the UK Government Security Classifications; data will be hosted in the UK; and the market will be developed under the USEF market framework, which is encrypted using libsodium encryption, and complied to ISO 27001 information security standards.<br><br>Work within SP Distribution will include the development of system design. This is in accordance with guidance from the SP Energy Networks Network Technical Services manager, and the Systems UK (SP Energy Networks IT systems) manager. This includes the use of multiple firewalls and d-militarised zones between areas of the business handling secure data, as shown in the attached diagram. Work will be undertaken to develop the data | | |

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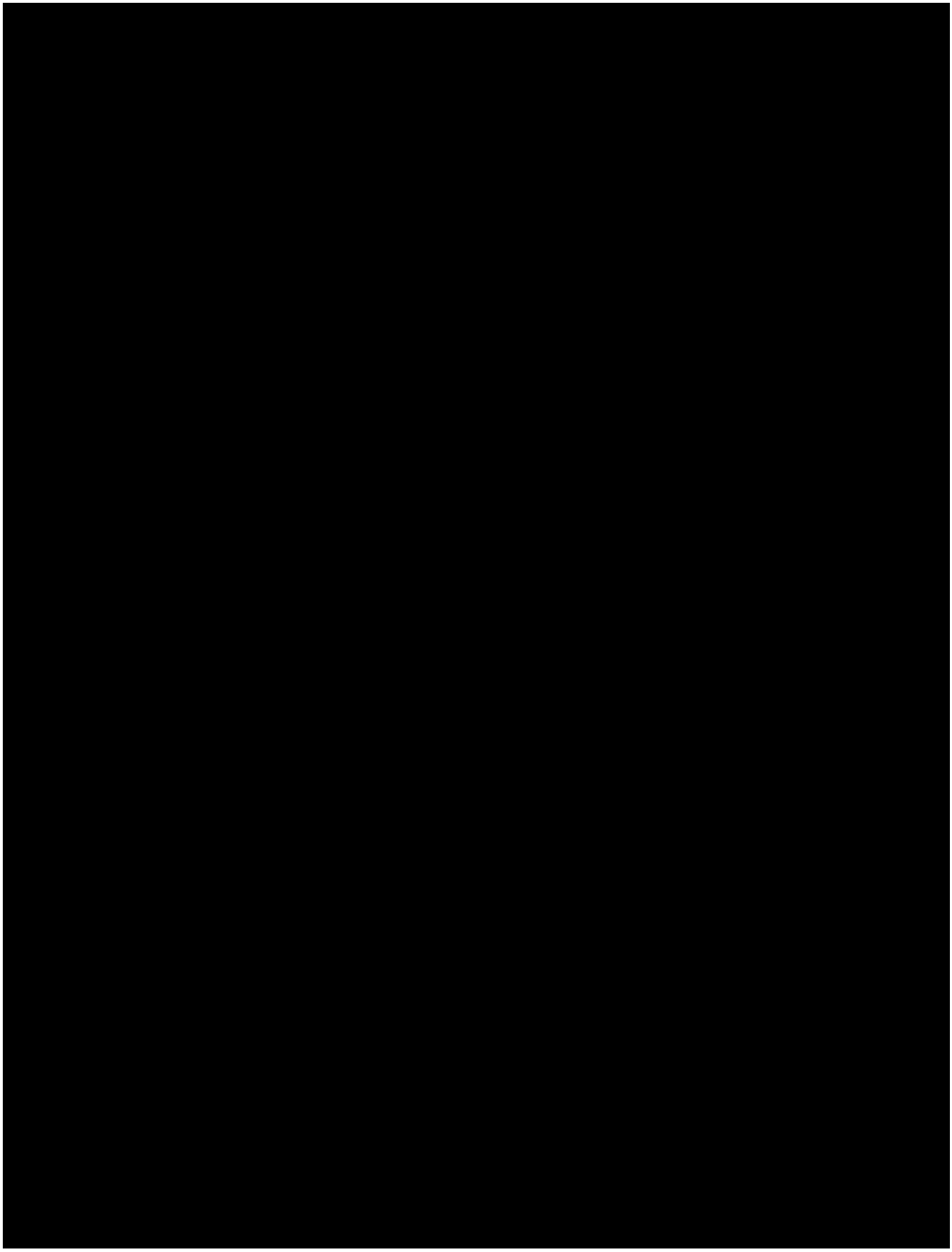
| | passage under these regulations [redacted] |
| Attachments | FUSION Q41 – DNO data interfaces |



# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

| | | | |
|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 42 |
| Question date | 12th September 2017 | Answer date | 19th September 2017 |
| Submission section question relates to | 9 | | |
| Topic | Multiple | | |
| Question | How applicable will the report that to be delivered through Project Deliverable 1 be to the rest of GB. If it is not applicable to the rest of the GB the proposed percentage appears high. Please provide a justification that the proposed percentage of funding associated with this deliverable is appropriate. | | |
| Notes on question | Budget associated to deliverables are detailed in the attached spreadsheet, based in specific tasks. Budgets associated to tasks have been reviewed and revised as part of the ongoing NIC process; [redacted] This is an element of our ongoing dialogue to improve project efficiency. | | |
| Answer | Deliverable 1 reports on the flexibility in East Fife. The revised budget associated to this deliverable is 14%.<br><br>Deliverable 1 is fundamental to the development and delivery of flexibility markets in GB, and for the delivery of FUSION. It informs the flexibility available within East Fife. Accordingly, it provides a methodology and insight into the utility of flexibility in a market-based framework.<br><br>The report will evaluate in detail flexibility for a range of flexibility services, products, and services for multiple flexibility procuring parties. FUSION will trial demand-side flexibility based around a network constraint product for service to the DNO; these are specifics, deliverable 1 will report flexibility for a range of products for example, voltage regulation, and will report objectively for a range of potential procurers of flexibility, for example energy suppliers. By taking this objective approach, FUSION ensures valuable learning can be shared taken up by multiple parties across GB. | | |

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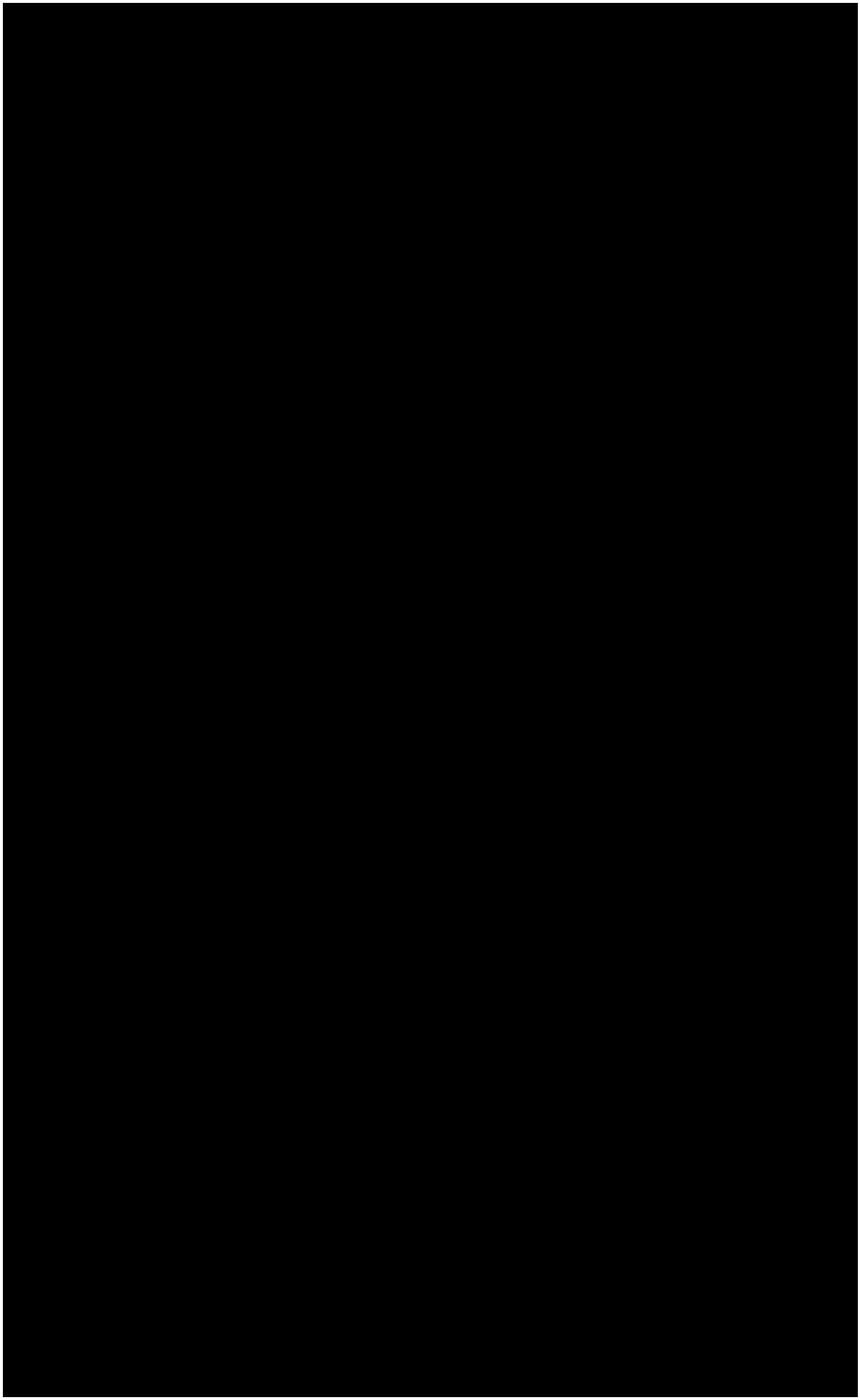
| | As detailed in response to question 29, East Fife is a variable regions, and is geographically, demographically, and economically reflective of GB as a whole. Accordingly, the outcomes of deliverable 1 are relevant and applicable, and of significant interest to numerous stakeholders across GB, including: DNOs, TOs, GBSO, aggregators, ENA, industrial and commercial customers, domestic customers, industrial and commercial representative bodies, domestic customers representative bodies, housebuilders, Ofgem and BEIS. |
| Attachments | FUSION Q42-45 - USEF deliverables costs |



# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

| | | | |
|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 43 |
| Question date | 12th September 2017 | Answer date | 19th September 2017 |
| Submission section question relates to | 9 | | |
| Topic | Multiple | | |
| Question | Given that the project is about the demonstrating that USEF can be used in GB the proposed funding associated with Project Deliverable 3 appears low. Please provide a justification that the proposed percentage of funding associated with this deliverable is appropriate. | | |
| Notes on question | Budget associated to deliverables are detailed in the attached spreadsheet, based in specific tasks. Budgets associated to tasks have been reviewed and revised as part of the ongoing NIC process; [redacted] This is an element of our ongoing dialogue to improve project efficiency. | | |
| Answer | Deliverable 3 is the publication of a USEF implementation plan for GB. Under the revised deliverables percentage costs, the NIC funding request percentage is 16%.<br><br>The amendment includes all tasks associated with the development of the USEF implementation plan for GB, as outlined in response to question 33.<br><br>16% of the budget associated to this deliverable is representative of its value to GB as a whole, and the costs directly associated with the development of the framework. | | |
| Attachments | FUSION Q42-45 - USEF deliverables costs | | |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

| Project code | SPD/EN/03 | Question Number | 44 |
|---|---|---|---|
| Question date | 12th September 2017 | Answer date | 19th September 2017 |
| Submission section question relates to | 9 | | |
| Topic | Multiple | | |
| Question | Please provide more detail on what will actually be delivered as Project Deliverable 6. Please provide a justification that the proposed percentage of funding associated with this deliverable is appropriate. | | |
| Notes on question | | | |
| Answer | The modelling report delivered as Project Deliverable 6 will include the following key elements:<br><br>• *In-depth analysis of DSR trials carried out in FUSION*. The report will provide an in-depth analysis of trial outcomes applying highly advanced big-data techniques (such as e.g. C-vine copula) given their superior performance when compared to traditional methods. This work will build upon and expand our previous engagement in large-scale trial analysis (e.g. Low Carbon London). The analysis of the delivery of flexible services in FUSION will be carried out by capturing the impact of all key drivers, including different calendar seasons, customer type, time of day etc. This approach will enable detailed characterisation and quantification of actual flexible services delivered in the trial against the counterfactual, also establishing the reliability of DSR-based flexibility services.<br><br>• *Establishing local benefits of FUSION concept*. Based on real-time data collected in the trial, we will use our detailed distribution grid models to quantify the benefits of the FUSION-enabled commoditised flexibility market in terms of avoiding reinforcements in the local distribution grid. In addition to quantifying the value of local flexibility against deterministic demand and uptake projections, we will also analyse the option value of flexible solutions to enable DNOs | | |

to defer large network investments when faced with uncertain developments in their network.

- *Quantifying whole-system benefits of FUSION in the GB context*. By applying our statistically representative network approach we will first quantify the DNO benefits of a GB-wide rollout of flexible solutions based on the FUSION concept. The benefit assessment will also include the contribution of DSR to security of supply and hence the avoided cost of building generation and network infrastructure to supply short-lived demand peaks. Building on DNO-level benefits, we will then apply our leading whole-system modelling tool to assess the whole-system benefit of flexible solution deployment unlocked by the FUSION concept, which will surpass partial benefits provided only at TSO or only at DNO level. Our whole-electricity system model co-optimises the operation and design of future electricity system and simultaneously considers both local and national electricity infrastructure. Benefits to be quantified will include both cost savings as well as carbon benefits in the context of future decarbonisation of the UK electricity sector, given that our previous studies clearly demonstrated the critical role of flexibility in delivering cost-effective decarbonisation of electricity supply (see list of references).

- *Business case analysis for FUSION concept*. We will identify and quantify key revenue streams from DNO and TSO services enabled by FUSION concept and explore synergies and conflicts between different services trialled in the project. Our revenue maximisation model allows for quantification revenues from the provision of multiple system services while ensuring deliverability if multiple services are contracted for simultaneously. In addition to DNO services these can also include energy arbitrage, balancing market, frequency response, fast reserve, STOR, capacity market, etc. Access to revenues from multiple service markets is critical to build a positive business case and justify the investment in flexible solutions. Assessment of revenues potentially available to flexible providers will reflect both current market conditions and more long-term scenarios for the UK electricity system in the context of ambitious decarbonisation targets.

- *Regulatory and commercial framework for cost-effective uptake of flexible solutions*. Taking into account the fundamental whole-system value of FUSION-enabled flexible services in the UK context, we will identify key barriers that may exist in current market and regulatory framework and prevent flexible providers from realising the full system value of their services, hence diminishing their business case due to inefficient market signals and inability to compete in flexible market services on a level playing field. Barriers may occur in a variety of areas such as energy policy, markets, technologies, regulatory framework and customer awareness. Based on the identification of main barriers for a cost-effective rollout of commoditised flexibility markets in the UK, we will proceed to formulate high-level recommendations for necessary modifications in the policy and regulatory framework to incentivise a cost-effective

deployment of flexible solutions in the future UK context and hence provide the flexibility required for delivering low-carbon electricity at minimum cost for the customers.

Given the extent and depth of the proposed work addressing a variety of topics covered in the report, and expected to span over several years, the requested funding is necessary to ensure all of the elements are appropriately covered in the analysis and that the outcomes presented in the report are of maximum benefit for all stakeholders in the energy system: from DNOs to the TSO, energy industry, policy makers, regulators and customers.

**References**


*Selected journal publications*

- Pudjianto D, Aunedi M, Djapic P, Strbac G, 2014, "Whole-Systems Assessment of the Value of Energy Storage in Low-Carbon Electricity Systems", IEEE Transactions on Smart Grid, Vol: 5, Pages: 1098-1109, ISSN: 1949-3053.
- Moreno R, Moreira R, Strbac G, 2015, "A MILP model for optimising multi-service portfolios of distributed energy storage", Applied Energy, Vol: 137, Pages: 554-566, ISSN: 0306-2619.
- Teng F, Aunedi M, Pudjianto D, Strbac G, 2015, "Benefits of Demand-Side Response in Providing Frequency Response Service in the Future GB Power System", Frontiers in Energy Research, Vol: 3, ISSN: 2296-598X.
- Teng F, Strbac G, 2016, "Business cases for energy storage with multiple service provision", Journal of Modern Power Systems and Clean Energy, Vol: 4, Pages: 615-625, ISSN: 2196-5625.
- Teng F, Aunedi M, Strbac G, 2016, "Benefits of flexibility from smart electrified transportation and heating in the future UK electricity system", Applied Energy, Vol: 167, Pages: 420-431, ISSN: 0306-2619.
- Strbac G, Aunedi M, Konstantelos I, Moreira R, Teng F, Moreno R, Pudjianto D, Laguna A, Papadopoulos P, 2017, "Opportunities for Energy Storage: Assessing Whole-System Economic Benefits of Energy Storage in Future Electricity Systems", IEEE Power and Energy Magazine, ISSN: 1540-7977.
- Sun M, Konstantelos I, Strbac G, 2017, "C-Vine Copula Mixture Model for Clustering of Residential Electrical Load Pattern Data", IEEE Transactions on Power Systems, Vol: 32, Pages: 2382-2393, ISSN: 0885-8950.

*Selected technical reports*

- Imperial College London, "Value of Flexibility in a Decarbonised Grid and System Externalities of Low-Carbon Generation Technologies", report for the Committee on Climate Change, October 2015. Available: https://www.theccc.org.uk/publication/value-of-flexibility-in-a-decarbonised-grid-and-system-externalities-of-low-carbon-generation-technologies/
- Carbon Trust and Imperial College London, "Can storage help reduce the cost of a future UK electricity system?", March 2016. Available: http://www.carbontrust.com/media/672486/energy-storage-report.pdf
- "Smart power: A National Infrastructure Commission Report", March 2016. Available: https://www.gov.uk/government/publications/smart-power-a-national-infrastructure-commission-report
- Carbon Trust and Imperial College London, "An analysis of electricity system flexibility for Great Britain", a report for BEIS, November 2016.

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| | https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/568982/An_analysis_of_electricity_flexibility_for_Great_Britain.pdf<br>• Poyry and Imperial College London, "Roadmap for flexibility services to 2030", report for the Climate Change Committee, June 2017. https://www.theccc.org.uk/publication/roadmap-for-flexibility-services-to-2030-poyry-and-imperial-college-london/ |
| Attachments | |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

| | | | |
|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 45 |
| Question date | 12th September 2017 | Answer date | 19th September 2017 |
| Submission section question relates to | 9 | | |
| Topic | Multiple | | |
| Question | Project deliverable 7 appears to be an important deliverable. Please provide a justification that the proposed percentage of funding associated with this deliverable is appropriate. | | |
| Notes on question | Budget associated to deliverables are detailed in the attached spreadsheet, based in specific tasks. Budgets associated to tasks have been reviewed and revised as part of the ongoing NIC process; [redacted] This is an element of our ongoing dialogue to improve project efficiency. | | |
| Answer | Deliverable 7 is a report on flexibility control, and will be developed in collaboration with the ENA Open Networks. The percentage of funding is 4%.<br><br>The deliverable itself will be the result of significant learning from the public consultation (deliverable 2), development of a USEF implementation plan for GB(deliverable 3), USEF process implementation (deliverable 4), and the undertaking of live FUSION trials (deliverable 5). These learnings will be reviewed, examined and evaluated as part of deliverable 7; however, no direct implementations or new developments will undertaken as part of this deliverable, limiting the cost and providing excellent value within the project. | | |
| Attachments | FUSION Q42-45 - USEF deliverables costs | | |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

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|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 46 |
| Question date | 5th October 2017 | Answer date | 10th October 2017 |
| Submission section question relates to | n/a | | |
| Topic | g) Robust methodology/ready to implement | | |
| Question | In response to question 41 you provided a diagram referenced 'Fusion Q41 DNO data interfaces'. Can you please clarify the following:<br>1) Will PowerOn have any function other than status monitoring or will it play an active role in managing the DMZ scheme? If the latter, how will the integrity of the scheme be verified, e.g. how will any interactions with existing PowerOn sequential switching schemes be prioritised?<br>2) There appears to be no link between the BSP level metering data and an Aggregator's input. What will the Aggregators input to the scheme be (aggregated metering data? network switch status?) and how will it be verified?<br>3) The USEF requires a platform to operate on so where will it reside? | | |
| Notes on question | DMZ is a cyber-security term, referring to a 'de-militarised zone', which separates two or more IT interfaces. | | |
| Answer | 1) PowerOn will act as monitoring software, through which flexibility can be viewed. The tendering and harnessing of flexibility will take place via network forecasting in advance of any constraint management events.<br><br>FUSION will not interfere with any sequential switching functions within PowerOn, thereby not compromising any distribution management system capabilities within PowerOn.<br><br>2) The aggregator is responsible for all customer interactions. This means they must be able to actively call upon their client base of flexibility providers to access flexibility in order to respond to a specific flexibility request from the DNO or any other procurer of flexibility.<br><br>The aggregator will manage the delivery of the demand event and | | |

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| | will capture HH meter data to evidence the outcome. This data is aggregated and shared with the DSO during the settlement phase of the process. The DNO will also validate the outcome based on BSP monitoring data.<br><br>3) A flexibility procurement platform is required to enable USEF, which will be built using cloud technology. For the purposes of the FUSION trial, this will be maintained by SP Energy Networks [redacted]<br><br>USEF itself is a framework developed to regulate the sale and procurement of flexibility services. |
| Attachments | |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

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|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 47 |
| Question date | 5th October 2017 | Answer date | 10th October 2017 |
| Submission section question relates to | n/a | | |
| Topic | Mulitple | | |
| Question | Please could you confirm whether you are planning to submit a bid to the BEIS Flexibility Markets Tender in October? | | |
| Notes on question | | | |
| Answer | FUSION has the ability to accelerate learning at a significant scale for GB flexibility markets. FUSION is designed to carry out a full-scale development and trial of a USEF-based flexibility market.<br>Whilst we are not able to lead a submission to the BEIS Flexibility Markets Tender in October, SP Energy Networks will be ready to adopt any staged outcomes from the existing and future work from BEIS and trial it.<br>Other parties wishing to lead a submission to the BEIS Flexibility Market Tender may request permission to access network data and support from SP Energy Networks, which we are willing to provide. | | |
| Attachments | | | |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

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|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 48 |
| Question date | 5th October 2017 | Answer date | 10th October 2017 |
| Submission section question relates to | n/a | | |
| Topic | g) Robust methodology/ready to implement | | |
| Question | Please provide written clarification of how many outages you expect to manage throughout the life of the project. | | |
| Notes on question | | | |
| Answer | We expect an average of [redacted] outage events per winter season during the life of the project.<br>This is indicative, and based on multiple sources, including the historical record of exceeded transformer ratings [redacted], as shown in the attachment. [redacted] | | |
| Attachments | FUSION Q48 - [redacted]_Exceeded_Tx_Rating_Events | | |

# Attachment: FUSION Q48 – [redacted] Exceeded Tx Rating Events

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

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|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 49 |
| Question date | 5th October 2017 | Answer date | 10th October 2017 |
| Submission section question relates to | n/a | | |
| Topic | b) Value for money | | |
| Question | As discussed within the bilateral, please provide information on any agreements you have reached with St Andrews regarding any future discount they will provide after the trial | | |
| Notes on question | | | |
| Answer | [redacted]<br><br>*<br><br>USEF is participant agnostic, and therefore will be accessible by any customer. USEF creates customer choice, allowing customers to decide to whom they sell the provision of flexibility. Parties wishing to provide flexibility, including the University of St Andrew's, Fife Council, [redacted] or any other flexibility provider, may expect to do so on a commercial basis.<br><br>This is a positive sum arrangement:<br><br>• Procurers of flexibility do so to avoid costly capital expenditures (DNOs are able to defer substation reinforcement)<br>• Providers of flexibility are able to commodity their energy use in line with their opportunity costs (i.e. ensuring comfort levels or service provisions are maintained)<br><br>No industrial and commercial trial locations or participants will be subsidised | | |

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| | during FUSION:<br><br>• Equipment to operate flexibility services will be budgeted by aggregators.<br>• Payments to users will reflect benefits to the DNO<br><br>For the purposes of a trial, the University of St Andrews, in addition to Fife Council, have granted access to their estate and are committed to partaking in trials. These early adopters will explore the value of flexibility services, and how a system can operate.<br><br>Post-FUSION, participant agnostic roll-out will be enabled. [redacted] |
| Attachments | |

# *Supplementary Answer Form*

# Project: FUSION

Tick if this answer has been provided verbally: ☐

| | | | |
|---|---|---|---|
| Project code | SPD/EN/03 | Question Number | 50 |
| Question date | 5th October 2017 | Answer date | 10th October 2017 |
| Submission section question relates to | n/a | | |
| Topic | g) Robust methodology/ready to implement | | |
| Question | As discussed, please provide more information on how the arrangements will work for providers of flexibility with exclusive arrangements with SO? | | |
| Notes on question | | | |
| Answer | Flexibility providers must honour exclusivity arrangements. Notwithstanding, the products required by the SO and DSO are significantly different, limiting conflict issues. Further, the time and duration at which flexibility services are requested are likely to vary between the SO and DSO. Aggregators a likely to be responsible for a portfolio of flexibility assets, and are able to coordinate measures taken on the portfolio to best serve multiple markets.<br><br>Accordingly, exclusivity arrangements are limited, and where there are multiple demands, there are expected opportunities for service stacking allowing flexibility to service both markets.<br><br>*<br><br>Interactions between the SO and DSO in FUSION are further developed. FUSION will undertake a significant and thorough due diligence process in work package 3, with the engagement of the SO, DNOs, aggregators and the ENA. This is committed to designing and developing flexibility products that are compatible across user groups.<br><br>FUSION will undertake further engagement through the Open Networks project, where FUSION will work with the GBSO and other DNOs to identify and manage flexibility conflicts, and will work on developing services based collaboration between T and D on procurement of flex services.<br><br>FUSION will set up a demonstration mechanism to trial and examine the interactions of multiple parties (such as the SO and DSO) seeking to harness the same flexibility asset. This will demonstrate the functionality of USEF to | | |

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| | overcome flexibility conflicts.<br>As previously highlighted, in addition to valuable Open Networks integration, FUSION will include GBSO senior representatives on the steering board and within the stakeholder forum. |
| Attachments | |