



**Risk Evaluation for Each RaaS Role and  
Suggested Procurement Strategies**

**Costain Deliverable**

**C6.2**

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## Document Control

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The report represents views and conclusions of Costain, and not necessarily those of SSEN or E.ON.

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## 1 RaaS Project Overview

The Resilience as a Service (RaaS) Network Innovation Competition project seeks to improve the operational resilience of electricity distribution networks in remote areas. The aim is to develop and trial a new market-based solution which uses services provided by a Battery Energy Storage System (BESS) together with local Distributed Energy Resources (DER) to swiftly, automatically, restore power to customers in the event of a fault (illustrated in Figure 1). Through temporary operation of the network in islanded mode, RaaS will maintain supply to customers during the time required for a DNO to repair the fault or to dispatch a conventional diesel generator to site for a longer-term issue.

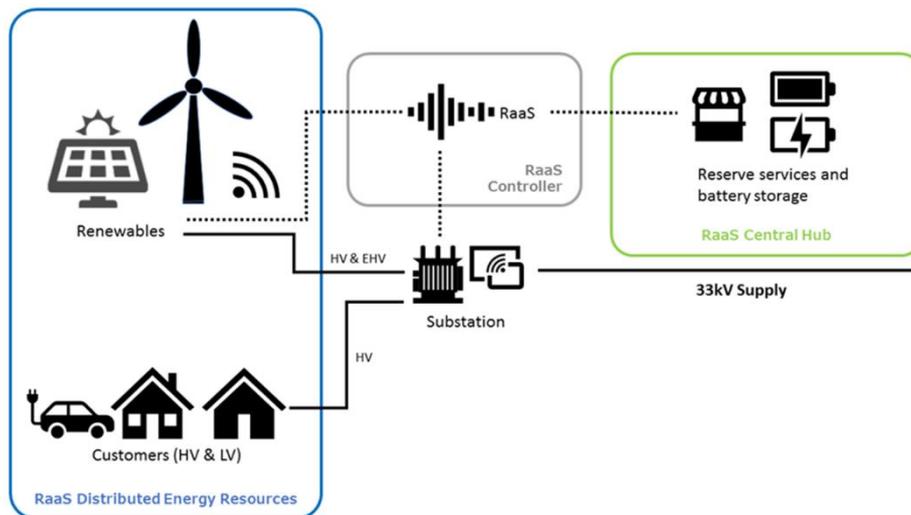


Figure 1. Topology of the RaaS technical solution

The RaaS concept would deliver low carbon, cost-effective network resilience to improve security of supply for communities in areas susceptible to power outages, supporting the UK's transition to Net Zero. The project is a partnership between SSEN, E.ON and Costain, and has been awarded funding through Ofgem's Network Innovation Competition.

The first phase of the project focuses on site selection, system design for the chosen demonstration site, and refinement of the business case for RaaS. This stage will inform a decision during 2021 on whether to proceed with the deployment and operation of a RaaS system at the chosen site for a trial period of up to two years.

The key outcomes from the RaaS project are:

- Detailed evaluation of the potential technical feasibility and financial viability of the RaaS concept from both the DNO and RaaS Service Provider perspectives
- Engagement with all stakeholders to understand perceptions and incorporate wider thinking into development of the RaaS proposition
- Building on the above bullet points, a successful demonstration at a site on SSEN's SHEPD network to provide learning on the technical application of RaaS and its performance to improve security of supply to customers
- A scalable and replicable business model for RaaS that gives a strong business case for DNOs and RaaS Service Providers (including an evaluation of the potential for revenue stacking with other flexibility services markets) and supports development of a competitive supply chain for RaaS
- Evaluation of the requirements for a second potential RaaS site to support a BAU DNO procurement process, incorporating technical and commercial learning provided by the RaaS project and implementation at the selected trial site

## 1.1 Context & Purpose of this Report

New markets and services bring risks; not just failure of individual projects, but also market failure where lack of clarity of potential demand deters new entrants, lack of opportunities limits economies of scale, or lack of suppliers reduces competition, each impacting on the cost effectiveness of procuring, or profitability of providing, a service. RaaS Work Package<sup>1</sup> 6 (WP6) ‘Supply Chain Engagement’ seeks to analyse and address these risks, formulating a strategy to create a vibrant market and supply chain, which will increase the likelihood of positive outcomes for customers.

So far, risk analysis within RaaS has focused on (i) project risks and (ii) Investor risks (where the ‘Investor’ both owns the RaaS asset and delivers RaaS and other flexibility services to the DNO and ESO), and many of the risks identified relate to individual projects, rather than the entire market.

This C6.2 deliverable addresses a different, wider perspective. Incorporation of RaaS into the electricity system and flexibility service markets forms different risks for different parties, alongside those applicable to site-by-site application of RaaS. Examples here could include:

- Market issues that deter supply chain investment in solution development
- Tendering approaches deter supply chain involvement in bidding
- Contractual requirements or risks that makes RaaS provision unattractive for potential providers
- Complexity of ‘value stacking’ RaaS with other income streams, potentially requiring sophisticated forecasting or trading capabilities

The purpose of C6.2 is to identify and prioritise some of the wider risks to successful development of the RaaS market (rather than the RaaS project itself) and suggest initial views on how these may be overcome. This will inform further work within WP6 that will develop appropriate commercial structures for RaaS and engage with the supply chain to provide a commercial strategy that will minimise these risks at GB and individual DNO level, thereby increasing the opportunities for individual RaaS schemes.

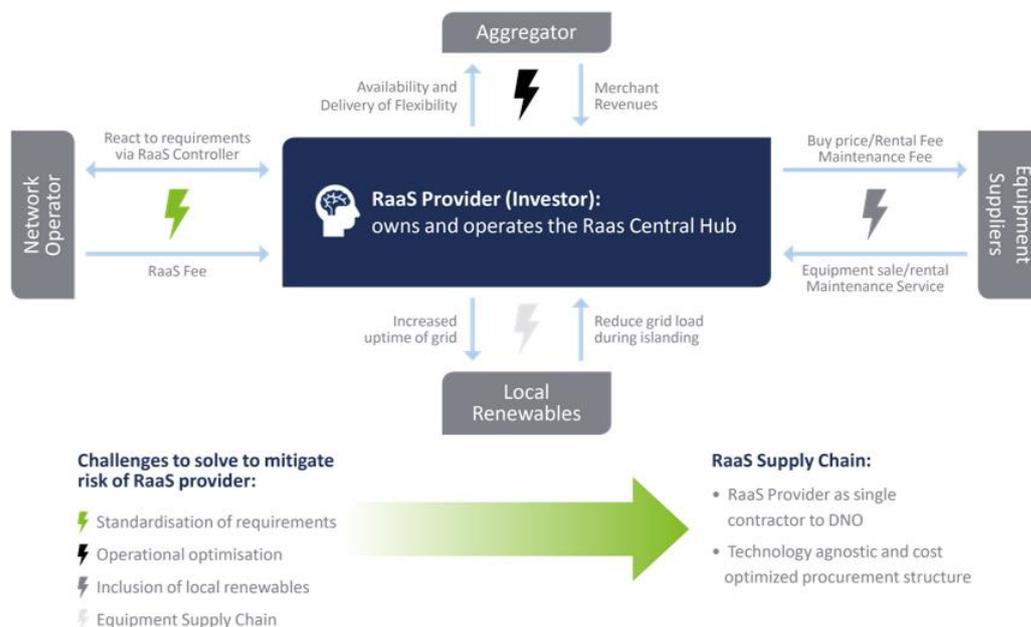


Figure 2: Schematic of RaaS commercial delivery

<sup>1</sup> WP1 Project Coordination  
 WP2 Front End Engineering Design  
 WP3 Detailed Design  
 WP4 Planning for Operational Commercial Optimisation

WP5 Business Model  
 WP6 Supply Chain Engagement  
 WP7 Demonstration Site Construction & Operation  
 WP8 Dissemination

## 1.2 Approach

Work so far has focused on the three key roles associated with delivery of the trial site demonstration scheme - DNO (SSEN), RaaS Service Provider (E.ON) and suppliers of equipment/services. However, the project recognises the range of other roles that would exist as the market for RaaS develops (and as technology enables RaaS to be delivered in new ways), and organisations that could fulfil these roles. This deliverable considers the suite of potential RaaS participants/actors.

The approach taken to this work comprises three stages, reflected in the structure of this report:

- Create a more comprehensive view of the potential roles in the RaaS market (Section 2)
- Create a draft risk register to identify risks associated with each of the roles which appear critical to market development (Section 3)
- Identify key themes to be managed through procurement and management strategies (Section 4)

## 2 Roles in the RaaS Market

### 2.1 Roles associated with the RaaS Demonstration project

The three key roles associated with delivery of the RaaS demonstration scheme are: Distribution Network Operator (DNO), RaaS Service Provider, and Suppliers of RaaS equipment - these create a value chain for RaaS delivery to Customers as shown in Figure 3

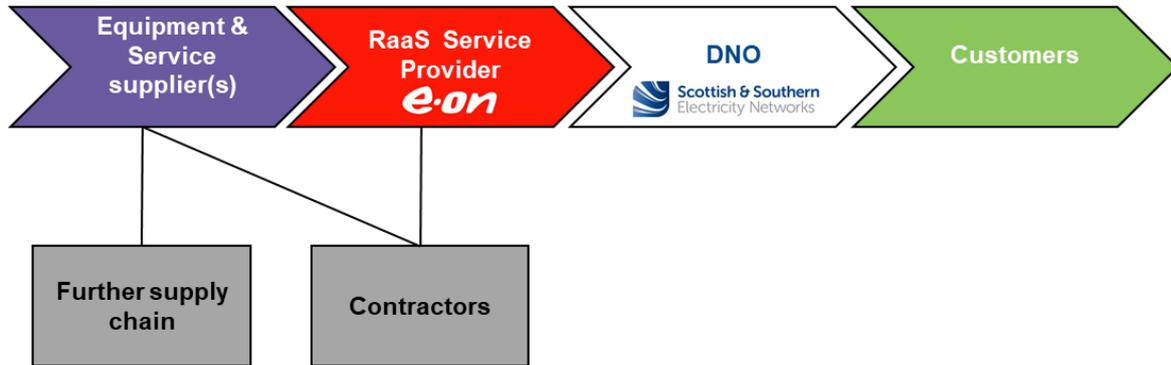


Figure 3: Value chain for the RaaS demonstration scheme

The definitions drawn up for each of these roles are given in Table 1.

Table 1: Organisational roles associated with the RaaS demonstration scheme

RaaS Role	Description
Customer	Domestic, commercial or industrial energy users, and G98/G99 connected generators, who will benefit from RaaS through a reduction in power outages, but have no direct commercial participation in the RaaS scheme - RaaS has no influence on the behaviour of these Customers during a RaaS event, and no behaviour change is assumed.  For the RaaS demonstration site it is currently assumed that all energy consumers and generators connected to Drynoch primary substation will be Customers, however more active participation in RaaS will be researched during the trial phase of the project.
Distribution Network Operator (DNO)	The DNO that procures RaaS to improve security of supply for Customers. As the DNO partner in the RaaS project, SSEN take this role.
RaaS Service Provider	The commercial entity that invests, deploys and operates RaaS to meet contractual obligations and optimise revenues through participation in other energy and flexibility services markets.  As a Project Partner, E.ON would fulfil this role for the RaaS trial scheme, noting that the project budget covers the cost of providing the BESS for the demonstration site.
Equipment/service suppliers & contractors	Providers of equipment or services required to implement RaaS, such as BESS, RaaS controllers, cabling, civil engineering works and testing, commissioning, and maintenance services.  For the RaaS project demonstration, E.ON are leading the BESS procurement activity

However, as described in C6.1 ‘Investigation into the Wider Potential of RaaS’, it has become clear that to create a thriving, robust market and completely unlock the potential for RaaS in GB, further roles must be defined, as described below.

## 2.2 Additional & Future Roles for RaaS in Business as Usual

Three key factors drive greater potential complexity for future business as usual (BAU) implementations of RaaS:

- The RaaS Service Provider may not own the RaaS assets - ownership of e.g. a RaaS battery energy storage scheme (BESS) might sit with a variety of organisations, e.g. from community organisations to energy companies to pension funds
- The DNO is unlikely to be able to host RaaS assets (i.e. a RaaS BESS), and so a third party host for the installation of RaaS equipment at a suitable network and geographic location would be required
- Other smart DERs within the RaaS area can contribute to resilience, increasing the duration of outage that could be covered by RaaS, or requiring a smaller battery capacity for the provision of RaaS - active participation of such DERs (e.g. EVs, Demand Side Response Schemes, etc.) may be managed by an Aggregator, or may participate directly in the RaaS scheme if technology, comms and settlement processes allow

RaaS provision might also become more complex due to increased diversity in technical solutions. In addition to smart DERs supporting a RaaS service, the RaaS ‘anchor generator’ (providing grid forming capability in islanded mode) could use different technology (for instance hydrogen storage and fuel cells) which may also interact with other energy vectors (e.g. drawing hydrogen from gas networks). Further, the anchor generator could be temporary or re-deployable for use in different locations at different times of year. On this last point, discussions with the SSEN NIA Project LEVEL indicate a potential use case for a BESS to provide EV charging to areas of high demand from tourists, whilst being relocated to RaaS zones during winter when the risk to resilience is increased.

Beyond the application of RaaS to improve local network resilience, further commercial complexity may be seen if a RaaS scheme is within a Distributed ReStart Zone (DRZ) established by National Grid ESO to provide capability for national Black Start from DERs. The RaaS project team continues to engage with the Distributed ReStart<sup>2</sup> team to explore synergies and opportunities to align these two use cases and support local and national resilience.

The additional roles associated with the future evolution of RaaS are defined in **Error! Reference source not found.** The team note that many of the organisations might employ consultants. however, at this stage the team did not identify any specific risks related to consultants, and so these are not included as a distinct role. The team also considered customers outside the RaaS area, who would support a scheme through the DUoS elements of bills, but do not receive direct benefit.

Table 2: Additional organisational roles associated with the implementation of RaaS

RaaS Role	Description
Aggregator	Third party intermediaries specialising in coordinating or aggregating demand response from individual consumers to better meet industry parties’ technical requirements for specific routes to market. Aggregators send signals to their consumers to modify their demand as a response to the System Operator requirements and/or market price signal <sup>3</sup>

<sup>2</sup> [www.nationalgrideso.com/future-energy/projects/distributed-restart](http://www.nationalgrideso.com/future-energy/projects/distributed-restart)

<sup>3</sup> ‘Aggregators - Barriers and External Impacts’, PA Consulting Group for Ofgem, May 2016, [www.ofgem.gov.uk/publications/aggregators-barriers-and-external-impacts-report-pa-consulting](http://www.ofgem.gov.uk/publications/aggregators-barriers-and-external-impacts-report-pa-consulting)

### Risk evaluation for each RaaS role and suggested procurement strategies

	Whilst the RaaS Service Provider may well be aggregator, in the context of the RaaS project, this definition excludes the RaaS Service Provider, and refers to any other aggregators with controllable assets in the RaaS area
Electricity Suppliers	Companies with an energy supply license, to whom customers pay their electricity bills. Electricity suppliers may be able to influence the delivery of RaaS in the future by way of dynamic tariffs
Electricity System Operator	The Electricity System Operator (ESO) is responsible for balancing electricity supply and demand, and therefore keeping the lights on. As the largest single buyer of flexibility services, the ESO will be an important customer for RaaS Service Providers.
Equipment Suppliers	Organisations that provide specialist elements of the RaaS assets, such as BESS, controllers, power electronics, telecoms equipment or associated services.
Host	Organisations providing physical space for the RaaS BESS and its connection to the network. In the RaaS demo, the DNO is the host.  For BAU delivery of RaaS, Hosts could be any site that has space, appropriate connection to electricity networks, and where planning consent can be obtained (or not required). The RaaS project team believe that - other than DNOs - there are two main classes of potential host <ul style="list-style-type: none"> <li>- 'Brownfield' Commercial/industrial customers with space</li> <li>- 'Greenfield' sites adjacent to the primary substation or a suitable point on the network.</li> </ul>
Investor	Entities choosing to invest in a RaaS scheme(s) or evaluating the business case to invest in RaaS. Prior project work reported in C4.1/C5.2 'DNO/ESO Views of Flexibility Markets and Alignment of RaaS to These Markets' report in has indicated that potential investors could include utilities, private equity, institutional investors and communities.  Different investors bring with them different levels of motivation, risk appetite, portfolio effects and sophistication in their understanding of energy/flexibility markets like RaaS
Contractors	The Equipment Supplier and Contractor role has been split out in BAU, reflecting that whereas technology elements such as BESS may be procured from global companies, a RaaS project may also use local generalist contractors for civil works, security, maintenance etc., who are likely to supply services to RaaS Service Providers within a confined geographic area.
Regulator	Ofgem (Office of Gas and Electricity Markets) regulates the electricity industry, including licenced electricity distribution and transmission network operators, competitive market generators, suppliers/retailers and aggregators. It takes decisions on price controls and uses incentives to drive cost effective delivery of energy systems that meet customer requirements and fulfil other policy objectives <sup>4</sup> .  Ofgem protects consumers by working to deliver a greener, fairer energy system.
Supporters	Supporters are a sub-set of Customers within the RaaS area who contribute power or energy management services during a RaaS event, as distinct from the Customer definition in Section 2.1, where no change in electricity demand or supply is assumed.  A Supporter's action helps the RaaS battery and extends the duration of islanded operation (or reduces the battery capacity required for RaaS), but where the assets are not directly controlled by the RaaS Service Provider.

<sup>4</sup> [www.gov.uk/government/organisations/ofgem](http://www.gov.uk/government/organisations/ofgem)

### Risk evaluation for each RaaS role and suggested procurement strategies

	<p>It is apparent that there may be multiple types of Supporter, for example:</p> <ul style="list-style-type: none"> <li>- Individuals, businesses or organisations that modify their energy consumption during a RaaS event in recognition that this can help to prolong the period of time that RaaS could provide supply for during a fault (e.g. by reacting to a communication from the DNO and deferring electricity consumption until normal grid operation resumes)</li> <li>- Customers that defer or change consumption during a RaaS event in response to a pricing signal (e.g. by responding to a dynamic change in tariff, whether manually or via automated devices/controls)</li> <li>- Those with a direct commercial relationship with the RaaS Service Provider, allowing the service provider to initiate a response from or control the behaviour of their DSR (Demand Side Response), energy storage, or generation capabilities</li> </ul> <p>and so over time there may be merit in further distinguishing this role according to the type of engagement and response (e.g. manual or automated, demand turn down or generation, etc.).</p>
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Incorporating these roles into the structure presented in Figure 3 above provides a fuller picture of *potential* commercial relationships - potential because this assumes a 'provider hub' model where the DNO has a single contract with the RaaS Service Provider, who then manages relationships with organisations providing other roles. This approach reflects arrangements for other flexibility markets, and aligns with existing DNO flexibility services procurement strategies, however, there are risks associated with this approach. The RaaS project will need to identify ways to mitigate these or develop alternative commercial approaches that avoid them.

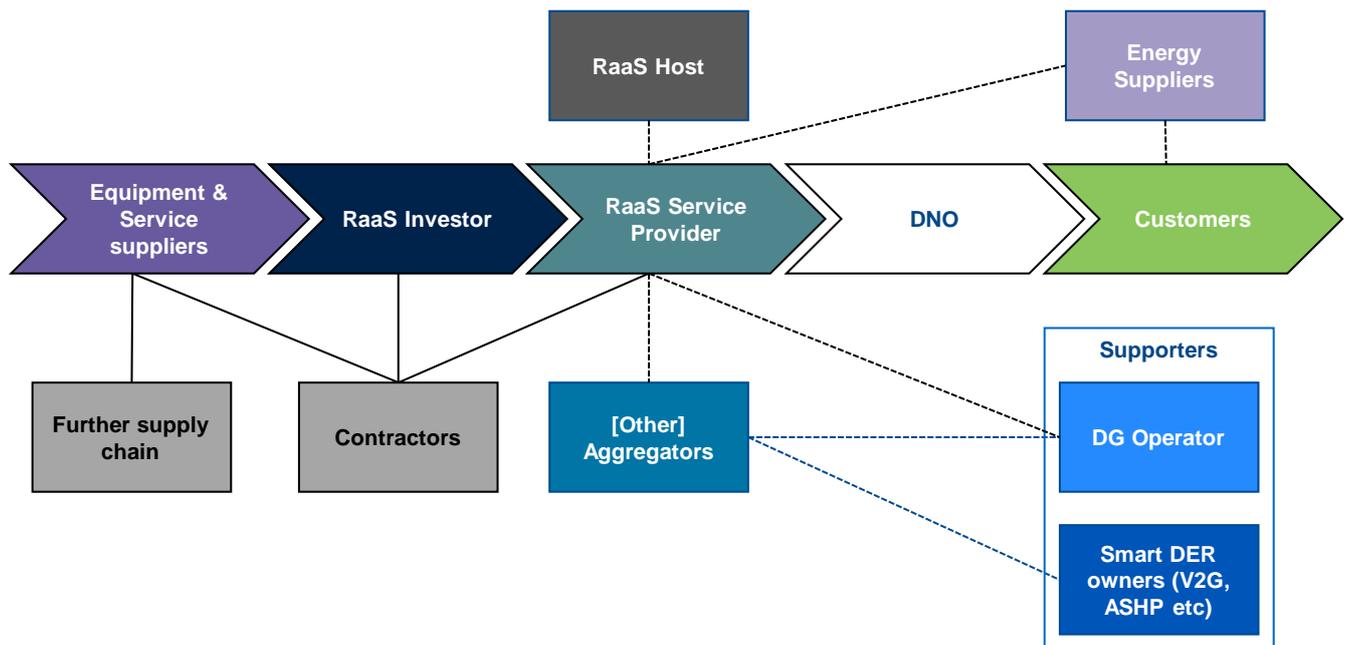


Figure 4 Potential RaaS commercial relationships

### 3 Risk Rating for RaaS in Business as Usual

In this section, we have assessed risks from the perspective of each of the roles listed in Section 2, and identified some initial mitigation actions. Note that risks from the perspective of the RaaS Investor were not re-assessed here, but are taken from the more detailed evaluation carried out in Work Package 5 and reported in the E5.2 ‘Investor Risk Evaluation’ report.

#### Risk Rating Methodology

The approach to identifying and appraising risks builds on the assessment framework developed for E5.2. An accompanying risk register has been created which considers both the likelihood and consequence of each risk materialising, and excerpts from this register are included within the descriptive subsections below.

The assessment considered how each risk identified would impact (i) the total market size for RaaS, (ii) the competitive intensity / vibrance of the RaaS market, (iii) the speed of uptake of RaaS, or (iv) the ability of RaaS solutions to deliver benefits for customers.

Risk likelihood is scored between 1 (unlikely) and 5 (almost certain); and consequence is scored between 1 (insignificant) and 5 (highly significant). These are evaluated for each of the four assessment categories and multiplied together to give four *individual* risk scores between 1 and 25. The highest of the individual risk scores is given in the column labelled ‘I’ in the tables below. A *cumulative* risk score is then generated by adding the four individual risks, and this is given in the column labelled ‘C’ in the tables below. The risks presented in these tables either have at least one individual risk rating of  $\geq 15$ , or a higher cumulative risk score ( $\geq 40$ ) - the accompanying risk register presents all risks identified.

#### 3.1 Customers

Risk Title	Risk Description	I	C	Mitigation
Insufficient improvement to security of supply	DNO commercial decision on RaaS service level does not fully meet community needs / expectations	16	44	A transparent methodology for calculating RaaS requirements must be developed, and decisions made during the procurement process should be clearly communicated by DNOs; the RaaS project should explore customer preferences regarding potential levels of service and cost effectiveness
Impact of GB-wide dynamic tariffs	Customers on dynamic/time of use tariffs could have incentives to consume electricity during a RaaS event which occurs when prices are low, thereby reducing the potential duration that the RaaS service could be provided for	16	36	The distinction between normal grid operation (and wholesale prices) and islanded generation & demand (whether under a RaaS scheme or otherwise) would need to be given further consideration by the industry and Ofgem to maintain fairness and equity - one option could be the application of an ‘emergency’ tariff during a RaaS event, in keeping with the current industry approach for a national Black Start situation.
Reliability of legacy backup power	Less frequent use of any customer owned back up diesel generation due to RaaS may result in these generators becoming less reliable  (whilst longer outages (beyond the duration capability of the RaaS service) would result in a DNO despatching	16	36	DNOs should provide clear messaging to customers about this potential consideration and expected performance of the RaaS scheme; customers would need to consider whether the maintenance/testing activities associated with their diesel generators would need to change.

### Risk evaluation for each RaaS role and suggested procurement strategies

	temporary diesel generators to site, in some circumstances the level of demand on the islanded network may mean that there is a short interruption between supply by the RaaS service and supply by the DNO generator - where diesel generation owned by individual customers is used less frequently due to RaaS, these generators may become less reliable for use in this situation)			
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In addition to the risks identified above, for I&C customers, an additional opportunity/benefit identified through this work is that improved network resilience may reduce their utilisation of, and so carbon emissions and costs associated with, use of their own standby diesel generators - at present it is not possible for the RaaS project to quantify potential benefits in this area due to lack of visibility regarding 'behind the meter' backup supply capabilities.

#### Summary

To ensure cost-effectiveness, a RaaS scheme to be implemented in a given location may not be sized to cover all potential outages. DNOs must provide a clear indication to Customers of the potential benefits, and any potential limitations, associated with the RaaS scheme to be implemented in their area.

Ofgem has announced that half-hourly settlement (HHS) will be mandatory for all customers from October 2025<sup>5</sup>. This is likely to result in an increase in the number of dynamic/time of use tariffs available, and the impact of this on the overall performance of RaaS schemes needs further investigation and consideration by the industry and regulator. By way of example, a high wind situation resulting in low wholesale power prices, but also leading to a RaaS event at a remote location, could incentivise customers to consume more electricity when the network is in a fault condition and relying on the capacity of the RaaS BESS.

#### Recommendations

**DNOs should engage with local Customers in parallel to running each RaaS procurement process.**

**The implications of potential changes to demand patterns associated with dynamic tariffs should be explored and, if potentially significant for RaaS, regulatory or commercial measures to address this should be investigated.**

### 3.2 Distribution Network Operator

Risk Title	Risk Description	I	C	Mitigation
Flexibility Market evolution	Changes to other (existing or future) flexibility markets (DNO, or ESO, or other e.g. intraday trading) impact the RaaS Service Provider's business case, thereby impacting on the number of future sites at which RaaS represents a cost effective solution for a DNO	20	60	This risk is beyond the RaaS project's control. Within the RaaS project, and during future roll out and evolution of RaaS, there will be a need to monitor developments across other flexibility markets, including engagement with the Open Networks project and DNO/ESO flexibility teams.
Complexity in including third party DERs in	Actual or perceived complexity in incorporating appropriate DER schemes entrenches the provision of RaaS into an approach based on large, new-build BESS - this may mean that RaaS is not as cost	16	52	Efficient information flows and clarity on commercial approach will allow potential RaaS Service Providers to more readily assess and incorporate third party DERs into a RaaS scheme to help meet resilience requirements.

<sup>5</sup> [www.ofgem.gov.uk/publications/electricity-retail-market-wide-half-hourly-settlement-decision-and-full-business-case](http://www.ofgem.gov.uk/publications/electricity-retail-market-wide-half-hourly-settlement-decision-and-full-business-case)

### Risk evaluation for each RaaS role and suggested procurement strategies

the provision of RaaS	efficient as it could be, and may limit the scope for RaaS to reach its full potential in delivering benefits to DNO customers			The RaaS project will investigate this as part of the potential commercial framework for RaaS.
The value of RaaS to the DNO (and its customers) does not equate to a fee that's attractive to a RaaS Service Provider	The value associated with a cost effective RaaS solution to improve security of supply is insufficient to provide an attractive business case for an Investor or RaaS Service Provider, leading to lack of market interest	15	48	The RaaS project will evaluate the business case from both the DNO and RaaS Service Provider perspectives to assess the financial viability of RaaS, and to communicate expectations regarding potential RaaS fees. The project will also develop a methodology which could be used by DNOs to appraise the application of RaaS across their own primary substation sites.
Lack of visibility of programme pipeline	Absence of a clear pipeline of potential schemes to be procured by DNOs results in a lack of investment by the supply chain to develop RaaS capability, constraining the market and/or leading to higher prices due to the lack of competition or economies of scale	16	48	Subject to a positive stage gate decision, during phase two of the project the CBA for RaaS across SSEN sites will be re-evaluated based on learning from the demonstration site and used to indicate the business's own pipeline.  Costain's C6.1 'Investigation into the Wider Potential of RaaS' report sets out a range of further potential applications for RaaS beyond remote & rural DNO networks, including implementation across other industries.
Procurement Approach	Conventional DNOs procurement approaches may only attract organisations familiar with bidding for such work, thereby deterring new market entrants - this consideration is relevant across emerging flexibility services	16	36	The RaaS project should consult with potential Investors & RaaS Service Providers to understand factors that may encourage participation by a range of different organisations with relevant capabilities, and develop approaches which are appropriate for the emerging supply chain, including community groups and SMEs.

#### Summary

The risks associated with DNO (and RaaS project) activities could restrict market development if not pro-actively managed. The RaaS project must continue to engage with DNOs, the Open Networks project, and supply chain stakeholders to ensure key decisions around RaaS procurement will support development of the RaaS market and deliver the right outcomes for customers.

#### Recommendations

**Consideration will need to be given to the implications of any proposed changes to the energy market (inc. dynamic tariffs) and flexibility markets for the provision of RaaS, both with regard to required service levels, and DNO and RaaS Service Provider business cases.**

**Towards the conclusion of the RaaS project DNOs should work to create a pipeline of go-to-market opportunities to build industry confidence in the RaaS market.**

**The RaaS project will continue to consider options to help maximise the current and potential future incorporation of DERs into the provision of a RaaS scheme to enhance performance or reduce cost.**

### 3.3 RaaS Investors & Service Providers

Work Package 5 of the RaaS project provided a detailed evaluation of the potential risks associated with to Investors and RaaS Service Providers, as reported in E.ON's E5.2 'Investor Risk Evaluation' report. The table below highlights five key risks identified through that work (note that cumulative risk scores were not derived within the Investor register).

Risk Title	Risk Description	I	C	Mitigation
Future technologies cheaper and/or more effective	Technologies could be developed over the next 5 to 10 years which deliver the same service specification as batteries but cheaper, or an enhanced service such as improved response time or duration	16	-	Investors to follow market developments to enable the adaptation of the RaaS product to incorporate new technologies.
RaaS service levels required by DNOs are too high for economical optimisation	RaaS service levels (e.g. energy required) specified by DNOs are so high the overall income from revenue stacking across flexibility markets makes RaaS unattractive to RaaS Investors	15	-	DNOs and potential RaaS Service Providers could evaluate a range of potential service levels for a site to understand the most cost-effective solution - whilst this may result in a RaaS scheme which meets a lower proportion of fault events, that may still provide worthwhile benefits to customers.
Long/fixed term contracts are no longer available for other flexibility services	Some existing flexibility services are moving from long term contracts procured months/years ahead to day ahead/day only products. This reduces the ability to forecast flexibility services prices or the overall revenues from stacking incomes over the life of a RaaS contract	16	-	Investors/RaaS Service Providers need to ensure that they have developed systems and capability to be able to trade dynamically and switch rapidly between participation in different flexibility services to maximise their returns.
New battery storage systems flood flexibility markets	Increasing numbers of new battery schemes may increase competition for participation in flexibility markets such as the Balancing Mechanism and frequency response. This may have a downward impact on prices across those markets, reducing overall revenues from stacking incomes over the life of a RaaS contract	16	-	Investors/RaaS Service providers need to ensure that they have developed systems and capability to be able to trade dynamically and being able to switch rapidly between participation in different flexibility services to maximise their returns.
DNO override control	The operation of the battery can be overridden at any time by the DNO, potentially impacting participation in other flexibility services	20	-	Ensure RaaS contracts with DNOs include a payment mechanism to mitigate against prolonged periods of override for reasons outside the control of the Investor or RaaS Service Provider which result in significant penalties for non-performance in other flexibility services.

In addition to the risks identified through the E5.2 work, risks associated with other RaaS roles which could also impact Investors/RaaS Service Providers include host availability, and future changes to other flexibility markets (other than length of contract identified above), including associated values, or obligations regarding participation in more than one flexibility services market at any point in time. Potential technical complexities associated with orchestrating the participation of multiple small scale DERs within a RaaS scheme may also create a risk for RaaS Service Providers (and therefore Investors), particularly whilst technical capabilities within this area are at the very early stages of development.

Finally, experience from Work Package 3 ‘Detailed Design’ reflects the fact that at present there is a limited pool of energy storage suppliers with the technical capability to meet RaaS requirements. This creates some risk for RaaS Service Providers as they may be dependent on a small number of providers, particularly during early stages of RaaS market development. The findings of C6.1 ‘Investigation into the Wider Potential of RaaS’ are therefore important to illustrate the potential future market for RaaS and provide evidence to inform supply chain investment in developing relevant equipment and skills - as the supply chain grows, this risk will diminish.

**Summary**

The RaaS product design and associated technical or commercial risks will all influence the perceived risk profile of RaaS, in turn potentially impacting cost of capital for investors. Further, the cost of capital, the number of RaaS opportunities, and typical asset sizes, may affect the types of investors that are attracted to the RaaS market, also influencing competition.

**Recommendations**

**Proposed DNO RaaS procurement processes developed through the project must be inclusive and designed to attract a wide range of organisations, avoiding approaches that are unsuited to, or excessively onerous for, credible investors and providers.**

**The procurement model should be aligned to the risks associated with potential Investors & RaaS Service Providers and their capabilities to raise finance.**

**For future roll out under BaU, co-ordination of RaaS procurement processes between all DNOs to create standardised approaches for specifying requirements and obligations, etc., will give clarity to potential RaaS Service Providers to support their participation, and balance the needs of DNOs and Investors.**

**As the RaaS concept evolves with deployment across increasing numbers of site, DNOs and RaaS Service Providers must be mindful of developing means to incorporate multiple small scale DERs where this use of existing assets represents a cost efficient approach to delivering RaaS.**

3.4 Aggregators

Note that this section is focused on Aggregators who manage assets within the RaaS area, and not the RaaS Service Provider (which may also be an aggregator). This role may contribute to the provision of RaaS by offering services (e.g. Demand Side Response (DSR), EV charging management, etc.) to the RaaS Service Provider to manage local demand during a RaaS event. This participation may extend the period of time that the BESS could provide power for following a fault, or result in a smaller proportion of the battery energy storage capacity being reserved for RaaS, thereby allowing additional participation in other flexibility markets.

Risk Title	Risk Description	I	C	Mitigation
Commercial agreements	Aggregators may be reluctant to sign RaaS agreements with competitors (i.e. another Aggregator appointed as the RaaS Service provider) due to concerns over competition/commercial sensitivities, etc.	16	52	Further work within WP6 will consider any potential barriers to, and appropriate commercial approaches for, the participation of Aggregators in the provision of RaaS.
RaaS revenue	Lack of sufficient value to attract participation	12	44	The RaaS project will assess the potential business case for RaaS from both the DNO and RaaS Service Provider perspectives - RaaS Service Providers then need to balance costs and benefits associated with different sized batteries, and delivery of the scheme via a mix of reserved capacity in the BESS together with services from Aggregators and Supporters.

### Summary

The most significant risk identified here relates to the fact that an Aggregator with DERs in the RaaS area may be reluctant to make a commercial agreement with a possible competitor (the RaaS Service Provider), due to concerns around competition.

### Recommendation

**Commercial arrangements proposed through the RaaS project need to consider potential interactions between all participants, clearly identifying potential barriers and options for working to address them. This should include consideration of different types of commercial interaction, e.g. bilateral contracts, blockchain settlement processes, etc.**

## 3.5 Electricity Suppliers

### Summary

As noted in Section 3.1, with increasing uptake of dynamic tariffs, there is the risk of customers being offered low electricity prices during a RaaS event, which could incentivise counterproductive behaviour from the perspective of maintaining supply for the duration of RaaS event planned for by the DNO. This effect could also impact on other types of local DNO flexible solutions. Measures to address this will require the involvement of electricity suppliers, and may impact on their operational or settlement processes.

### Recommendation

**The RaaS project must engage with the electricity retail sector to seek thoughts on this, and make recommendations for consideration by the wider industry and regulator to ensure appropriate outcomes for customers.**

## 3.6 Electricity System Operator

### Summary

Based on current estimates for RaaS deployment, RaaS appears unlikely to create risks for the ESO. However, the RaaS concept allows revenue stacking through participation in other flexibility markets, and so the business case for a RaaS Service Provider (and hence RaaS fee offered to a DNO) will be based on forecasts of income from services provided to the ESO. As with the uptake of dynamic tariffs, this point is relevant to other DNO flexible solutions too. As the ESO develops new flexibility service, or adapts existing products, there is a risk that misalignment between different flexibility products may not provide optimal outcomes for customers.

### Recommendation

**The ESO should continue to consult with DNOs and third-party service providers when evaluating changes to ESO balancing markets, to understand how proposals may affect revenue stacking capabilities, and ensure appropriate outcomes for customers with regard to both the quality and cost effectiveness of the electricity supply system.**

## 3.7 Equipment Supplier

### Summary

Equipment supplier risks primarily relate to the potential scale of the RaaS opportunity, and so reflect risks captured against other roles. A key means to reduce perceived risks related to the potential size of the market for RaaS equipment is to consider wider applications of the RaaS concept beyond remote & rural DNO networks. By providing a view on these opportunities, potential RaaS equipment suppliers, and indeed Investors, will have an increased understanding of the possible scale and evolution of the market, allowing them to make decisions with regard to building capabilities in the associated areas. Costain's C6.1

## Risk evaluation for each RaaS role and suggested procurement strategies

‘Investigation into the Wider Potential of RaaS’ report identifies adjacent markets with opportunities for similar-scale resilience solutions (e.g. the water industry and other industrial sectors), as well as considering the international potential for RaaS.

Engagement through Work Package 3 ‘Detailed Design’ suggests that equipment providers who customarily provide EPC (Engineering, Procurement and Construction) contracts are experiencing risks in assessing construction costs in remote areas. This issue also affects Contractors, as discussed in Section 3.9 below.

### 3.8 Hosts

Risk Title	Risk Description	I	C	Mitigation
Host engagement	Potential Hosts not sufficiently engaged with RaaS concept (or with RaaS Service Providers or DNOs) to understand the possible value & benefits, or what would be involved in hosting a RaaS scheme, meaning suitable sites aren’t available	20	55	Engagement and awareness raising by DNOs may be required to generate interest in host site at locations where a RaaS scheme is being considered. DNOs could invite expressions of interest in hosting; and RaaS Service Providers would then need to engage with potential sites during the procurement process.
Planning consent	Apprehension regarding responsibilities for obtaining any planning application or permits associated with a site, or liabilities if permissions aren’t obtained or conditions aren’t met	15	45	As RaaS Service Providers would have detailed technical knowledge of the solution and should have (or have access to people with) prior planning experience, it is suggested that obtaining planning consent or other required permits should clearly be the responsibility of the RaaS Service Provider.  Note - if this approach is taken, the timing of planning applications will need to be considered within the overall DNO procurement and/or delivery timeframes.
Competition for Host sites	During the RaaS procurement process bidders compete for a small number of suitable (from commercial or technical perspective) host sites to make a competitive RaaS bid; this could be perceived by hosts as time consuming or otherwise unwelcome leading to potential hosts withdrawing interest, or may result in hosts proposing land lease fees which are uneconomic for the provision of a RaaS scheme	12	40	DNOs could participate in, or perhaps broker, interactions between potential Hosts and potential RaaS Service Providers, however careful consideration would need to be given to maintain DNO neutrality and commercial confidentiality throughout such engagement.

#### Summary

Suitable RaaS Hosts will be critical to the successful application of RaaS, and engagement led solely by RaaS Service Providers may not elicit sufficient interest amongst potential hosts. Further, in addition to land/space requirements, proximity to appropriate points of connection on the electricity network would also be a consideration.

Anecdotal reports from some DNOs during project stakeholder engagement have similarly indicated that securing engagement from I&C customers to provide other DSO flexibility services can be difficult, particularly during early stages of market development, and/or where sites don’t have a dedicated, trained energy manager. For RaaS, lack of availability of sites or competition amongst RaaS Service Providers to secure host

locations could lead to overbidding and prohibitively high costs. Alternatively potential Hosts may become disillusioned due to multiple contacts from different RaaS Service Providers, or due to complex or time-consuming interactions, particularly where benefits are not clearly communicated, or are not significant alongside their day-to-day business.

Engagement with potential Hosts will require clarity about responsibilities including planning & permitting, delivery & operational obligations, site security, etc., and the RaaS project has yet to explore whether Hosts could be expected to be ‘hands on’ or ‘hands off’ with delivery, operation or security of RaaS assets.

**Recommendations**

**The RaaS project, and other DNOs adopting RaaS, should explore the extent to which it would be appropriate for them to engage with and support potential hosts, as they form a key aspect of the RaaS supply chain.**

**As part of their RaaS procurement process DNOs should consider the extent to which they can indicate appropriate sections of the electricity network for a RaaS point of connection (or indeed areas of the network where a connection would not be possible), including information on any potential import (battery charging) or export constraints.**

3.9 Contractors

Risk Title	Risk Description	I	C	Mitigation
Logistics	Difficulty of logistics and transportation of plant and equipment to remote and rural locations, including small roads, ferries, etc., together with availability of maintenance crews	12	36	When procuring RaaS schemes, these factors must be considered by both the RaaS Service Provider (for delivery of the battery and associated equipment) and the DNO (for delivery of DNO side elements of a RaaS scheme), and contractors with suitable capabilities and experience must be sought.
Geographic coverage	A wide geographic spread of potential sites may have implications for delivery of a programme of RaaS sites, and the associated timeframes	12	32	

**Summary**

In addition to the installation & commissioning of the RaaS BESS and DNO equipment, preparatory work such as civils tasks (inc. drainage, provision of a suitable base for the battery containers, etc.), comms systems, site security measures, and provision of welfare facilities will be required. Given the remote nature of RaaS schemes, local contractors may be best placed to undertake such activities due to practicalities of delivery and experience within the region. Using local contractors can also increase the social value of RaaS by increasing in-location spend on construction and maintenance.

**Recommendation**

**RaaS Service Providers should consider the merits of using local contractors or using established delivery partners for all required tasks.**

3.10 Regulator

**Summary**

This initial consideration of the practical aspects of RaaS procurement and delivery has identified several factors that could pose issues around the scope of DNO activity in RaaS Service Provider procurement activities with the wider supply chain, interactions between competing organisations and/or different aspects of the electricity/energy system, and complex forecasting considerations related to wider energy and flexibility

markets. The Regulator clearly has a role in understanding these matters and ensuring that the market is well placed to deliver appropriate outcomes for customers.

### Recommendations

**To ensure that there are no artificial regulatory barriers to the application of RaaS or capability of this solution to meet its full potential in delivery benefits for customers, the industry may need to evaluate a range of factors including:**

- The role of DNOs in supporting the identification of potential Hosts and engagement between Hosts and potential RaaS Service Providers
- Interactions between RaaS and other aspects of the electricity supply market (including possible development of processes and data flows to ensure appropriate local prices during a RaaS event in response to a network fault), and
- Interactions between different flexibility markets as they develop over time

### 3.11 Supporters

Risk Title	Risk Description	I	C	Mitigation
Unwillingness to participate	The commercial arrangement or terms offered by a RaaS Service Provider, or perceived risks regarding the associated impact on their day-to-day activities, means potential Supporters do not participate	16	56	Stakeholder engagement activities during the RaaS project should include developing an understand of the viewpoints of potential Supporters.  For future roll out of RaaS, DNO-led engagement with potential Supporters should encourage and promote their involvement.
I&C customer understanding	I&C customers feel that risks to their own resilience/operations outweighs benefits of supporting RaaS	16	48	Potential benefits of participation must be clearly communicated by RaaS Service Providers or DNOs, to allow I&C customers to make an informed and balanced judgement about risks associated with their participation in RaaS.
RaaS revenue	Lack of sufficient value to attract participation	12	44	The RaaS project will assess the potential business case for RaaS from both the DNO and RaaS Service Provider perspectives - RaaS Service Providers then need to balance costs and benefits associated with different sized batteries, and delivery of the scheme via a mix of reserved capacity in the BESS, services from Aggregators, and services from Supporters

### Summary

The involvement of Supporters in the delivery of a RaaS scheme could allow a RaaS service to be provided using a greater proportion of existing assets and capabilities, thereby potentially providing a more economically efficient solution.

### Recommendations

**The RaaS project must consider how potential Supporters can be contracted or incentivised to support continuity of supply during RaaS events.**

**At the time of writing, the Distributed ReStart project is considering direct contracts between the ESO and each organisation that will support the Distributed ReStart scheme (rather than the ESO contracting with the**

**Anchor Generator in the Distributed ReStart Zone (DRZ), and the Anchor Generator contracting with other participants). Whilst that is a different use case to RaaS with key distinctions in requirements, the RaaS project will continue to work with the Distributed ReStart team to understand potential procurement strategies, and ensure that these are aligned to allow suitable assets to participate in both Distributed ReStart and RaaS where appropriate.**

## 4 Mitigating Risks through the Procurement Strategy & Commercial Structure

The proposals for the RaaS procurement strategy and commercial structures will be finalised during Phase 2 of the project, with ongoing stakeholder engagement alongside the trial operation of the demonstration scheme at the trial site, to seek views on the optimum structure for RaaS delivery. This will include detailed evaluation of:

- Concerns of, and potential benefits from, Aggregators working together with the RaaS Service Provider
- Concerns from customers with their own electricity resilience schemes regarding the application of, or participation in, RaaS
- How the RaaS Service Providers can value the participation of Aggregators or Supporters in the cost effective provision of a RaaS scheme to a DNO

This section summarises suggestions for how the risks identified above can be mitigated throughout different stages of RaaS delivery - from the RaaS project through pre-tender activities, procurement, installation and operation.

### 4.1 RaaS Pre-tender: strategy, pipeline & engagement

**Stakeholder & Market Engagement:** Engagement will be critical to raise awareness and promote interest from all stakeholders - this engagement needs to be at industry level for development of the market for RaaS, and at project level for Customers and potential Hosts, Supporters and Contractors in the RaaS area. For local engagement the DNO will need to take the lead role in clearly and openly communicating benefits and opportunities. Potential RaaS Service Providers should also take a role here, for instance to elicit and secure RaaS Hosts, and to obtain information from their supply chain regarding technical solutions and costs.

DNOs should aim to adopt a standardised, transparent methodology for deriving RaaS requirements and associated service values to provide transparency to the supply chain and to customers. The RaaS project will develop clear proposals for these approaches, open to peer review and adaptation by the industry.

Where possible, DNOs should seek to identify and a pipeline of potential RaaS sites and communicate these to the market. Even where these will be tendered for on a site by site basis, this will build industry confidence in the opportunities available from RaaS, supporting commitment to developing the required capabilities and/or equipment.

**Location-specific factors:** Each RaaS area will have a unique makeup of potential participants (e.g. Hosts & Supporters). The engagement and procurement strategies developed through the project will reflect these options, and the potential development of the market. Further, RaaS deliverable C6.1 'Investigation into the Wider Potential of RaaS' sets out several industries and commercial sectors that may have an interest in participating in a RaaS scheme to support the DNO, or potentially procuring RaaS to support their own site.

In addition to identifying suitable site for a RaaS solution and specifying requirements to put to the market through the procurement process, DNOs may have a useful role in engaging with local organisations and/or the wider supply chain to stimulate participation, particularly in the early stages of market development. Where appropriate this could extend to brokering engagement with potential RaaS Service Providers, or developing interfaces between different organisations that may consider participation in RaaS, to provide a means for diverse mixes of RaaS Service Providers, Hosts, Aggregators or Supporters to coalesce and explore opportunities for providing a RaaS scheme.

### 4.2 Procurement

To stimulate the market for RaaS, procurement processes must be designed to encourage participation from a wide range of potential Investors (potentially from communities to pension funds) in partnership with RaaS Service Providers with commercial and technical optimisation capability, and encourage participation from a wide range of potential onward supply chain organisations.

**Standardisation:** DNOs should aim to adopt a standardised, transparent methodology for deriving RaaS requirements and associated service values to provide transparency to the supply chain and to customers. The RaaS project will develop clear proposals for these approaches, open to peer review and adaptation by the industry. Similarly, to support supply chain engagement with this new market, RaaS procurement processes should be aligned across DNOs to provide a clear opportunity and quickly build familiarity amongst all supply chain stakeholders.

**Technology:** The expected typical size of a battery required for a RaaS scheme is less in demand than other scales of BESS at present, and therefore the market is benefiting less from the economies of scale seen with other more prevalent battery capacities. DNO identification of a potential pipeline of RaaS sites, or a tender process which encompasses a number of sites, may build supply chain confidence in committing to the provision of appropriate BESS schemes and associated control technology. The detailed system designs developed through the RaaS project will provide blueprints for other to adopt/adapt in developing their RaaS solution.

**Allocation of risk and accountability:** For a new enterprise delivering new capability, the balance of risk and reward must be right for all parties to provide a firm basis for sustained success. This balance must be reflected in the opportunities offered to the market and the procurement approaches used.

In allocating risk, the proposed RaaS procurement strategy will consider:

- Site-specific technical/commercial risks, as well as portfolio risk for a number of RaaS schemes
- Risk appetite of potential Investors and RaaS Service Providers
- Other Investor/RaaS Service Provider specific factors

The procurement strategy and process will need to understand these factors and be designed to appeal to Investors/ RaaS Service Providers with appropriate capabilities and risk appetite. For instance:

- A single framework contract for many opportunities across an entire DNO may be more appealing to larger utilities, and perhaps lead to lower procurement costs
- A site-by-site procurement approach may be more interesting and accessible to community investors and may generate higher social value

**Commercial:** Whilst commercial arrangements are still under development, options for participation of Aggregators and Supporters will be reflected in the procurement strategy. Where a RaaS Service Provider and multiple Aggregators/Supporters combine to deliver an efficient and cost-effective solution, the project will investigate alternative models - an example here may include the DNO (rather than RaaS Service Provider) holding contracts with Aggregators or Supporters (reflecting the approach that National Grid ESO are currently proposing within the Distributed Restart project). An alternative may be a collaborative agreement between all relevant parties (DNO, RaaS Service Provider, Aggregators and Supporters) that clarifies what is technically and commercially expected when a RaaS event occurs.

**Geography:** By their nature, sites which will benefit from initial roll out of RaaS are remote and dispersed across GB. This may have little impact for some roles (e.g. Investor, battery supplier, etc.) but may have a major impact on others (e.g. Contractors for small civils or maintenance works) - a Cornish SME may be interested in tendering for such works in Cornwall, but not in the Hebrides. Evidence from supply chain

engagement within the RaaS project suggests that fixed-price EPC arrangements for delivery in remote areas are difficult for the RaaS supply chain to cost.

The experience of local Contractors around issues like site access is likely to enhance RaaS delivery, in addition to improve the social value of RaaS within the local area through investment in the local economy.

To support local involvement in the delivery of RaaS, DNOs could engage with Local Authorities, Local Enterprise Partnerships and other relevant bodies to raise awareness of opportunities associated with RaaS, with these organisations using established contacts or communication routes to signpost RaaS to the local supply chain.

A further consideration regarding location is that for any given site, there may be few alternative locations and/or landowners that are able or willing to host the RaaS battery. This may curtail the chance of a full procurement exercise to assess advantages across a range of sites, and the process may be limited to negotiation with a single landowner - in locations where there are few suitable host sites, individual potential hosts become more influential stakeholders.

**Environmental, Social & Governance (ESG) criteria:** RaaS represents a lower carbon solution to temporary diesel generation for improving security of supply in remote locations, supporting DNOs to deliver Net Zero. To build on this and realise further environmental benefits, it would be highly appropriate to ensure that procurement processes used within RaaS include a review of environmental and sustainability aspects of delivery from potential suppliers - for example, the existence of policies to reuse and recycle end-of-life RaaS batteries.

The procurement process may also be used to promote other social values held by the appointing organisation, such as payment of a Living Wage, or support for mental health and wellbeing.

**RaaS Organisational Design:** Many models and methodologies have been developed to enhance performance in project and scheme delivery (e.g. IPA Project Routemap, ICE Project 13, Construction Playbook), each of which address failures in project delivery caused by traditional, highly transactional commercial models that drive low cost bidding and a more adversarial route to solving problems based on what was agreed in the contract.

The models above vary but are all based on the concept of a partnership approach, where parties are involved at the right time, are rewarded and incentivised appropriately, and behave responsibly, including adopting a “how can we resolve this?” approach, rather than “how can I make this not-my-fault?”. A commercial model for RaaS that involves DNOs, RaaS Providers, Investors, Hosts, Supporters and Suppliers has the potential for significant commercial complexity. Therefore, organisational design, based on modern principles, will explore how RaaS parties can be aligned towards the common goal of extended continuity of supply to customers in the RaaS area.

As the RaaS enterprise design is further defined and the roles are finalised, the project will seek to develop an organisational structure which will offer:

- A risk-based approach which ensures that critical roles in RaaS delivery work effectively as a team across different organisations to realise RaaS
- Right-time procurement, and early involvement where this adds value in reviewing designs, assessing constructability, and encouraging commitment, particularly for activities that may have longer lead times
- A fair balance of risk and reward, reflected in fair terms, incentives and penalties
- Potential capability for clustering of suppliers (where clustering is an approach to contracting two or more separate subcontractors in such a way as to incentivise them to work collaboratively towards the common goal)
- A balanced scorecard of procurement measures/criteria reflecting all aspects of value (e.g. social and environmental), not simply lowest cost

- An open, fair and transparent procurement, selection and appointment process, which encourages new entrants and local companies, without compromising quality standards
- Balancing of long-term relationships with the need to maintain resilience, so the programme is not vulnerable should any partner withdraw or cease trading
- Relationships with partners who share commitments and aspirations related to the communities and environment that represent the purpose of the RaaS project, including respecting residents, businesses and visitors, and appropriate management and logistics to mitigate impacts from noise, dust, congestion, power interruptions and other construction and installation activities
- Regular 360-degree performance reviews with partners and suppliers as appropriate to maintain high standards of delivery amongst all those involved in scheme delivery

**High demand / long lead-time materials:** With increased focus on and demand for alternatives to fossil fuels, demand for batteries and their constituent parts and materials is rising. A short-term transactional contract relationship is less likely to prioritise RaaS over, say, car manufacturers, so a longer-term relationship, potentially including some form of shared incentivisation, is more likely to result in an assured supply of these critical components and materials.

**Ensuring access for new entrants / small companies:** In keeping with DNO to run open, fair and transparent procurement process, the RaaS procurement strategy should ensure that new entrants, local companies, and other organisations with relevant skills and capabilities, but limited experience in bidding for such work, are encouraged to participate. Key to this is clear communication of project requirements, activities to raise awareness of opportunities amongst these organisations, and thoughtfully worded tender documents to allow organisations to understand how their expertise may map to delivery of relevant aspects of RaaS.

**Evaluation:** To incorporate this range of factors into RaaS procurement processes, a Balanced/Weighted Scorecard of measures should be applied. This is usual for DNOs, but should be encouraged/applied throughout other RaaS procurement activities (e.g. RaaS Service Provider procurement of a suitable energy storage system). Considerations could include information on the following:

- Health and Safety
- Quality Assurance
- Project Management
- Technical plans and deliverables
- Information Security & Data Protection
- Lead times
- Transport / delivery plans
- Re-use / recycling plans
- Material / equipment disposal methods
- Maintenance plans / requirements
- Environmental / sustainability policies
- Risk Management - inc. business continuity plans
- Planned use of subcontractors / partners and engagement with the onward supply chain - inc. selection processes
- Planned engagement with the local community
- CSR - policies and procedures regarding whistleblowing, Living Wage commitment, Anti Bribery measures, ensuring against Modern Slavery, etc.
- Insurance cover
- Finance / credit information
- Commercial - prices offered

### 4.3 Construction & Installation

**Planning Permission:** All relevant planning permissions or other permits/authorisations will be required prior to commencing construction & installation. It is noted that certain sites (e.g. a site hosted by an industrial company) may support RaaS under permitted development, however this is still likely to require some form of notification to the Local Authority. As RaaS Service Providers would have detailed technical knowledge of the solution, and should have (or have access to people with) prior planning experience, it is suggested that obtaining planning consent or other required permits should clearly be the responsibility of the RaaS Service Provider.

## 4.4 Operation

This risk evaluation work has emphasised the benefit of RaaS Service Providers having the capability to be able to trade dynamically and switch rapidly between different or changing electricity industry flexibility services to maximise their returns. Similarly, Investors & RaaS Service Providers need to follow market developments to adapt, and to spot opportunities for incorporating new technologies into their offering for RaaS or other flexibility products.

The continued evolution of energy technologies creates risk of early obsolescence, or of other options emerging which provide a more resilient, sustainable, or cost-effective solution. To this extent, the use of fixed term, or rolling, RaaS contracts provides certainty to RaaS Service Providers allowing them to appraise their current business case, but also allows for review over time as markets and technologies develop. Accordingly, a proposed initial BAU RaaS contract length of 5 years seems appropriate, and this proposal will be tested with stakeholders through ongoing project engagement activities.

As DNO requirements for RaaS are to be focused on customer benefits (rather than specific technologies or methodologies), this will allow space for leaving space for innovative solutions and approaches. The use of functional KPIs, and the clear communication of these during the procurement process, will then support the delivery of suitable outcomes for customers.

**Social Value:** Social value should be enhanced through a range of different measures appropriate to the location of an individual RaaS scheme.

Positive relationships with schools, colleges and universities should be developed, which include offering site visits, access to data, and/or talks on energy systems, sustainable solutions and the benefits of working in an energy, engineering or innovation role - where appropriate such talks can be aligned with relevant curriculum subjects.

The implementation of RaaS may also draw on local organisations for delivery of the scheme, further, local retail, hospitality or leisure service would be used by teams involved in delivery of the scheme, representing expenditure with local businesses.

Increased export capability from local renewable generation due to greater network availability will augment the income available to such schemes. Further, where the regulatory environment changes and peer-to-peer energy trading is supported, this could form an additional flexibility market revenue for a RaaS battery storage scheme. Alternatively, where a local renewable or community energy scheme chooses to install a battery system for the purpose of maximising local use of the electricity, RaaS may offer an additional income stream to that battery

Social value is also expected to accrue from the improved security of supply allowing local businesses to have more reliable trading or internet access capabilities. Improvements to network resilience may also encourage existing businesses to expand or new businesses to base themselves in more remote locations. These wider economic benefits of RaaS to the local economy should be evaluated during Phase 2 of the project and the demonstration of RaaS at the selected trial site.

**DNO operations:** DNO stakeholder engagement should not end with the procurement process - particularly during the early stages of RaaS implementation. DNOs should provide clear messaging about the performance of the system and the enhanced resilience delivered, both to help manage customer expectations, and to elicit views as to the perceived benefits and any changes that customers would value.

## 5 Conclusions

Through early consideration of detailed factors associated with the BAU application of RaaS and future evolution of the concept, risks and potential mitigation measures can be identified. This work has evaluated the potential risks from the perspectives of a range of RaaS roles and identified initial mitigations actions which can be taken forward through the project to support the successful development of the RaaS market.

Key findings include:

- The importance of the role of Host, including how potential Hosts could be identified, engaged with, and participate in RaaS
- How Supporters, and their relationships with the RaaS system, become important where RaaS moves from provision via one key asset to provision via aggregations of smaller assets within the RaaS area
- How customers and other stakeholders might be engaged with as part of RaaS procurement and delivery activities
- Potential opportunities to improve the social value from RaaS

These findings will now inform further work across the RaaS project, including:

- WP6 'WP6 Supply Chain Engagement' - further development of the supply chain and procurement strategy
- WP7 'Demonstration Site Construction & Operation' - how learning from real-world delivery of a RaaS solution can further inform the development of the RaaS market
- WP8 'Dissemination' - hypotheses and proposals for RaaS can be tested and validate via stakeholder engagement and consultation