RaaS

Resilience as a Service

Work Package 5:

Investor Risk Evaluation

(E5.2)

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I. Contents

II. Executive Summary

Work Package 5 'Business Model' of the RaaS - Resilience as a Service - innovation project aims to develop the Investor Business Case and Heads of Terms for the Business as Usual application of RaaS, as well as coordinating the amendment to the RaaS project partner Collaboration Agreement in preparation for the Stage Gate decision regarding progression to Phase 2 of the project and the implementation and trial of a RaaS demonstration scheme.

This 'Investor Risk Evaluation' E5.2 milestone deliverable explores what risks Investors may face participating in RaaS, and how these may be mitigated.

The purpose of the report is to explain what the Investor risks and mitigation measures are, establish what the balance of risk is with regard to whether certain Investor types are impacted more than others, and identify how the findings should be addressed in future RaaS project Work Packages. To complete this report a risk register was compiled by E.ON with support from project partner colleagues. The project team also reached out to external companies that might be interested in participating in a future RaaS market, and invited consultants working on the project to contribute to the risk register. It is recognised that these risks have been raised during the development stages of the project, and therefore each risk will continue to be given detailed consideration to establish whether the risk remains applicable, and whether the proposed mitigation measures are suitable or could be enhanced.

This report describes the structure of and definitions used to create the Investor Risk Register which present each of the risks and associated mitigation measures identified by the project team and through discussion with investor stakeholders. An analysis of the categories of risk and mitigation items is provided, followed by an evaluation of potential impacts on different investor types, allowing mitigation measures to be prioritised. Implications for further project work are also discussed.

Risks

A total of 73 risks were identified, and these have been ranked by their Significance, which is determined by evaluating both the likelihood and consequence of the risk occurring. Unmitigated, 50% of the risks have been labelled as Significant or Critical for an Investor. Following this, the risks have been grouped into categories to support further analysis. The categories applied and presented within this report are as follows:

- Battery Unavailability - technical issues prevent the BESS from being available to deliver RaaS or other Flexibility Services
- Financial Returns - items that will impact an Investor's financial returns not specified in the other categories
- Flexibility Services Uncertainty - inability to forecast Flexibility Services revenues with certainty
- Long Term Future of RaaS - longevity of the RaaS market
- RaaS Procurement - lack of extensive deployment of RaaS by DNOs or use of unsuitable procurement methods
- RaaS Technical Design - BESS functionality or technical design does not meet DNO RaaS requirements
- Safety - injury resulting from the application or operation of RaaS
- Site Specific - factors relevant to a RaaS scheme at a given site (rather than generic across all applications of RaaS)

Mitigations

Of the risks identified only 4% could not be influenced by an Investor. 27% of the mitigation measures related to events that may happen beyond the establishment of the RaaS market. The mitigations identified were grouped into categories to support analysis. The categories applied and presented within this report are as follows:

- Consult Ofgem - consult with Ofgem (or other relevant bodies) on industry changes which may impact RaaS longevity
- Co-ordinate Procurement - industry co-ordination of RaaS procurement UK wide to encourage DNO participation
- DNO Engagement - engage with DNOs to promote the application of RaaS where suitable
- Flexibility Market Strategy - develop a dynamic Flexibility Services trading strategy
- Product Evolution - enable evolution of the RaaS product to remain relevant in the face of market changes
- RaaS Contract - protect against risks through RaaS contract terms with the DNO
- RaaS Scheme Design - agree the specification & design of RaaS to meet Investor and DNO needs
- Safety Management - implement safe systems of work to prevent injury
- Supplier Contract - protect against risks through supplier contract terms

Significance of risks

Once the risks had been mitigated only 11% remained 'Significant' which meant they were still likely to happen or may have a serious impact on Investors. These could be further summarised into the following themes:

- BESS functionality or design does not meet the DNO RaaS requirements
- Inability to forecast Flexibility Services revenues with certainty
- DNO RaaS procurement specification is financially unviable for Investors
- Conflict between RaaS and other Flexibility Services obligations

Impact on Investor types

The impact of risks on three different Investor types was evaluated based on the three categories Barriers to Entry, Capability to Compete and Attractiveness of Participation.

Community Group investors were perceived to be most likely affected due to unfamiliarity with the potential requirements and complexities of flexibility markets, and capabilities to act within these markets. They were seen as being affected by all three categories.

Institutional Investors were perceived to be less attracted to participation if the market size was too small and revenues from Flexibility Services could not be guaranteed with some certainty.

Energy Services Companies were perceived to be less attracted to participation if the market size was too small.

Priority of Mitigations

The following mitigation measures were identified as priorities to be addressed within Phase 1 of the RaaS project (prior to the Stage Gate decision):

- RaaS Scheme Design - agree the specification & design of RaaS to meet Investor and DNO needs
- RaaS Contract - protect against risks through RaaS contract terms with the DNO
- Flexibility Market Strategy - develop a dynamic Flexibility Services trading strategy

Conclusions and Recommendations

Various categories of risks and mitigation measures have been established. Only 11% of the risks identified remain Significant after mitigation. The prioritised mitigation measures will be addressed through further work within Phase 1 of the project and so will be understood conclusively before proceeding to Phase 2.

A wider consideration for the project is the procurement of RaaS by DNOs. The key procurement related risks flagged were a lack of participation by DNOs and onerous/DNO specific obligations which could impact on market opportunity and financial viability for Investors. The project must address how a coordinated approach can be achieved to tackle these risks and attract Investors.

1. Introduction

1.1. Project Overview

The RaaS - Resilience as a Service - project is funded by the Network Innovation Competition (NIC) of the UK's Office of Gas and Electricity Markets (Ofgem). It is being delivered by three partners - Scottish and Southern Electricity Networks (SSEN), E.ON and Costain. SSEN are the distribution network operator (DNO) for the project evaluating the technical feasibility and financial viability from a DNO perspective; E.ON are an energy solutions provider who are leading the technical delivery of the battery system and developing the investor business case, and Costain are a management consultancy acting as programme managers while also providing input to the market design assessment.

The aim of the project is to investigate the technical application and commercial opportunities associated with the provision of a new market based flexibility service that could be used by DNOs to improve network resilience in remote or rural areas. This service would use a Battery Energy Storage System (BESS) together with local Distributed Energy Resources (DER) to supply customers in the event of a fault on the network.

The project will determine how network resilience can be improved in a cost-effective manner for customers in areas susceptible to power outages, where traditional reinforcement or use of DNO owned standby generation to improve security of supply would be prohibitively costly. This can be achieved by a DNO procuring RaaS from a third-party service provider, who can stack revenues through participation in other flexibility markets. In addition to developing the technical solution, the project seeks to evaluate the financial case from a DNO perspective while giving insights to RaaS service providers on the investment business case and optimal flexibility markets to operate the battery in.

In the first phase, the project focuses on site selection, system design for the chosen demonstration site, and refinement of the business case. This phase will validate whether the concept is technically feasible and financially viable and will inform a decision to be made in 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.

Phase two of the project comprises the delivery, commissioning and operation of the system in a test phase, which is due to start in 2022. This will involve monitoring and evaluation of the system's performance as well as examining different combinations of flexibility services.

The Resilience as a Service concept offers a market-based solution to improve operational reliability and provide customers with a low carbon, cost effective and secure electricity supply.

1.2. Purpose and Structure of this Report

RaaS Work Package 5 'Business Model' aims to develop the Investor Business Case and Heads of Terms for the Business as Usual application of RaaS, as well as coordinating the amendment to the RaaS project partner Collaboration Agreement in preparation for the Stage Gate decision regarding whether to progress to Phase 2 of the project and the implementation and trial of a RaaS demonstration scheme.

This 'Investor Risk Evaluation' report explores the risks Investors may face participating in RaaS, alongside revenue stacking through participation in other Flexibility Services markets, and how these risks may be mitigated. The report also sets out how the findings from this assessment of risks should

be addressed in future RaaS project Work Packages. It is recognised that these risks have been raised during the development stages of the project, and therefore each risk will continue to be given detailed consideration over the course of the project to establish whether the risk remains applicable, and whether the proposed mitigation measures are suitable or could be enhanced.

The purpose of this report is to present:

- the risks Investors may face when participating in RaaS
- the actions that can be taken to mitigate the likelihood or consequence of each risk
- the significance of each risk and potential impact on Investors
- whether certain Investor types are impacted more than others
- the prioritisation of mitigation measures and their incorporation into further project work
- conclusions and recommendations as a result of the work presented in this report

The report comprises the following sections:

- Definition of a Risk Matrix (Section 2.1)
- Investor Risk Register - explanation of the risk register developed through this work, including format, scoring, definitions and population (Section 2.2)
- Analysis of the Investor Risk Register - evaluating the risks and mitigation measures identified (Section 2.3)
- Impact on Investor Types - evaluation of how different Investor types may be impacted differently (Section 2.4)
- Mitigations priorities and incorporation into further project work - the prioritisation of mitigation measures and how these will be addressed within the RaaS Work Packages (Section 2.5)
- Impact of results on further project work - how the results of this deliverable impact the wider project (Section 3)
- Input / Feedback from Stakeholder Engagement - a summary of the process for engaging with investor stakeholders and the feedback received (Section 4)
- Summary and Conclusions (Section 5)

1.3. Definition of Key Words or Abbreviations

Table 1 provides definitions of key phrases or abbreviations used within the report.

Table 1: Definitions of key phrases and abbreviations

Word / Abbreviation	Definition
Aggregator	An organisation who can operate groups of assets in electricity Flexibility Services markets on behalf of owners/Investors
BESS	Battery Energy Storage Solution
DNO	Distribution Network Operator
ESO	Electricity System Operator responsible for keeping supply and demand in balance - in Great Britain National Grid ESO have this role

Flexibility Services	Grouping of the Balancing Services and Wholesale Markets an Investor may participate in to generate non RaaS revenues
RaaS	Resilience as a Service
Investor	An organisation or group of organisations that provides capital to support the provision of RaaS by a RaaS Service Provider
Investor Risk Register	The file which contains all of the Investor risks and mitigation measures identified
RaaS Life Cycle	The stages in the implementation of a RaaS scheme during which risks may materialise, such as concept, tender and operation
RaaS Service Provider	The organisation appointed to deliver and operate the RaaS scheme, who may or may not be the same as the RaaS Investor

2. Risk Register and Findings

This section of the report defines what a Risk Matrix is, explains the creation of the Investor risk register and its definitions, reviews the risks identified and what mitigations can be put in place, explains how different Investor types could be affected and how future Work Packages in the RaaS project should address the mitigations identified.

2.1.Definition of a Risk Matrix

A Risk Matrix provides a framework to determine the significance of risks, prioritise actions and to make business decisions.

Table 2 shows an example of a Risk Matrix. It has two axis, Likelihood and Consequence. Likelihood reflects how likely the risk is to occur, and Consequence represents the impact that the risk would have if it were to occur. This matrix has five options for both likelihood and consequence, however the number of options, and the terms used to describe the options, can be adapted according to the item or process or event to be risk assessed. The combination of likelihood and consequence for a given risk determines the Significance of the risk. In this example there are four levels of significance ranging from low to extreme, however again the number of levels used, the terms applied, and how these relate to the combination of likelihood and consequence, can be tailored to suit a specific risk assessment. Similarly, those undertaking the risk assessment must establish the implications of different levels of significance, for example an Extreme classification may result in an immediate halt to activities to allow further investigation.

This risk matrix concept has been used to create the Investor Risk Register, with associated definitions for Likelihood, Consequence and Significance given in Section 2.2 'RaaS Investor Risk Register'.

Table 2: Risk Matrix Example

	Consequence				
Likelihood	Insignificant	Minor	Moderate	Major	Severe
Almost Certain	Medium	High	High	Extreme	Extreme
Likely	Medium	Medium	High	Extreme	Extreme
Possible	Medium	Medium	High	High	Extreme
Unlikely	Low	Medium	Medium	High	High
Rare	Low	Low	Medium	High	High

2.2.RaaS Investor Risk Register

This section describes the Risk Register created to collate the RaaS Investor risks. It presents:

- the format of the register
- the process followed to populate the register
- the risk scoring system including definitions of Likelihood, Consequence and Significance
- definitions of the RaaS Life Cycle against which risks were assigned
- definitions of the risk categories used to group risks for analysis and summary within this report
- definitions of the mitigation categories used to group mitigations for analysis and summary within this report

2.2.1. Risk Register Format

An excel spreadsheet was used to collate the risks. Table 3 lists the column headings used in the Investor Risk Register and provides a description of the use and purpose of each.

Table 3: RaaS Investor Risk Register column headings

Column Heading	Input Type	Description
RaaS Specific	List	Select whether the risk is specifically linked to RaaS or is a wider battery/energy system related risk that could impact RaaS
Risk type	List	Select the category to be assigned to the risk to support analysis and reporting
Risk	Free Text	Short description of risk
Description	Free Text	Long description of risk
Impact Stage	List	Select which stage of the RaaS Life Cycle the risk would materialise in
Unmitigated Likelihood	List	Select how likely the risk is to occur if unmitigated
Unmitigated Consequence - five impact types	List	Select the level of consequence the risk would have for each of the impact types if unmitigated
Unmitigated Significance	Automated	Determines the Significance of the risk for the Investor prior to mitigation
Unmitigated Impact Type	Automated	Determines which impact type is most significant for this risk prior to mitigation
Mitigation	Free Text	Description of actions that should be taken to reduce the Likelihood or Impact of the risk
Mitigation Category	List	Select the category to be assigned to the mitigation measure to support analysis and reporting
Mitigated Likelihood	List	Select how likely the risk is to occur once mitigated
Mitigated Consequence - five impact types	List	Select the level of consequence the risk would have for each of the impact types once mitigated
Mitigated Significance	Automated	Determines the Significance of the risk for the Investor once mitigated
Mitigated Impact Type	Automated	Determines which impact type is most significant for this risk once mitigated
Comments	Free Text	Option to provide further information about the risk, its Likelihood/Consequence, or associated mitigation measures

2.2.2. Risk Register Population Process

The risk register was created by E.ON and initially populated by the E.ON RaaS project team members.

The register was then circulated to non RaaS project team members within E.ON for input and feedback. Additional input was received from E.ON's Market Insight, Product Development, Engineering and Public Affairs teams.

E.ON also gained input from Cornwall Insight, a consultancy supporting E.ON's RaaS project work regarding Flexibility Services and how Investors can maximise revenues from different markets.

To also engage with a wider market and different potential Investor types, the register was then shared with Costain who carried out interviews with four companies/organisations who may be well placed to facilitate participation of others in RaaS, or directly invest in a RaaS scheme.

Costain provided E.ON with a summary document[1] describing the approach taken to this stakeholder engagement and the feedback received from interviewees, which was then used to update and enhance the Investor Risk Register and complete this report.

2.2.3. Risk Scoring System

This section explains the categories used in the Investor Risk Matrix for Likelihood, Consequence and Significance, and describes how the identified risks were scored.

Likelihood

Table 4 lists the five grades of Likelihood used in the Investor Risk Register together with their definitions, and indicates associated probabilities. Grade 1 is the least likely and Grade 5 the most likely.

Table 4: Likelihood grades with definitions and probabilities

Grade	Likelihood	Definition	Probability
1	Unlikely	Extremely rare	<10%
2	Possible	Low likelihood but not impossible	10-25%
3	Occasional	More likely than possible but less than 50% chance of occurrence	26%-49%
4	Likely	More likely to occur than not	50%-90%
5	Almost Certain	Only small chance it will not occur	>90%

Consequence

Five grades of Consequence have also been applied, however the potential consequence has also been appraised with regard to five Impact Types, to more clearly define the Consequence.

Table 5 lists the Impact Types which have been used in the Investor Risk Register together with their definitions.

Table 5: Impact Types with definitions

Impact type	Definition
Safety	Risk of injury due to operation of the RaaS scheme
Market Size	Risk of a constrained market opportunity for Investors
Financial	Risk of reduced financial returns for an Investor (comprised of revenues from RaaS and participation in other flexibility markets)
RaaS Contract	Risk of breach of RaaS contractual obligations
Flexibility Services Contract	Risk of breach of contractual obligations for other flexibility markets

Table 6 then presents the five grades of Consequence with definitions for each Impact Types. Grade 1 has the lowest consequence and Grade 5 the highest consequence.

[1] 'Resilience as a Service - Investor Risk Review', Costain, February 2021

Table 6: Consequence grades with definitions by Impact type

Grade	Safety	Market Size	Financial	RaaS Contract	Flexibility Services Contract
1	No injuries	No impact on market size	No or immaterial impact on performance	No impact	No impact
2	Minor injury with effects in timeframe of weeks, full recovery expected	Market size reduces by less than 10%	Impact in year or over the duration of the project but not material to the financial return	Acceptable penalties within contract framework	Acceptable penalties within contract framework
3	Moderate injury with effects in timeframe of months, full recovery expected	Market size reduces by less than 30%	Reduction in financial return versus anticipated but still in line with acceptable	Multiple breaches of contract and penalties	Multiple breaches of contract and penalties
4	Permanent injury/disability, unlikely to fully recover	Market size reduces by up to 70%	Financial return lower than acceptable	Termination of project contract with Investor	Termination of project contract with Investor
5	Fatality	Market size reduces by more than 70%	Project loss making	Termination of market wide RaaS contract with Investor	Termination of market wide Flexibility Services contract with Investor

Each of the identified risks was graded against Likelihood and Consequence for all five Impact Types.

Significance

The Significance classification for each risk is determined from the Likelihood & Consequence grades. Table 7 lists the Significance classifications with definitions given.

Table 7: Significance Categories and Definition

Significance Classification	Definition
No impact	No impact on Investors (note - this category only applies to risks post mitigation measures)
Insignificant	No significant impact on market size or financial returns for Investors
Acceptable	More impact on the market size and financial returns but still within acceptable terms for Investors
Significant	Investors would need to give serious consideration as to whether the possible benefits outweigh the consequence of the risks for their situation
Critical	Consequence too high for Investors to participate

Table 8 maps the Significance classification according to Likelihood and Consequence.

Table 8: Significance by Likelihood and Consequence

	Consequence				
Likelihood	1	2	3	4	5
5	Acceptable	Acceptable	Significant	Critical	Critical
4	Insignificant	Acceptable	Significant	Significant	Critical
3	Insignificant	Acceptable	Acceptable	Significant	Significant
2	Insignificant	Insignificant	Acceptable	Acceptable	Significant
1	No Impact	Insignificant	Insignificant	Insignificant	Acceptable

The Investor Risk Register identifies the Impact Type which has the greatest influence on Significance. Where more than one Impact Type has the same level of Significance, the Impact Types have been prioritised as presented in Table 9.

Table 9: Impact Type priority order

Priority	Impact Type	Reason
First	Safety	The safety of people is always the priority of any organisation.
Second	Market Size	If the RaaS market size is limited there will be a smaller opportunity for financial benefit for Investors, which may deter participation.
Third	RaaS Contract	Breaches of the RaaS contract by Investors due to performance may deter DNOs from implementing RaaS solutions, reducing the potential financial benefits for Investors
Fourth	Financial	Such risks are likely to be specific to one project rather than to an Investor's portfolio of projects. This assumes that although an Investor may not make the financial returns it expects on one project, that risk will not affect all projects.
Fifth	Flexibility Services Contract	As a risk may only impact on the provision of one Flexibility Services product and not all flexibility markets, this is assumed to have the least impact.

2.2.4. RaaS Life Cycle

Each risk identified has been allocated to a specific stage in the RaaS Life Cycle. This provides a useful indication of the balance of risks across the different stages of a scheme. Table 10 describes the stages that were used.

Table 10: RaaS Life Cycle stages

Stage	Definition
Concept - the RaaS project demonstration	The development and appraisal of the RaaS concept including product design & specification, contractual framework, financial business case (to the Investor and to the DNO) and demonstration of the technical and commercial viability of the RaaS solution. This stage needs to be complete for RaaS to become a viable option for implementation at locations across distribution networks

Project Development	The stage at which specific designs would be created for an individual or group of RaaS sites, to meet the requirements specified by the associated DNO.
Tender	The process through which DNOs select suppliers to deliver RaaS schemes.
Operation	The installation and operation of an asset to provide RaaS (together with other Flexibility Services) for the duration of the contract.
Product Extension	Extensions of the RaaS product following the establishment of a mature RaaS market - this considers factors that may impact on the scale of the RaaS market in the future.

2.2.5. Risk Categories

To support analysis of the Investor risks for summary in this report, eight risk categories were identified. Table 11 lists the categories applied with definitions given. For some categories a short name has been used in the risk register and for reporting in gphs.

Table 11: Risk Categories

Risk Category and (Short Name)	Definition
Battery Unavailability	The battery is unable to operate due to damage or network interruption preventing the provision of RaaS/Flexibility Services obligations
Financial Returns	Specific financial impacts such as lower Flexibility Services revenues, lack of certainty over long-term revenues, or increase in costs due to e.g. policy changes
Flexibility Services Uncertainty (Flex Uncertainty)	The Investor is unable to reliably forecast the revenues from Flexibility Services over the duration of the RaaS contract
Long Term Future of RaaS (RaaS Future)	Changes to regulation or the development of solutions that could reduce the size of the RaaS market once it has reached maturity
RaaS Procurement	The RaaS specification, contractual obligations or procurement strategy (inc. timescales for procurement, contract lengths) make prices uncompetitive, reduce the size of the market opportunity or limit the number/size of Investors who can/want to participate
RaaS Technical Design	The functional capability of the BESS does not meet the requirements of the procuring DNO's specification
Safety	Risk of danger to people during installation or operation of a RaaS system.
Site Specific	Risks that are unique to individual sites, e.g. difficulties sourcing land for battery installations, accessibility, finding contaminated land or protected species, etc.

2.2.6. Mitigation Categories

To support analysis of the mitigation measures for summary in this report, ten mitigation categories were identified. Table 12 lists the categories applied with definitions given. For some categories a short name has been used in the risk register and for reporting in graphs.

Table 12: Mitigation Categories

Mitigation Category & (Short Name)	Definition
Consult Ofgem	Consult with Ofgem (or other relevant bodies) to ensure that any industry changes continue to accommodate solutions which represent the best outcome for the customer, highlighting potential impacts of any changes on RaaS as necessary
Co-ordinated RaaS Procurement (Co-ordinate Procurement)	Some co-ordination of the approaches used to procure RaaS by DNOs will support market participation and growth through elements of standardisation.
DNO Engagement	Engagement from DNOs is required to implement a number of the mitigation measures identified, and to promote the capabilities of a RaaS product.
Flexibility Market Strategy (Flex Strategy)	Investors should ensure that they have systems in place to operate dynamically in the range of Flexibility Services to adapt and maximise returns as products change and new products emerge
No Influence	Investors are unable to influence mitigation of such risks, e.g. a future reduction in electricity demand reducing the need for RaaS (though potentially increasing the RaaS Service Provider's ability to participate in other Flexibility Services)
Product Evolution	Investors should ensure that the RaaS proposition has options for adapting to potential future market conditions
RaaS Contract	Mitigate risks through careful development of RaaS contract terms
RaaS Scheme Design	DNOs to create RaaS specifications which can be met by a range of Investors / technologies types, Investors to ensure that their systems design can fulfil a DNO's requirements
Safety Management	Ensure safe systems of work are implemented to enable people to work safely and avoid injury, and take other potential human interactions into consideration when designing the RaaS solution (e.g. DNO staff working on the downstream network, people visiting the BESS site, members of the public passing the site, trespassers, etc.)
Supplier Contract	Mitigate against supplier failure through careful development of contract terms

2.3.Analysis of the Investor Risk Register

This section of the report summarises the content of the Investor Risk Register. It explores:

- the risks identified and how they have been categorised
- which risks are specifically linked to the development of the RaaS product
- the mitigations identified and how they have been categorised
- the impact of mitigations on the Significance status of risks
- where risks sit in the RaaS Life Cycle
- the risks which remain Significant or Critical after mitigation
- how different Investor types are impacted
- the prioritisation of mitigations and their relation to further RaaS project work

2.3.1. Risk Categories

In total 73 risks were identified by the RaaS project team and through engagement with Investor stakeholders. These risks are recorded in the Investor Risk Register, and each has been given a risk category as described in Section 2.2.5 'Risk Categories'.

This section summaries the risk categories and provides examples of the risks identified.

Figure shows the percentage of the risks associated with each category, with definitions of the categories given below. This chart illustrates that risks were spread across the categories, with no one category being dominant.

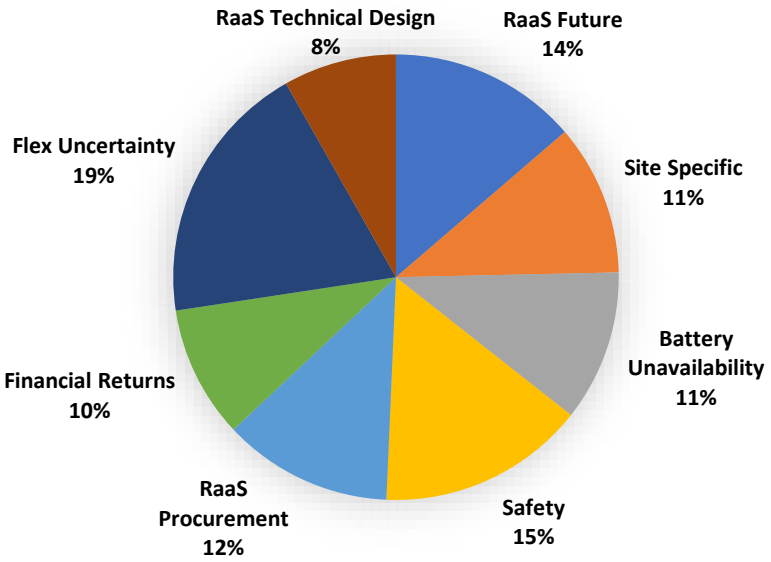

Figure 1: Proportion of total risks by Category

- Flexibility Services Uncertainty (Flex Uncertainty) - these risks relate to being unable to forecast with certainty what revenues the Investor will receive from other Flexibility Services over the duration of the RaaS contract. Risks include overall price uncertainty, the introduction of new products which are not compatible with RaaS, and the potential move too day/week ahead auctions.
- Safety - risks associated with working on site and the operation of the RaaS scheme, including working in proximity to live equipment, weather conditions, traffic and the presence of unauthorised individuals.

- Long Term Future of RaaS (RaaS Future) - these focus on the longer-term risk to RaaS. Examples include regulatory or policy changes which impact on the RaaS concept, demand reduction or volatility reducing the need for RaaS (though potentially increasing the RaaS Service Provider's ability to participate in other Flexibility Services), and industry changes or technology developments which provide more cost-effective solutions to RaaS.
- RaaS Procurement - risks that relate to a DNO's specification for a RaaS scheme such as impracticable service requirements or obligations, a lack of extensive deployment of RaaS by DNOs, inconsistent format of specifications across DNOs, or a DNO procurement strategy (inc. timescales for procurement contract lengths, etc.). A small market size, lack of standardisation across the UK or uneconomic returns will deter Investors from participating. Similarly procurement timeframes may be too short for some investor types to create consortia, raise capital or appoint technical advisors and/or suppliers.
- Battery Unavailability - risks that relate to the BESS being unable to fulfil its RaaS or other Flexibility Services obligations due to unavailability. Examples include battery faults and network issues affecting the battery's ability to charge.
- Site Specific - these are risks that are specific to one project/location, such as difficulties sourcing land for battery installations, accessibility, finding contaminated land or protected species, or a higher than expected level of demand during a RaaS event meaning that the full delivery window (period of coverage) specified by the DNO cannot be met.
- Financial Returns - these primarily relate to lower revenues from other Flexibility Services as a result of auction success rate or a potential clash with the provision of RaaS, and lack of certainty over long-term revenues.
- RaaS Technical Design - this report has been produced as part of the RaaS innovation project, and so several risks identified reflect the fact that the RaaS concept and capability of a BESS system to meet a DNO's requirements is still under development with a view to potential technical demonstration. These risks will be resolved as the project progresses and the concept is finalised.

2.3.2. RaaS or Non RaaS Specific risks

The Investor Risk Register captures whether risks are specifically linked to the development of the RaaS product or whether they are a wider battery/energy system related item that could impact RaaS. All items will need to be addressed by Investors.

Table 13 shows the proportion of risks that are RaaS specific and Non RaaS specific by risk category, and these are discussed below the table. Overall the identified risks relatively evenly split between being RaaS specific and Non-RaaS specific.

Table 13: Proportion of risks by Category according to which are RaaS specific and which are not

Risk Category	RaaS Specific	Non RaaS Specific
Battery Unavailability	3%	8%
Financial Returns	7%	3%
Flex Uncertainty	12%	7%
RaaS Future	0%	14%
RaaS Procurement	11%	1%
RaaS Technical Design	8%	0%
Safety	0%	15%
Site Specific	7%	4%
Total	48%	52%

Examples of RaaS Specific risks include:

- Battery Unavailability - these relate to battery charging constraints due to faults/demand on the network, which prevent the provision of RaaS or other Flexibility Services
- Financial Returns - these relate to how RaaS obligation may conflict with the provision of other Flexibility Services, thereby affecting Investor financial returns
- Flexibility Services Uncertainty - these relate to being able to forecast revenues reliably, and therefore understand the potential acceptability of the RaaS fees offered
- RaaS Procurement - these risks relate to the methods used by DNOs to procure RaaS services, and how this may influence Investor participation and RaaS market size
- RaaS Technical Design - these relate to the BESS technology/design not meeting DNO requirements, and to the expected requirement that a DNO may be able to override the operation of RaaS (and/or the battery's capability to charge to maintain services) at any time, potentially impacting the provision of RaaS or other Flexibility Services
- Safety - the Investor Safety risks identified reflect general points regarding the application of batteries, working with live equipment, travel & transport and weather conditions, and so are not RaaS specific. However, it is acknowledged that DNOs may face RaaS specific risks such as fixing a fault where the downstream network is live or working in the primary substation when automated switching is being carried out.
- Site Specific - these include risks that are unique to individual sites, e.g., difficulties sourcing land for battery installations, issues with access to service remote areas, inability of the RaaS scheme to provide the full resilience requirements, and early battery degradation.

Examples of Non RaaS Specific risks include general battery faults, changes to other Flexibility Services, future events which may affect the RaaS market and Safety related risks which are not specific to RaaS (e.g. traffic, working with live equipment).

2.3.3. Mitigation Categories

Mitigation measures have been identified for each risk in the Investor Risk Register. These mitigations attempt to reduce the Likelihood and/or Consequence of the risk. To support analysis and reporting, the mitigation measures have been grouped into categories. This section summaries those categories and provides examples of the measures identified.

Figure 1 shows the proportion of proposed mitigation measures by category, with definitions of the categories given below

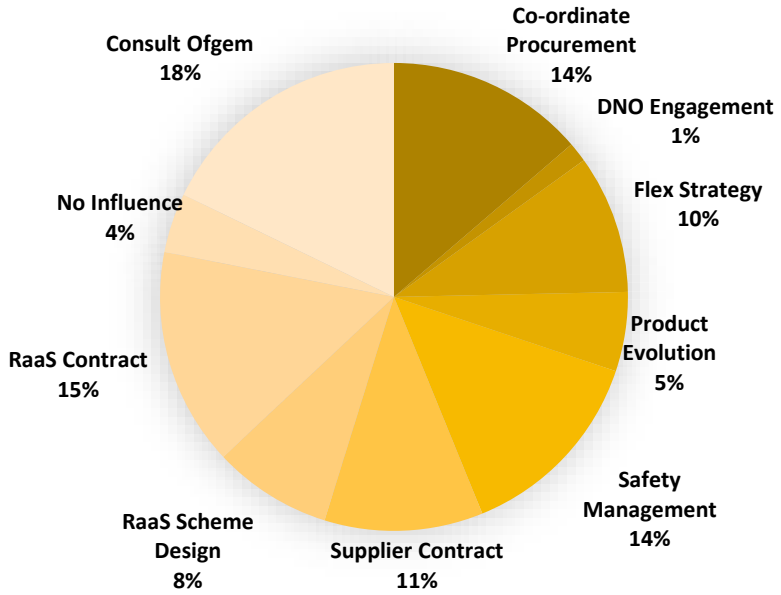

Figure 1: Proportion of mitigation measures by Category

- Consult Ofgem - a number of risks identified are a result of changes that Ofgem (or other relevant bodies) may propose, for example additional investment in the network which could reduce the need for RaaS. In those scenarios RaaS Investors would seek consultation with Ofgem to evidence the potential benefits of a RaaS solution.
- Co-ordinate Procurement - an element of co-ordination in the approaches used to procure RaaS by DNOs will encourage market participation and growth through familiarisation with similar or standardised contract expectations and obligations.
- DNO Engagement - these mitigations include close engagement with a DNO to clearly understand requirements, and to promote the capabilities of a RaaS solution in remote locations.
- Flexibility Market Strategy - due to short term contracts, competition, pricing volatility and uncertainty of potential implementation of RaaS, Investors must ensure they have systems in place to dynamically manage their portfolio in near real time to maximise their returns from Flexibility Services. If they do not have capability internally, they should consider the use of a third party with market trading expertise (e.g. potentially an Aggregator).
- No Influence - there are some risks which the Investor cannot mitigate against. These relate to a demand reduction or volatility which could reduce the need for RaaS (though potentially increasing the RaaS Service Provider's ability to participate in other Flexibility Services).
- Product Evolution - Investors must continue to monitor requirements for RaaS, and other Flexibility Services, and evolve the RaaS product to remain relevant across the markets.
- RaaS Contract - these reflect situations where the BESS is not able to meets contractual requirements or obligations, or risks around potential conflicts between participation in RaaS and participation in other Flexibility Services markets, including the fact that a DNO may retain the right to override the operation of RaaS (and/or the battery's capability to charge to maintain services) potentially impacting the Investor's provision of RaaS or other Flexibility Services, therefore careful structuring of a RaaS contract is required to understand a procuring DNO's expectations, maintain compliance to avoid penalties, and potentially allow for compensation where participation in other Flexibility Markets is heavily impacted.
- RaaS Scheme Design - during the Concept stage this relates to the need to develop a comprehensive understanding of the requirements for a RaaS solution, and the creating specifications and designs which meet DNO and Investor needs, can be met by a range of

Investors / technologies types, and take into account such things as fire prevention and prevailing weather conditions.

- Safety Management - safety related considerations include working with live equipment, traffic incidents, weather conditions and hazardous materials, and it's critical that Investors ensure that those involved with delivering and/or operating a RaaS scheme have clear processes to maintain safe systems of work, and take other potential human interactions into consideration when designing the RaaS solution (e.g. DNO staff working on the downstream network, people visiting the BESS site, members of the public passing the site, trespassers, etc.)
- Supplier Contract - for situations where a supplier may cause or influence a risk (such as installation delays due to a supplier, or lack of a timely response to a fault with the battery or ancillary equipment), it's important that the supplier contract includes clauses to correctly apportion the risk, including e.g. penalties for faults within warranty periods, or for breaches of specified performance standards.

2.3.4. Reduction in risk Significance status after mitigation

Each risk in the register was scored twice. First as 'Unmitigated' i.e. the theoretical impact should no action be taken to address the risk, then as 'Mitigated', reflecting the balance of a risk once the mitigation measures are implemented.

Figure 2 shows the movement in Significance status between Unmitigated and Mitigated risks.

50% of the Unmitigated risks were identified as Significant or Critical. The Critical risk identified relates to the expectation that a DNO will retain a capability to override the operation of RaaS. It is assumed that this will be an almost certain requirement by DNOs and depending on how frequently this happened, Investors could lose significant revenue from participation in RaaS or other Flexibility Services, and may be penalised for failure to participate in those other services.

Once mitigation measures are applied there were no remaining Critical risks and Significant risks reduced to 11% of the 73 risks identified. In total there was a 57% reduction in overall Significance status after mitigation[2]. The remaining 11% of Significant risks are discussed in Section 2.3.6. 'Outstanding 'Significant' Risks'.

Figure 2: Unmitigated and Mitigated Risk Significance scores

[2] Reduction of significance is calculated as the movement between statuses e.g. 49% Significanct to 11% = 38% reduction in significance.

2.3.5. RaaS Life Cycle

As explained in Section 2.2.4 'RaaS Life Cycle' risks were assigned to a stage in the RaaS Life Cycle to determine the balance of risks over the course of a project. This section presents an analysis of the risks across the stages, and illustrates the mitigated Significance of risks during each stage.

Figure 3 shows the spread of risks across the different stages, with examples of the associated risks given below the chart.

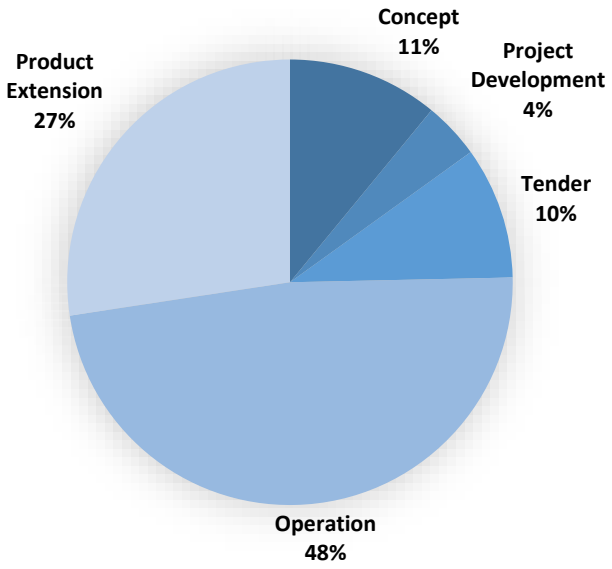

Figure 3: Proportion of risks by RaaS Life Cycle stage

- Concept - the two themes here are that the BESS technology/design does not meet DNO requirements, and that the RaaS market size may remain too small due to lack of market engagement & interest.
- Project Development - the risks at this stage relate to designs for a specific site or group of sites, and reflect considerations such as the ability to securing suitable locations to install batteries, or the remote nature of sites where a RaaS battery would be installed (e.g. accessibility for both installation and future servicing).
- Tender - these relate to the DNO procurement of RaaS, and include excessive performance/contract obligations or significantly different specifications between DNOs. Such risks could deter Investors from participating in the RaaS market, or prevent them from delivering economies of scale for DNOs, making a RaaS solution unviable.
- Operation - these risks centre around the installation and operation of a RaaS scheme, including potential battery outages affecting the provision of RaaS or other Flexibility Services, and the safety of anyone who may come into contact with the scheme (inc. RaaS Service Provider staff, DNO staff, contractors, visitors to site, and members of the public).
- Product Extension -these relate primarily to uncertainty over the future evolution of the Flexibility Services market and what impact that may have on profitability, and to potential alternatives to RaaS which may significantly impact the size of the RaaS market opportunity for Investors in the future.

Figure 4 shows the mitigated Significance status of risks over the RaaS Life Cycle.

Figure 4: RaaS Life Cycle by Mitigated risk Significance

There are Significant risks at all stages of the Life Cycle apart from Project Development. Most of the Significant risks are associated with the Concept stage. This relates to ensuring the BESS technology/design can meet a DNO's specified requirements, which is a key focus of Phase 1 of the RaaS project. All remaining Significant risks are discussed in Section 2.3.6. 'Outstanding 'Significant' Risks'.

2.3.6. Outstanding 'Significant' Risks

As per Figure 2 in Section 2.3.4 'Reduction in risk Significance status after mitigation', 11% of the risks remain significant to the Investor after the identified mitigation measures have been implemented. Table 14 lists the risks that are still deemed 'Significant', describes the proposed mitigation, and explains why it remains Significant.

Table 14: Mitigated risks which are still Significant

Risk	Proposed Mitigation	Comments on Significance
Resilience Service Requirements from DNOs are too high for economical optimisation	Use outputs of the RaaS project to engage with other DNOs and Ofgem to standardise the RaaS product specification across GB, and balance the needs of the DNO for RaaS and the Investor's participation in other Flexibility Services.	If a coordinated and standardised approach to procurement cannot be developed this could deter Investors from participating and significantly reduce the size of the RaaS opportunity.
Utilisation of RaaS service higher than forecast	Ensure visibility of historic numbers of outages in the tender information provided	To enable the Investor to submit RaaS fee prices at tender stage they will need to make assumptions on what other Flexibility Services revenues they may be able to access, and

	by DNOs to support assessment of participation in other flexibility markets and suitable battery sizing, and ensure RaaS contracts with DNOs include a suitable payment mechanism.	evaluate the optimum battery size for participation across the range of markets. This perceived risk therefore has nuances (in line with elements of uncertainty across all Flexibility Services markets) associated with the RaaS Service Provider's assessment principles. Appropriate consideration of the RaaS income stream would reduce the significance of this risk (indeed additional utilisation may increase income). However, where a RaaS Service Provider had purely sized a battery to participate in other flexibility markets with the intention to sacrifice that participation to provide a RaaS service, this risk would be more significant. In either case, visibility of data and assumptions around potential numbers of outages provides information on which the RaaS Service Provider can make their assessment.
Long/fixed term contracts are no longer available for Flexibility Services	Investors need to ensure they have developed systems to be able to trade dynamically and be able to switch between Flexibility Services rapidly to maximise their returns.	Dynamic trading systems will support market participation but may not guarantee that the Investor secures sufficient revenues from Flexibility Services to meet its financial targets.
New volumes of battery storage flood Flexibility markets	Investors need to ensure they have developed systems to be able to trade dynamically and be able to switch between Flexibility Services rapidly to maximise their returns.	A flood of new battery storage assets for Flexibility Services markets will likely lead to a significant drop in Flexibility prices. Dynamic trading systems will support market participation but may not guarantee that the Investor secures sufficient revenues from Flexibility Services to meet its financial targets.
Delays in the introduction of new Flexibility Services	Engage with Ofgem and other industry bodies to publish timescales for the introduction of new Flexibility Services and highlight the potential risk to RaaS if they do not align.	The RaaS fees Investors require will be based on assumed availability of and participation in other Flexibility Services during the contract term. If these change in scope or timing this could significantly impact the financial returns of the project.
DNO has RaaS override control	Ensure RaaS contracts with DNOs include a payment mechanism to mitigate against	Even where a RaaS contract allows an Investor recompense for e.g. prolonged periods of time times when a DNO overrides the RaaS system for reasons outside the control of the Investor

	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.	or RaaS Service Provider, there is a risk that an Investor is blocked from further participation in other markets due to ongoing performance failures.
Insufficient network protection scheme(s) in island mode	The DNOs need to assess and understand the impact of operating an island network off a battery on the existing protection scheme and adjust or improve protection assets if necessary. Investors cannot take the responsibility for protection of the existing network. The RaaS Project detailed design work will analyse this in detail and set out the requirements for a range of different sites, which should then serve as a basis for informing the future application of RaaS to other sites and networks.	If DNOs cannot adequately adjust or upgrade the protection systems this will affect the viability of RaaS.
Ability to perform black-start based on unproven assumptions	The requirements to perform a successful black start of the 11kV network will be analysed in detail during the detailed design stage of the RaaS project. DNOs implementing RaaS would need to use this learning to understand the requirements for successful black start from the BESS, and include this accordingly in any tender documents.	If the requirements for performing a successful black start require an uneconomical BESS at the majority of sites, this might affect the overall viability of RaaS, however the capability to provide ride-through islanding (in the absence of black start capability) could still provide a revenue from RaaS.

2.4.Impact on Investor types

This section explores whether there are risks which adversely affect certain Investor types more than others, and if so, why. It explains whether these risks create a barrier to entry, affect the capability to compete within the market, or affect the attractiveness of participation.

Three key Investor types have been identified, as follows:

- Community Groups - residents and businesses that share in the investment of a local community energy project. Their interest is likely to be in one or more local projects, with the purpose of generate benefits for their communities. Such groups may not have the capability to act as a RaaS Service Provider directly, so would rely on participation in RaaS through third parties, and may potentially require funding and/or guidance from government bodies or other supporting organisations.
- Institutional Investors - these companies do not directly participate in the delivery of energy solutions. They invest in companies that do have the capability or create corporate vehicles to employ suppliers to deliver services on their behalf. Institutional Investors will look for large scale, low risk investments with secure financial returns, potentially having funds available to participate in RaaS nationally.
- Energy Services Companies - companies whose core business is the delivery of energy projects, and so have the technical and operational capability to deliver RaaS together with the financial capability to fund such projects. They may be well placed to invest nationally, again seeking secure financial returns.

Table 15 maps risks categories against Investor types and identifies which Investor is affected, with further description given below the table. The risk categories not included in the table affect all Investor types equally.

Table 15: Risk type impact on Investors types

Risk Category	Barrier to Entry	Capability to Compete	Attractiveness of Participation
Flexibility Services Uncertainty	None	Community Groups	Community Groups Institutional Investors
RaaS Market Size	None	None	Institutional Investors Energy Services Companies
RaaS Procurement	Community Groups	Community Groups	Institutional Investors

Community Groups

- Barriers to Entry - DNO procurement processes may require evidence of industry experience or economic strength as a perceived mitigation against failure to deliver. Community based groups may struggle to meet such thresholds, therefore this barrier may be significant. To address this barrier DNOs could actively support the participation of Community Groups in the provision of a RaaS schemes.
- Capability to Compete - complexities associated with ensuring compliance with contractual obligations and/or participating in a range of flexibility markets to stack revenues from e.g. DNO, ESO and wholesale markets requires familiarity with the markets and capabilities to trade effectively to realise the required returns. Alternatively Community Groups may need to contract with third parties with the capabilities to act as a RaaS Service Provider and manage

participation in these markets on their behalf, impacting on the potential income. Contract negotiations would also be necessary for engaging with sub-contractors to develop a RaaS scheme, and/or with potential RaaS Service Providers. DNOs and RaaS Service Providers could support the participation of Community Groups in the provisions of a RaaS scheme through awareness raising and clear communication of the potential benefits and risks for the local community.

- Attractiveness of Participation - uncertainty over the potential evolution of Flexibility Services markets may deter Community Groups from participation in RaaS. Further, for smaller numbers of local investments it may not be as possible to balance potential risks and returns as may be the case with a wider portfolio of projects. The perceived complexity of the market may also be a significant deterrent.

Institutional Investors

- Attractiveness of Participation - Institutional Investors will be looking for a steady financial return from a reasonable sized portfolio of projects managed by companies capable of acting as the RaaS Service Provider, and the absence of clear/committed uptake and deployment of RaaS by DNOs will influence perceptions regarding market size opportunity. Uncertaintiy around the development of other Flexibility Services also adds complexity to the assessment of financial returns. The range of procurement risks identified may influence decisions by Institutional Investors, however the outcome from the RaaS project, with successful demonstration of RaaS during Phase 2 of the project, will provide evidence and learning to inform the future roll out of RaaS by DNOs.

Energy Services Companies

- Attractiveness of Participation - Energy Services Companies will recognise economies of scale in using their capabilities to deliver RaaS schemes across a portfolio of sites, acting as the RaaS Service Provider as well as Investor. Their success, coupled with the active deployment of RaaS by DNOs, may deliver sustainable financial returns whilst meeting DNO requirements for a cost effective solution. Scale will also enable Energy Services Companies to manage risk across their portfolio. A slow uptake and deployment of RaaS by DNOs would not encourage Energy Service Companies to invest time in developing a RaaS market offering.

2.5.Mitigation priorities and incorporation into further project work

Through creation of the Investor Risk Register and engagement with Investor stakeholders, the following mitigation measures were identified as highest priority to be addressed through the RaaS project to help de-risk the proposition:

- Develop a detailed design for the RaaS solution which recognises DNO and Investor perspectives, and provides specifications which can be appraised by all relevant market participants
- Protect against risks through careful development of RaaS contract terms
- Investigate a dynamic Flexibility Services trading strategy for Investors

Table *16* sets out how these considerations will now be addressed through the relevant Work Packages within Phase 1 of RaaS with the purpose of developing a commercial approach which acts to reduce percieved risks.

Table 16: Mitigations to be addressed in RaaS Phase 1 Work Packages

Work Package	RaaS Specification	RaaS Contract Terms	Flexibility Services Strategy
WP3 Detailed Design	WP3 will address the outstanding risks associated with the BESS functionality and potential DNO requirements which will inform the specification for a RaaS scheme. This work aims to define requirements suitable for trial implementation of RaaS and for future deployment across other network areas.	Not applicable	Not applicable
WP4 Operational & Commercial Optimisation	Not applicable	Not applicable	WP4 aims to evaluate and understand options for optimisation operation of the battery asset in RaaS and other Flexibility markets, with the aim of maximising Investor revenues. This will provide a range of outcomes based on different price forecasts and on scenarios which reflect different forecasting/requirements specification capabilities of a DNO. This will provide the project with an enhanced understanding of the level of uncertainty associated with investment in a RaaS scheme.
WP5 Business Model	Not applicable	WP5 will develop proposed Heads of Terms for the provision of RaaS. In addition to the terms of participation in RaaS, this will incorporate a framework for specifying the DNO requirements for RaaS at a given site (demand capacity, duration, etc.) together with potential payment	WP5 will use the output from WP4 to evaluate potential Investor returns from participation in RaaS and other Flexibility Services markets based on the scenarios considered. Indicative levels of required RaaS fee will be compared with the DNO business case assessment to

		structures, to ensure potential Investors can understand and evaluate potential obligations and their capability to meet the requirements with the technology/ies available to them. All risk mitigation measures relating to the RaaS contract will be considered by the project team and incorporated into these Heads of Terms as appropriate.	understand the extent of the overlap between Investor required fees and DNO cost effective fees. This assessment will inform the project Stage Gate decisions regarding the potential technical feasibility and financial viability of RaaS.
WP6 Future Supply Chain Engagement & WP8 Dissemination	WP6 will engage with the supply chain to provide information on the RaaS concept, explore capabilities, and identify any existing best-practice relevant to development of the RaaS specification.	By engaging with a wide range of stakeholders to both understand perceptions of RaaS and relevant best practice from outside the electricity distribution industry, WP6 & WP8 can inform development of contract terms which balance and mitigate risks, to support the wider future application of RaaS.	Through these WPs the project team will engage with Investors, DNOs and others to seek views and validate that revenue stacking from different Flexibility Services can be achieved practically as well as theoretically, and to understand any further considerations with regard to the market design for RaaS. WP6 will also explore the range of potential applications of RaaS in GB (beyond rural network implementation) to provide insight regarding risks around the potential market size.

3. Impact of results on wider project activities

Section 2.5 ‘Mitigations priorities and incorporation into further project work’ refers to the risks and mitigation measures that must be addressed within Phase 1 of the RaaS project (prior to the Stage Gate decision regarding whether to progress to Phase 2 of the project and the implementation and trial of a RaaS demonstration scheme),

In addition to those specific aspects, a wider consideration to be addressed by the project is how to co-ordinate the procurement of RaaS by DNOs across GB. Various risks identified through this work have flagged the impact that a lack of extensive deployment of RaaS by DNOs or use of unsuitable procurement methods or contract obligations may have.

From an Investor’s perspective the greater the uptake/application of RaaS by DNOs the greater the attraction to invest time in creating a RaaS offering. To ensure that RaaS is attractive to a wide range of potential investors and market participants, standardisation in product specifications, contract terms and contract length (where non geographically specific) across potential RaaS sites and between DNOs would enable Investors to clearly understand and meet requirements and to realise potential economies of scale in participating in the provision of RaaS across a number of sites. This would also support Investors in evaluating the participation of RaaS assets in other Flexibility Markets across their portfolio of schemes,

RaaS Work Package 8 ‘Dissemination & Stakeholder Engagement’ will be used to present proposals to stakeholders and elicit feedback to shape development of the outputs from the RaaS project. All contributes and challenges will be addresses to ensure that the project reflects the requirements of all potential RaaS market participants as fully as possible.

The project will also identify any opportunities to remove current barriers to potential implementation of RaaS and raise these with appropriate external organisations (e.g. regulation, standards, governments policy, etc.).

4. Input / Feedback from Stakeholder Engagement

As described in Section 2.2.2 'Risk Register Population Process', the initial Investor Risk Register created by E.ON was shared with Costain, who subsequently carried out interviews with four companies/organisations who may be well placed to facilitate participation of others in RaaS, or directly invest in a RaaS scheme.

Costain provided E.ON with a summary document[3] describing the approach taken to this stakeholder engagement and the feedback received from interviewees, which was then used to update and enhance the Investor Risk Register (with regard to risks, mitigation measures and risk scores) and complete this report.

A summary of the findings from this are presented below.

Risks

The two key risk categories referred to by interviewees were Flexibility Services Uncertainty and RaaS Procurement.

- Flexibility Services Uncertainty - interviewees identified product evolution, timescales associated with procurement requirements (e.g. fixed for the contract duration vs day ahead scheduling), contract length, and the ability to stack revenues from participation in other Flexibility Services markets, as key risks to the certainty of revenues from a RaaS asset.
- RaaS Procurement - interviewees identified short timescales (Investors unable to put in place consortia, advisors, suppliers, finance in time to tender), lack of scale (market size and tender volume), contract length, and undefined market requirements, as key risks to potential interest and participation by Investors.

Mitigation Measures

The mitigation measures suggested by interviewees to address these risks included:

- Agreements with DNOs to incentivise them to identify periods of time during which a RaaS event is not likely to be called, thereby allowing the BESS asset to participate in other Flexibility Services markets over the agreed period
- Tender blocks of e.g. 10 or more RaaS installations, or framework agreements with mini tenders, would work well to address perceptions around the potential scale of RaaS implementation
- Well defined market requirements (inc. technical specifications), longer term contracts, and/or potential bundling of several DNO flexible solution use cases into one contract may act to encourage Investor participation.

Recommendations

Interviewees provided the following recommendations:

- Continued review of the Investor Risk Register throughout the RaaS project to add or update risks as the energy sector & Flexibility Services markets evolve
- The project must convert the findings and conclusions from this engagement work into specific requirements for a RaaS solution, whether related to the approach to procurement, or operational requirements, or terms of the associated contract. This will support communication of the concept to Investors, and their appraisal of the potential benefits and

[3] 'Resilience as a Service - Investor Risk Review', Costain, February 2021

risks associated with participation in the provision of RaaS (including stacking revenues through participation in other Flexibility Services markets).

- The RaaS project must engage with all other DNOs and the Investor community frequently and in depth, to ensure that RaaS and Flexibility Service stacking is achievable practically as well as theoretically.

5. Summary & Conclusions

5.1.Summary

The purpose of the 'Investor Risk Evaluation' E5.2 milestone deliverable was to identify the risks Investors may face participating in RaaS, how these may be mitigated, and how the findings from this assessment should be addressed within future project activities to provide conclusions for potential market participants.

Eight risks categories were identified (see Section 2.2.5 'Risk Categories'), with Flexibility Services Uncertainty being the largest at 19%.

Of the risks captured, 48% were perceived to be RaaS Specific , with 'Flexibility Services Uncertainty' here being the largest at 12%, and 'RaaS Procurement' being second at 11% (see Section 2.3.2 'RaaS or Non RaaS Specific risks').

Mitigation measures were then identified for each risk, and these have been grouped into ten mitigation categories (see Section 2.3.3 'Mitigation Categories'). Of these, 'Consult Ofgem' was the largest at 18%. This category includes risks that may emerge once the RaaS market has become established and impact its future scale. The second largest mitigation category was 'RaaS Contract' at 15%.

After mitigation only 11% of the risks identified remained 'Significant', and so may impact on an Investors desire to participate in RaaS (see Section 2.3.4 'Reduction in risk Significance status after mitigation'). The list of remaining 'Significant' risks can be seen in Section 2.3.6 'Outstanding 'Significant' Risks'.

In Section 2.3.5 'RaaS Life Cycle' the risks were plotted against the different stages of implementation of a RaaS scheme. 11% of the risks sit in the Concept stage, including risks that BESS technology/design will not meet a DNO's RaaS specification, and that the RaaS market size will be too small to attract Investors. This highlights the importance of learning from the RaaS project and widely disseminating the findings and conclusions. 27% of the risks sat in the Product Evolution stage, which reflects future considerations once the RaaS market is established.

Section 2.4 'Impact on Investor types' reviewed how risks types affected Investor types differently. Community Groups were perceived to be most affected due to unfamiliarity with the potential requirements and complexities of flexibility markets, and capabilities to act within these markets.

The mitigation measures which need to be addressed during Phase 1 of the RaaS project were identified as refining the RaaS specification, protecting against risk through the RaaS contract, and developing a Flexibility Services optimisation strategy. Section 5 'Mitigation priorities and incorporation into further project work' sets out how the points will be addressed through the different Work Packages.

Section 4 'Input / Feedback from Stakeholder Engagement' summarises the findings from the Investor stakeholder interviews held by Costain, and used to inform this work. The feedback received from interviews reflected the risk categories identified by the project team, with a focus on Flexibility Services Uncertainty and RaaS Procurement.

5.2.Conclusions

Agreeing the RaaS product specification, drafting the RaaS head of terms and analysing the capability for optimisation across Flexibility Services markets are the priority actions for the RaaS project to address the risks identified. These will be addressed comprehensively within Phase 1 of the project through Work Packages 3 to 6 & 8.

In addition to these priorities, wider consideration needs to be made as to how to coordinate the procurement of RaaS by DNOs, as the impact of this was captured in several risks. A standard approach with participation by all DNOs is seen as the most successful outcome. The project must consider how this can be achieved, taking into consideration other industry plans and initiatives, including those being explored through the ENA's Open Networks[4] project.

[4] www.energynetworks.org/creating-tomorrows-networks/open-networks