

DISTRIBUTION NETWORK OPERATOR ASSET RISK MANAGEMENT

David NEILSON

SP Energy Networks – UK

David.Neilson@spenergynetworks.co.uk

Susan BRADSHAW

SP Energy Networks – UK

Susan.Bradshaw@spenergynetworks.co.uk

Albert SANTANDREU

SP Energy Networks – UK

Asantandreu@spenergynetworks.co.uk

Alberto ELENA

SP Energy Networks – UK

Aelena@spenergynetworks.co.uk

ABSTRACT

Managing risk, improving safety and bettering asset performance for customers, the general public and staff is core to the role SP Energy Networks (SPEN) plays as a UK Distribution Network Operator (DNOs). SPEN is committed to continuously improving its risk management strategies to reduce exposure and harm, and to maximise asset performance. This can only be achieved with an effective and responsive risk management strategy and framework.

DNOs are asset-centric organisations with assets located across large territories, crossing public and private land. This makes it difficult to control and manage of all network assets and their associated risks and dangers.

This paper outlines the strategy that SPEN has developed to identify solutions to mitigate risks, share best practice and address equipment quality issues common across local areas and within the wider industry. This has been achieved by the development of a centralised Asset Management Risk Framework which uses a bottom-up approach based on risks reported at a local and national level. This framework forms part of SPEN's Enterprise Risk Reporting framework, which has been in place for over 15 years and embeds risk management into the heart of the organisation's governance process.

By standardising the method of measuring the impact of particular risks and aligning risks directly to the RIIO-ED1 outputs and incentives mechanism, risk management locally and at a central function has been improved with 89 new risks identified since implementation, and has proved an effective way of engaging and managing risks.

BACKGROUND

SPEN is part of the Scottish Power Group of companies. SPEN distribution network is split in two distribution Licence areas covering from LV up to 132kV:

- SP Distribution plc (SPD) is responsible for the Distribution network in Central and Southern Scotland
- SP Manweb plc (SPM) is responsible for the Distribution network in Merseyside, Cheshire,

North Wales and North Shropshire

SPEN owns, operates and maintains over 30,000 electrical substations, 46,000 km of overhead line and 65,000 km of underground cable within the two licence areas. This infrastructure serves circa 3.5 million customers connected to SPEN's network.

SPEN and the other UK DNOs are asset-centric organisations where assets such as towers and overhead line conductors are located across large territories, crossing public and private land. This makes it difficult to control and manage of all network assets and their associated risks and dangers.

DNOs further have to manage the risk across different types of assets with different failure modes and failure rates, adding further difficulty to risk management whilst ensuring high levels of performance.

As an asset centric organisation, risks to the asset base are an integral part of the SPEN Asset Risk Management process. In order to capture these risks and stimulate debate on the best course of mitigation and to improve asset management practice, an Asset Management Risk Framework process has been established and certified in line with ISO 55001. This framework provides a focus on asset risk that is wholly appropriate for an organization whose revenue is particularly dependent on the performance and condition of physical assets.

This framework provides a useful and specific risk management approach in line with to SPEN's overall business goals. This is completely aligned to the current price review RIIO-ED1 outputs and incentives mechanism. DNOs are expected to deliver Output and Incentive strategies and at a specific programme level with the introduction of Risk Points or a Risk Delta as the new output [1]. In as much as the regulatory contract is to deliver a well-defined and understood risk reduction with clear programmes, there is still the requirement to capture emerging risks over and above those to RIIO-ED1.

CHALLENGE

SP Energy Networks has recently formed a new business structure which has empowered regional Districts to asset manage at a local level. Prior to this restructure and prior to the implementation of SPEN’s Asset Management process, risks and assets were managed by a small number of Asset Managers.

Prior this structure the understanding of emerging risks and decision making was not always fully informed and not comprehensively captured within SPEN’s Asset Management Risk Framework process.

A more informed approach for asset specific risk management was required to understand the risks at a local District, Licence and SPEN level. Risks could be specific to a District, common to one or more Licence, and may have an impact at a SPEN business level.

Based on this SPEN built on its existing risk scoring framework and established a bottom-up structure which empowered the local Districts to understand their local risks, gave the Licence the power to identify common risks and set these in context to SPEN level risk.

SOLUTION

Risk bottom-up structure

Risks are captured via a bottom-up approach based on risks reported at a local and national level. This allows SPEN to identify solutions to mitigate risks, share best practice and address equipment quality issues common across local areas and within the wider industry.

SPEN has structured its Asset Management Risk Framework in line to the RIIO-ED1 outputs and incentives mechanism. The risks have been classified based on the Licence area they belong to and they are reviewed on a monthly basis at the various levels shown in Figure 1.



Figure 1. Risk bottom-up structure

Level 2

- District operational and investment tactical decision making
- Review of risk at a District level , relating to performance, customer service, policy and delivery plans
- Emerging risk and network issues evaluated with mitigation recommended and implemented

Level 1

- Strategic and tactical decision making at Licence level
- Review Licence specific risk, performance and delivery plans
- Emerging risk and network issues considered and reviewed - mitigation reviewed and signed off at Licence level if appropriate

Level 0

- SPEN strategic risk and investment decision making
- High level delivery and risk at SPEN level
- Emerging risk reviewed -e.g. -HSE, Network and Customer impact – mitigation formal sign off

In addition, these are supported by the internal system design and engineering forums set up specifically to develop solutions to complex and emergent asset issues as well as identifying network risk and performance issues that may impact RIIO-ED1 plans and targets.

Risk Framework Scoring Model

The new Asset Management Risk Framework is used for establishing a risk mitigation process for any asset risk within the Governance framework of the structure based on the bottom-up approach.

The risk mitigation process involves five key steps (Figure 2):

1. Identify,
2. Evaluate,
3. Define,
4. Implement and
5. Monitor

This sets out the criteria for establishing an unmitigated risk score to each asset and for managing, reducing or eliminating risks to a Tolerable level based on the As Low As Reasonable Practicable (ALARP) principle. Once a risk is identified, evaluated, defined and an action plan is implemented, it is then continually monitored to assess the plan with the intent of revising the course-of-action.

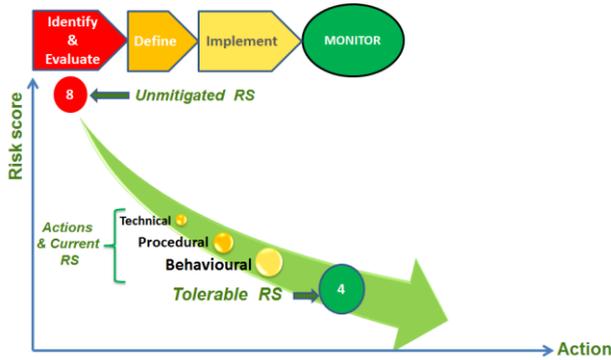


Figure 2. Risk Mitigation Process

This risk mitigation process is captured through an Asset Risk Register structured as follows:

1. Risk Description
2. Impact Scoring
3. Actions to Mitigate and Avoid

Risk Description

The Risk Description is specific and not generic, a true and accurate description of the risk faced by the local District or Licence.

For example a breach of legislation is considered a generic statement and it wouldn't be included as a risk, unless there is a specific type of legislation that the business is currently experiencing difficulty in complying with. The risk statement is specific and includes a description of the contributory events. This provides clarity of risk and can be easily understood by all the stakeholders.

The risk is also defined by differentiating between the event and the consequence of such event. For example, a failure to trip issue with a specific type of switchgear would be included as event and the likelihood on increase of customer minutes lost would be included as the consequence of the event. This differentiation is important in order for the appropriate mitigation course to be identified.

Impact Scoring

To ensure a consistent approach a standard template is used by business units when constructing a risk report. This is the same approach as used by the SPEN Enterprise framework. The SPEN template contains a scoring mechanism which is used to determine the relative significance of risks based on impact and likelihood guidelines.

The approach to risk scoring is the use of a 5 x 5 matrix, where a number between 1 (minor) and 5 (catastrophic) is assigned to a risk to reflect its potential impact, and a number is assigned between 1 (remote) and 5 (certain) to reflect the likelihood of its occurrence. These numbers

can either be added together, or multiplied to create a risk score, as illustrated in Figure 3.

	1	2	3	4	5
5	6	7	8	9	10
4	5	6	7	8	9
3	4	5	6	7	8
2	3	4	5	6	7
1	2	3	4	5	6
	Likelihood				

Figure 3. Risk matrix

The potential impacts of each risk on the business are considered against pre-set categories, to ensure a consistent impact assessment. For each risk, the 5 x 5 matrix is completed for the following impact areas:

- P&L and/or Cash Impact in the Current Budget Year
- P&L and/or Cash Impact beyond the Current Budget Year
- Health & Safety
- Business Operational Performance
- Environment
- Stakeholders

Impact Area	Not Applicable	1	2	3	4	5	Likelihood	Risk Score
		Minor	Moderate	Significant	Major	Catastrophic		
P&L and/or Cash Impact within current budget year	<input type="radio"/>	below £1m	between £1m and £20m	between £20m and £25m	between £25m and £50m	over £50m	Possible (10%)	5
P&L and/or Cash Impact beyond the current budget year	<input type="radio"/>	below £1m	between £1m and £25m	between £25m and £50m	between £50m and £100m	over £100m	Unlikely (10%)	3
Health & Safety Impact on health and safety over the next 12 months	<input type="radio"/>	minor discrepancy resolved by the end of professional	discrepancy requiring treatment by medical professional	major discrepancy requiring full recovery (30+)	serious discrepancy with increased medical intervention	fatal	Severe (10%)	6
Business Operational Performance Impact on operational activities across the business	<input type="radio"/>	minor performance of non-critical activities	minor disruption to network, support services limited to non-critical activities	disruption to network, some support services limited	temporary loss of service, outage in some business critical services, business performance limited	major service loss, business performance severely impacted	Possible (10%)	5
Environment	<input type="radio"/>	increased use of fuel or increase in waste generated	breach of hazardous substances	breach of hazardous substances and breach of environmental legislation	breach of environmental legislation leading to a fine and regulator involvement	breach of environmental legislation leading to prosecution, a fine and regulator involvement	Possible (10%)	5
Stakeholders Relationship and relationships with employees, customers, shareholders, press, government, major regulators	<input type="radio"/>	short term loss of employee morale, adverse local media report	minor employee dissatisfaction, adverse (negative) local media reporting, isolated incidents	moderate employee dissatisfaction, adverse media interest creating reputational concerns, negative national observation (press), and a minor reduction in customer base	serious employee dissatisfaction, adverse national media reporting, significant negative reactions from media and other key stakeholders, significant decrease in share price, and a significant reduction in customer base	company wide employee dissatisfaction, widespread adverse reactions from media and other key stakeholders, significant decrease in share price, and a significant reduction in customer base, reputation severely impacted and impossible to regain	Unlikely (10%)	4
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		Risk Score 4.31

Figure 4. Risk Scoring Interface

As it can be seen in Figure 4, for each impact area the impact and likelihood are scored between 1 and 5. These scores are added together, which created a risk score for each impact area (these can range from 2 up to 10 as illustrated in Figure 3).

The individual impact risk scores are then used to generate an overall risk score for the risk.

The overall risk score is never lower than the individual impact area risk scores; however is differentiated slightly by taking into account impact risks scores with a lower weighting. This distinguishes between similar risks, whilst ensuring that risks are not diluted if they score highly in one impact area, but not others.

Actions to Mitigate and Avoid

Upon considering the impact of the risk and the likelihood of the impact, actions are agreed to improve the risk position to a Tolerable level (i.e. either reduce the impact and/or the likelihood).

Three types of actions are considered to mitigate a risk:

- Technical
- Procedural
- Behavioural

For example, a risk of oil spillage from an EHV power transformer require a technical solution to refurbish a transformer to avoid oil spillage, a procedural action to put in place a process to assess poor condition EHV transformers and identify the appropriate investment intervention for each of them, and a behavioural action to all front-end staff to make sure that they identify and report any poor condition EHV transformer before starting leaking oil.

The final aim of these actions is to reduce an asset risk from an unmitigated risk to Tolerable risk based on the ALARP principle (Figure 5).

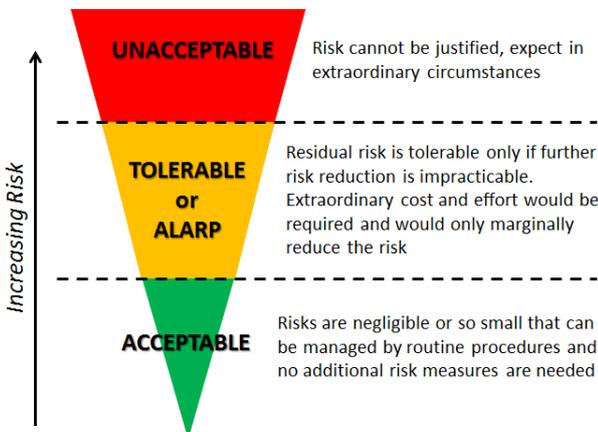


Figure 5. ALARP triangle

Making sure a risk has been reduced to a tolerable level (ALARP) is about weighing the risk against the sacrifice needed to further reduce it. The process is not about balancing the costs and benefits of measures but, rather, of adopting measures except where they are ruled out because they involve grossly disproportionate sacrifices [3].

CONCLUSIONS

Fully understand new and emerging risks, and managing these issues within asset centric organisation can be difficult. Thus, establishing a clear risk framework which is complementary to DNOs investment plans is essential.

By standardising the method of measuring the impact of particular risks and aligning risks directly to the RIIO-ED1 outputs and incentives mechanism, risk management locally and at a central function has been improved in SPEN.

As a result of the developed understanding of risks at a local District level we have seen an increase in empowerment and accountability of SPEN front-end staff to identify and manage its own risks.

The SPEN bottom-up Asset Management Risk Framework has brought the benefits of:

- Identify 89 new risks since implementation
- Share best practice and address equipment quality issues common across local areas and within the wider industry
- Improved communication on asset risk & performance helping to optimise our approach to risk during RIIO-ED1

REFERENCES

[1] OFGEM, 2012, "Strategy consultation for the RIIO-ED1 electricity distribution price control. Overview", www.ofgem.gov.uk

[2] S Bradshaw, 2014, "SP Energy Networks Guidelines on Risk Reporting", www.spenergynetworks.co.uk

[3] Health and Safety Executive (HSE), UK, <http://www.hse.gov.uk/risk/theory/alarpglance.htm>