PRINCE EDWARD ISLAND
Regulatory & Appeals Commission
Commission de réglementation et d'appels
ÎLE-DU-PRINCE-ÉDOUARD

ea technology

Maritime Electric – Storm Response Information Request

Introduction

The Prince Edward Island Regulatory and Appeals Commission (the "Commission") has engaged with EA Technology to consider the prudency of Maritime Electric's Storm response and associated expenditure, specifically in relation to named Storm Fiona. This desktop orientated project is based around the Commission's formal processes which involves the preparation of a list of written questions drafted by EA Technology's remote project team, before being issued for completion by Maritime Electric via the Commission.

The EA Technology project team are looking to build a picture of the policies, practices and procedures employed by Maritime Electric, and will form an opinion that will be predominantly based upon the responses to the questions contained within this document.

Maritime Electric (ME) are therefore advised to consider the completeness of the responses returned and are directed to include additional information which may prove pertinent to aid understanding. Our expectation and preference would be to receive drafted responses to the questions posed rather than the supply of a large volume of documentation – however, we accept that in some circumstances the return of a single document may provide a more efficient and straight forward means of response. Where this approach is taken it is considered an absolute requirement that the relevant sections of the document is specifically referenced in the response.

Maritime Electric are also directed to arrange the returned responses in a logical and easy to navigate manner, where possible linking provided materials to question number.

The written questioning is arranged in sections which are intended to provide some background information regarding Maritime Electric's electrical infrastructure, system design, and typical configuration. The questioning moves onto to consider the range of available provisions which exist within the organisation which can be called upon when faced with an incoming weather type of event, the resources available in order to make a response, and their associated controls. This project has also been tasked to consider the way in which Maritime Electric manage the assets on their electrical system, and to consider the underlying condition of the asset base prior to undertaking a storm response, as this is considered to have a significant affect upon the system's performance and overall resilience.

The EA Technology project team hope that Maritime Electric find both the questions and requests for information to be clear and straight forward. However, we acknowledge that terminologies and utility vocabulary vary, not just between different system operators, but across geographic regions too. Therefore, if Maritime Electric experience any difficulties in the interpretation of this information request, or require any clarification regarding the intent behind the line of questioning posed, then a query clearly stating the issue should be sent to the Commission, who will request clarification from EA Technology. We look forward to receiving your responses.

Background & Electrical System

Request IR-1:

Please provide :-

- A breakdown of the different geographic regions within your organisation's jurisdiction.
- samples of electrical system single line diagrams which illustrate the typical configurations used at each system operating voltage level.
- a table which identifies a breakdown of the total lengths of cables/overhead line operated at each voltage level within each of your geographic regions.

a) Please identify where electrical circuits share common structures.

b) Please provide an age profile for the asset populations identified.

c) Please provide an asset health / condition profile for each of the asset populations.

d) Please provide indicative asset population numbers for differing overhead line plant and switchgear (e.g. transformers, auto-reclosers, fuse units, switches etc.) for each of the asset populations.

e) Please provide an indication as to the approximate proportion of connected customers who have their own standby generation equipment.

Request IR-2:

By what process does your organisation determine:

a) The asset health/underlying condition of the electrical infrastructure assets?

b) The criticality of the electrical infrastructure they operate?

c) When was this process last reviewed for adequacy and effectiveness?

d) Against which other approaches / network operators has your organisation been benchmarked?

Request IR-3:

During Hurricane Fiona, how many individual faults/points of damage were sustained at each voltage level in each geographic region?

a) What proportion of these repairs involved the replacement of the plant and equipment identified in 01 d)?

Request IR-4:

What technological features/facilities exist at the voltage levels across your electrical network (e.g. SCADA, Telecontrol, SMART metering)?

a) Please provide a brief explanation to their function/purpose, how this may differ during reactive system events, and any constraints or limitations experienced during their use.

b) How do these systems interface with your organisations operating, maintenance and capital investment strategies?

Request IR-5:

Over the last 10 years, what initiatives, innovations or changes in policy or working practices have been introduced to the electrical transmission and distribution systems which aid response, restoration and repair activities during periods of adverse weather?

a) Please provide an outline of the constraints, restrictions and limitations on their successful implementation.

Request IR-6:

EA Technology would like to understand more about the overhead line designs operated by your organisation, can details of the company design specifications (and relevant standards) of lines operated in this region by voltage level be provided?

a) When were these specifications last technically reviewed? And by who?

Request IR-7:

By what process does your organisation select a specific overhead line specification and/or individual design structure prior to construction at a particular geographic location / application / operating environment?

a) How, and at what frequency is the performance of this process determined?
b) What observations and improvements have been made over the last 10 years?
c) Is it possible to briefly outline any examples which demonstrate where and how variations to either circuit constructions or overhead line specifications have taken place, the reasoning behind the changes identified, and how this action addressed any specific vulnerabilities or resilience issues identified?

Request IR-8:

The EA Technology project team would like to understand a little more about the typical system configurations employed on your electrical systems at different operating voltages. Please provide a summarised overview of the system design policies and practices employed over the last 20 years and a description as to how they have evolved over this period, and how these documents have been influenced by previous post adverse weather event reviews.

Request IR-9:

What mechanism(s) does your organisation employ to identify either geographic regions or network sections which are more vulnerable to the effects of adverse weather?

a) How are these mechanisms and their associated outputs maintained and assessed for effectiveness?

Request IR-10:

EA Technology would like to understand the processes by which your organisation ensures legal compliance and appropriate maintenance of their electrical infrastructure and its associated protections. Please supply an overview of how this is achieved. What do these processes tell you? What are their limitations? How does your organisation use this information?

Q1. Please provide evidence of how your organisation determines the effectiveness and value provided by each of the stated processes.

Q2. Under what circumstances would the stated processes be reviewed and revised? Please provide a brief commentary of the changes to the processes, including justification for changes and improvement objectives.

Q3. Please summarise what progress has been made against delivery plans which are derived from the stated processes.

Request IR-11:

What criteria does your organisation consider when determining capital investment policy, strategy, procedures and plans?

a) How are delivery plans formulated and prioritised?

Request IR-12:

What evidence can your organisation supply to demonstrate their approach when determining and evaluating the effectiveness of investment?

Request IR-13:

What period do the current capital investment plans cover, and what progress has been made against them?

a) How often are these plans reviewed and revised?

b) Are there any constraints which affect your organisations ability to deliver these plans?

Request IR-14:

How has the current vegetation management programme been developed?

a) How has this approach changed over the last 10 years?
b) Please provide a brief summary of the current vegetation management policy
c) Please provide a table of current vegetation management clearances

Request IR-15:

When was your organisations approach to vegetation management last reviewed, and can evidence be supplied to support any evolution in approach?

Request IR-16:

What is the current status of the vegetation management activities, and what progress has been made against programme plans?

a) What benefits does your organisation believe that the programmes of vegetation management would be expected to deliver?

Request IR-17:

EA Technology understands that issues pertaining to vegetation management and vegetation clearances may have affected your organisations storm response. Please outline the issues encountered, and briefly describe what has been done to resolve these difficulties?

Request IR-18:

EA Technology accept that, for a variety of reasons, it is not always possible to achieve the desired vegetation clearances.

a) In such circumstances, where vegetation management clearance specifications have not been achieved, what are the next steps considered to ensure the adequacy of the electrical system protection and are these documented in policy and/or procedures?
b) Please provide a real world example to demonstrate this process in action?
c) How successful has your organisation been in implementing these proposed actions, and have the actions delivered the desired results?

Request IR-19:

Does your organisation have documented electrical supply restoration policies & procedures?

a) Please provide an outline of the existing supply restoration policies, practices and procedures for both “System Normal” or “business as usual” and for application under “Emergency” or “Major System disturbance” conditions.

Request IR-20:

What defined categories of adverse weather event (e.g. wind, snow, ice etc.) / emergency conditions do your organisations policies and procedures cover?

a) How are associated roles and responsibilities identified and fulfilled for each of the defined categories outlined above?

Request IR-21:

Please provide evidence when the policy and/or procedures documents referred to in 08 were last reviewed?

a) Please provide an insight into the review findings – including documented actions.

Request IR-22:

Against which other organisations or specifications does your organisation benchmark vegetation clearance specifications and the associated documentation referred to in IR-18 to ensure that they represent best practice?

Request IR-23:

Briefly describe the breadth of arrangements which have put in place within your organisation to ensure adequate resource (labour and materials) availability during adverse weather events? Note this includes direct labour and contractor resources.

a) Upon what basis, and with what controls have these agreements been negotiated?

b) Do these arrangements include manpower specifications and/or agreed labour rates / service charges?

c) What proportion of this labour resource already holds electrical operational authorisation thereby enabling them to work on your electrical systems?

Request IR-24:

What approach is taken by your organisation to provide assurance with regard to the competence and quality of the resources outlined in IR-23?

a) How is this maintained?

Request IR-25:

How does your organisation identify and categorise adverse weather events?

a) What range of potential impact estimation tools does your organisation have at their disposal?
b) How and when is the response to each category of event triggered?

Request IR-26:

With regard to your organisations in-house ability to identify and predict the potential impact of adverse weather events.

a) What actions and resources does your organisation currently employ to identify upcoming weather events and assess their likely impact?
b) Can you briefly describe or demonstrate how these resources/facilities have improved over the last 10 years?

Request IR-27:

What controls exist to ensure that weather forecasting and impact assessment modelling services (either internally or externally sourced) provide accurate deliverables and represent good value for money?

Adverse Weather Event – Resource Identification Process

Request IR-28:

How does your organisation determine the actual resource requirements from potential adverse weather impact estimations / projected system impact modelling to ensure that an appropriate event response can be planned?

a) Do practices differ between transmission, sub-transmission and distribution voltages?
b) And given the dynamic nature of this exercise, how are decisions validated to prevent the accumulation of excessive cost?

Request IR-29:

Please provide evidence that the processes referred to in Request IR-28: are subject to regular benchmarking and review. Please provide an insight into any refinements made in the last 5 years.

Adverse Weather Event – Preparation Phase

Request IR-30:

Having identified and categorised an adverse weather event, made an impact assessment, and linked this to a resource requirement, what determines when resources are engaged and mobilised?

Request IR-31:

What additional command and control techniques does your organisation employ when co-ordinating emergency response over routine operational activity?

a) Have these been benchmarked against organisations recognised as those which represent best practice / best in class?

b) How could your organisations practices be enhanced to achieve an improved performance?

Request IR-32:

Once requested, how are external resources vetted, competency and equipment assessed, and granted authorisation to operate, work on, and/or test your organisation's electrical infrastructure?

Request IR-33:

What provisions exist within your organisation to ensure the quality and adequacy of any materials supplied by other responding 3rd party agencies prior to their introduction / installation on your electrical system?

Request IR-34:

During Hurricane Fiona, how many temporary electrical authorisations did your organisation issue?

a) Please briefly describe the breakdown of any authorisations granted (i.e. LV, HV, EHV, Non-electrical).

Request IR-35:

What steps are taken to prepare / brief engaged resources? What information is exchanged, and approximately how long does the complete preparation process take?

Request IR-36:

What was the Personal Protective Equipment (PPE) expenditure during Hurricane Fiona? Please outline the nature of this expense.

Adverse Weather Event – Response Activity

Request IR-37:

What activities would your organisation typically take during an adverse weather event?

a) How has the level of activity outlined differed during Hurricane Fiona from previous events?
b) How has this affected the associated costs of performing these activities?

Request IR-38:

What steps has your organisation taken to explore opportunities to enhance restoration performance during adverse weather events? Please provide supporting evidence.

Request IR-39:

How does your organisation determine that it is safe to initiate damage assessment and system / supply restoration work?

Adverse Weather Event – Damage Assessment

Request IR-40:

What techniques, resources & sources of information are used to identify damage caused by adverse weather events, system faults and/or supply interruptions?

a) What improvements have been made in this area over the last 5 years?

Request IR-41:

Please describe the areas where your organisation feels that the employed damage assessment approaches fall short of expectation and briefly explain why this is the case.

Request IR-42:

How is damage assessment information recorded, assessed and validated?

a) What difficulties have been experienced in this area?
b) What steps have been taken to overcome these difficulties?

Request IR-43:

How are damage assessors trained?

a) How is the performance of those involved in damage assessment measured?

b) What steps have been taken to maintain and improve competence / capability in this area?

Request IR-44:

What controls and provisions are put in place to ensure the safety of those engaged with either damage assessment or system/supply restoration activities?

Adverse Weather Event - Restoration Phase Planning

Request IR-45:

How is information provided by damage assessors and/or supply interruption information processed, and how does this lead to response and resource allocation & prioritisation?

Request IR-46:

Upon receipt of storm damage information, or being informed of instances of supply interruption, how long does the execution of response prioritisation and preparation typically take?

Request IR-47:

What approach(es) are employed to co-ordinate and control response resource prioritisation, allocation, and logistics? Briefly describe the interfaces and the nature of exchanges with external response stakeholders.

Adverse Weather Event – Restoration Phase Execution

Request IR-48:

What approaches to supply restoration are typically taken?

a) what factors and or influences are used to determine the most appropriate course of action?

b) what controls exist to oversee this determination? And to prevent an accumulation of excessive costs?

Request IR-49:

How does your organisation ensure that an appropriate and correct resource (labour and materials) assignment is made?

a) By what process(es) are any shortfalls or surplus identified? And resolved?
b) When and how were these processes last evaluated for effectiveness?

Request IR-50:

During reactive response events / states of emergency, are “temporary fixes” allowed? (i.e. emergency repairs which are risk assessed for safety and integrity, but may not conform to your organisation’s normal construction standards).

a) How is the appropriateness and quality of any such repair assessed by your organisation to provide assurance of adequacy of expected repair longevity and contribution to the integrity of the system?
b) How are the locations of any “temporary fixes” reported and recorded?

Request IR-51:

Either during or following the completion of any restoration activity, what information is recorded from the field? How is this documented/recorded? And how is it subsequently utilized?

Request IR-52:

What criteria or electrical system condition is used to “re-allocate” or “stand-down” restoration teams and/or engaged resources (including the de-activation of Emergency Operation Centres & logistic Supply centres etc.)?

a) How have these criteria evolved over time and previous storm experience?
b) What has recently been done to streamline these processes?
c) What initiatives exist to identify ways in which this process can be optimised?

Adverse Weather Event – Post Event Activity

Request IR-53:

What mechanisms exist to ensure that any temporary system repairs are removed / repaired / replaced in order to restore the electrical transmission and distribution systems to their “design-level” of system integrity/resilience?

a) How effective have they proven to be?
b) What measures exist to drive continuous improvement in this area?

Adverse Weather Event – Post Event Review

Request IR-54:

What actions are taken to review your organisations response to adverse weather events? Briefly outline the lessons learnt during Storm Fiona, and how these lessons have been used to drive continuous improvement activity within your organisation?

Request IR-55:

Following an adverse weather event such as Storm Fiona, in which high wind speeds are experienced, what actions are taken to assess the future resilience needs of the network in affected regions?

a) What storm hardening measures have been implemented following previous adverse weather events prior to Storm Fiona?
b) Did these parts of the network suffer from faults during Fiona?
c) If so, why did the previously implemented remedial action(s) not prevent these faults?

Request IR-56:

Over the last 10 years, what course of action(s) have been considered to improve system resilience in relation to vegetation / tree impacts? Please provide evidence of initiatives that have been implemented, and show what progress has been made against planned activities? Details of any constraints or restrictions, and the reasoning behind why other approaches have been discounted?

Request IR-57:

Please provide details of the number of system faults experienced during Storm Fiona against the number of years since vegetation clearance was carried out for each Region / line / voltage level.

Request IR-58:

Having completed a variety of other projects and works for network operators and utilities in this region, EA Technology is aware that some utilities have changed practices regarding the widths of Rights of Way (RoW), clearances and vegetation management practices in this geographic region following past severe weather events.

a) Is your organisation aware of such changes? If so, briefly describe what actions your organisation has taken since being made aware.

b) What criteria is currently considered when determining RoW and vegetation clearance specifications and activity programmes at the different voltage levels?

c) How does your organisation monitor the effectiveness of both RoW and vegetation clearances?

Request IR-59:

Following previous adverse weather events, what consideration has your organisation given to undergrounding critical sections of the overhead line infrastructure?

i) Are there any examples of where this has been carried out?

ii) What was the impact of this investment?

Request IR-60:

Please provide a tabulated breakdown of the individual incidents during Hurricane Fiona by:

- Region / location / asset identifier
- Voltage level – include all voltage levels used for distribution and transmission
- Type of equipment e.g. wood pole line, tower line, OHL conductor, UG cable, ground mounted equipment, etc.
- Fault cause e.g. falling tree, windblown (branch), windblown (other), pole damage, tower damage, etc.

Adverse Weather Event - Information System(s) Questions

Request IR-61:

How is your organisation's response activity to adverse weather events communicated both internally and externally?

Request IR-62:

Does your organisation provide estimated restoration times?

i) Please briefly describe how these estimates are determined.

ii) How are revisions to these estimates reviewed for validity and communicated ?

Request IR-63:

What measures has your organisation put in place to improve the efficiency, accuracy and effectiveness of its communications and estimated time of restoration determinations following recent adverse weather events?

Request IR-64:

What information is collected during electrical system restoration?

a) How does this information influence both the short term and longer-term business activities?

Adverse Weather Event – Misc Asset Management

Request IR-65:

How are asset defects and failures recorded within your organisation?

a) What processes are in place to monitor level of outstanding defects and effectively manage rectification?

Request IR-66:

Please provide a list of specific attributes considered during inspection and maintenance for transmission and distribution overhead lines including structure, conductor, plant and linegear, and the frequency at which such inspection and maintenance is carried out.

Request IR-67:

Does your organisation have a process(es) in place that considers risks and potential impacts when making both pro-active and reactive asset related decisions? Please provide a brief overview of how this is achieved.

Specific Financial Questions…

Request IR-68:

Over what time period were the costs associated with this financial claim accrued?

a) against which approved regulatory financial accounting practice(s) has this claim been submitted?

b) By what process has the allocation of costs (capital vs Operational, Maintenance & General) been decided?