VERIFICATION PROTOCOL

for

CLIMATE CHANGE & EXTREME WEATHER

A Guide to Adaptation Planning for Electricity Companies in Canada

Canadian Electricity Association | Association canadienne de l'électricité

PURPOSE OF THIS DOCUMENT

This is a companion document to *Climate Change and Extreme Weather: A Guide To Adaptation Planning For Electricity Companies in Canada*, (hereafter the Guide) and should be read in conjunction with the Guide.

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BACKGROUND

The Canadian Electricity Association (CEA) aspires to support member organizations in the development of their own climate change adaptation plan. Member companies are encouraged to make use of the support and tools provided to develop their own plans for approval by their senior management. Once a plan has been approved, it is expected that identified actions will be completed.

The need for robust planning to help ensure resilience in the face of climate change may also be driven with greater urgency by each organization's assessment of other factors such as their risk exposure; consideration of key stakeholders' expectations; a desire to demonstrate due care; and other requirements such as ISO 14001 or sound asset management strategies.

This verification process can be applied when organizations are developing and implementing their plans, to ensure that robust controls are in place and functioning.

The Climate Change Adaptation project requires the development and implementation of a data verification process for reporting progress.

While the guidance document refers to both the overarching process and implementing risk mitigation controls as 'plans,' the overarching process should be thought of as the large P plan and the implementing plans as small p plans.

Climate change and extreme weather risks are additional risks to be managed: as such, they may be able to be effectively managed using existing processes. Where organizations have existing processes that they believe will adequately manage the risks, the 'Plan' can take the form of a simple roadmap describing how various objectives are met e.g., 'the way that the organization meets the objective to assess risk is by its ERM risk assessment process'. If organizations opt to manage the climate and weather risks by using existing processes, they simply need to satisfy themselves that the processes adequately meet the need. This thought process should be documented in order to demonstrate that it took place. Only in those cases where an organization does not have existing procedure(s) would there be a need to develop 'new' process.

It is recognized that for certain issues, there may be insufficient information available to properly characterize risks and/or support informed decisions regarding appropriate controls. This does not mean that an overarching Plan cannot be in place, nor does it mean that actions cannot be taken on well-understood issues. It means that in those instances where risk controls cannot be determined due to a lack of information, organizations should continue to seek the necessary information and, once available, incorporate it into their risk management plan. In the meantime, organizations should determine whether interim actions are necessary/appropriate to control risk at acceptable levels.

Many organizations already have some degree of risk control in place and should take credit for them. However, as the nature of the risk changes, the controls must be revisited for continued adequacy, suitability and effectiveness. For example, organizations may have implemented vegetation management programs with metrics and periodic assessment to determine their adequacy, suitability and effectiveness. Where the program fails to meet the organization's objectives, modifying action can be taken. The existing control, with its performance metrics, needs to evolve with the changing climate's impacts on vegetation growth rate and health etc. In such a case no further action may be required.

Consistent with sound management strategy, it is recognized that the adaptation process will be iterative and should demonstrate continual improvement.

The Plan, whether it is integrated or stands alone, should be assessed against the following 8 Steps and associated objectives. This activity should be undertaken in a timeframe set by the organization based on their sense of urgency.

Once the Plan has been developed, organizations need to begin implementation. Once again, the timeline for implementation should be based on the sense of urgency associated with risk that are either not assessed or exceed managements risk tolerance.

Factors outside the control of the organization could challenge completion of the development of specific risk mitigation measures. Factors, which may pose barriers, include:

Inconsistent or contradictory science–or a lack of actionable scientific information at the desired regional/local level can impede risk assessment. To thoroughly complete Steps 4-6, utilities might have to undertake specific, detailed, scientific studies that explore climate change impacts on unique variables (or coincidental impacts on multiple variables) in specific regions. It is recognized that such studies could take considerable time. In such cases an organization may not be able to progress to step four for the particular issue or group of issues affected. In such cases, the organization is expected to actively monitor developments and act when the science supports the risk assessment. In the interim, the organization is expected to consider taking 'no regrets' actions.

The lack of viable (technologically feasible or economically viable) options may prevent an organization from progressing to Step 5 for the particular issue or group of issues affected. In this case, the organization is expected to actively monitor developments and seek viable mitigation measures.

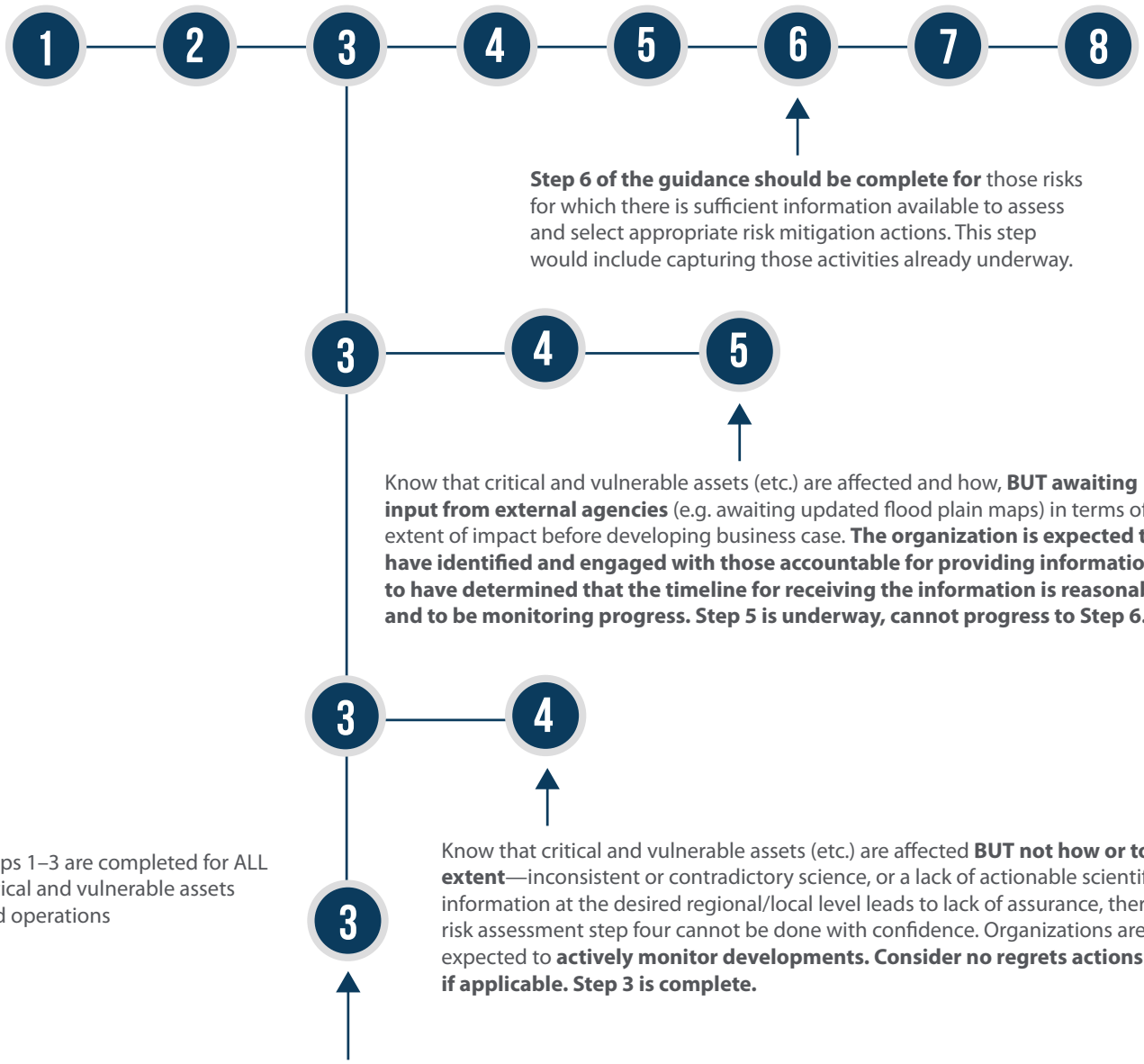
Awaiting input from outside agencies may pose barriers to completion of Step 6 (development of a business case) for the particular issue or group of issues affected. In this case, the organization is expected to identify and engage with those accountable for providing information, to determine that the timeline for receiving the information is reasonable, and to actively monitor progress.

The exceptions typically pertain to single issues or groups of issues and not all issues. Mitigation plans should be developed to the extent practicable.

Figure 1 below illustrates the expected status of implementing actions (risk mitigation plans).

Organizations should have implemented Steps 1 through 3 of the guide for all critical and vulnerable assets and operations.

Figure 1 Exceptions Influencing the Ability to Progress Implementing Actions through Step 6



Scope

The scope of the CEA climate change adaptation plan initiative is limited to physical assets and operations. It does not constitute a comprehensive climate change adaptation plan. Organizations may wish to broaden the scope to consider potential impacts outside the realm of physical assets and operations – for example, impacts on staff.

The plans must recognize the complex interdependencies that exist between internal and external processes and organizations that must be functioning. The plans should identify the critical goods, products or services that are essential for fulfilling the organization's objective(s) but fall outside the control of the organization.

If an organization's supplies of critical goods, products or services could be impaired by climate change or extreme weather, this risk should be addressed in its plan. It may be that that the organization simply seeks assurance of reliable supply from its supplier. In in the absence of an adequate level of assurance, the organization should have another contingency plan such as building an increased inventory. For example, the supply of fuel oil to a remote generating station relies on winter roads that may be compromised by warmer winters. The contingency plan could be to ensure that the storage tanks have a two-year capacity.

Objective

The CEA is obliged to report progress related to the status of climate change adaptation planning to the project sponsor, Natural Resources Canada (NRCan). In addition, CEA may wish to report to stakeholders and the public the aggregated status of member climate change adaptation plans and associated resiliency assurance. Such reporting helps with the sector's advocacy on the issue of continual improvements in resiliency. Participating member organizations are therefore encouraged to keep records and share the status of plan development (and implementation) with CEA. CEA is not compelling members to follow this verification protocol, but is encouraging it to help communicate the level of uptake and progress and to ensure that information is available and can be shared in a consistent manner. The assurance process may also contribute to public disclosures.

To gain this assurance and to ensure consistency, repeatability and comparability of results a data verification process has been prepared.

Methodology

The format of the verification process lists the objectives as found in the guidance document, along with a series of 'evaluation considerations' designed to assist the user in determining whether the managed process (plan) conforms to the Guide. The 'discussion' points detail what should be considered to determine conformance. The verification process ultimately requires the user to conclude whether or not the elements of the organization's managed process conform to standard risk management practice.

Conformance in its purest sense means that all of the objectives associated with each Step have been met. In the event that particular issues are on hold pending resolution of barriers outlined in Figure 1, the organization may still be deemed to be in conformance with documented exceptions, provided it has: made progress on all issues which do not fall into an exceptions category through all Steps; made progress all issues to the extent practicable; documented the factors which have contributed to an issue being held at an interim Step; considered and implemented interim controls as appropriate. Issues for which exceptions do not apply and that do not meet the objectives are deemed non-conforming.

Recognizing that various participating organizations may have different objectives and capabilities related to assurance, the process allows for flexibility and varying degrees of effort/assurance. The CEA expects that organizations 'self-verify' that their processes conform to the Guidance document and meet the objectives listed under each of the eight Steps. Such self-assessment will help organizations determine if they have the appropriate controls in place and functioning; it will also help them demonstrate the controls to interested parties (e.g. Registrars).

There are three levels of assurance described. The verification process has been developed such that it can guide self-assessment and/or support the development of more in-depth audit protocols. Auditors may wish to use the verification process as a guide to developing a more open-ended questioning approach. Non-auditors can readily apply the self-assessment approach.

The data verification process approach mirrors the steps outlined in the Guide. As with any assurance process, the verification 'checklist' should be augmented with a request for supporting documentation. Examples:

- Has the utility identified critical and vulnerable assets — Y/N (supporting documentation could be a list)
- Has the facility assessed the risk — Y/N (the supporting documentation could be a risk matrix)
- Is climate change recognized as an enterprise risk — Y/N (the supporting documentation could be a listing of approved enterprise risks)

The supporting documentation does not have to be unique to climate. Determining critical and vulnerable assets, and subsequent of risk could be part of a broader documentation such as enterprise risk or ISO 14001.

This approach is reasonable and scalable.

The process should provide sufficient rigour to satisfy the need for assurance that the overall conclusion is valid. The **overall conclusion** of the verification should be that either adaptation plans are both adequate and suitable to meet organizational objectives (e.g. reliability), or that they are not. This conclusion should be communicated internally as part of process control as well as externally to meet CEA reporting objectives.

The three levels of assurance are:

1. **Self-assessment:** Completing a self-assessment checklist can form the basis of self-declaration. This approach would meet the minimum assurance that organizations have adequate controls in place. This level of self-declaration of conformity is similar to the process that CEA has applied to the ISO 14001 requirement.
2. **Internal audit:** Undertaking an Internal Audit (first party) provides more assurance than self-assessment due to the objectivity and independence of the auditors, and the additional rigor of the audit process. Such an audit could be combined with broader risk assessment or ISO audits.
3. **Third-party audits:** Third party audits are often perceived to provide the greatest degree of assurance, as they typically supplement internal audits, and are conducted by auditors (such as registrars) that are at arm's length from the auditee. This type of audit can be combined with broader risk assessment or ISO audits e.g. assurance related to climate change controls could form part of an ISO 14001 audit.

Climate change mitigation and adaptation are explicitly referenced in ISO 14001 Introduction (0.1) Background; and context (4.1, A4.1). 'The intent of [ISO 14001 s.] 4.1 is to ensure that organizations understand important issues that

can affect, either positively or negatively, the way an organization manages its environmental responsibilities. Issues are important topics for the organization, problems for debate or discussion or changing conditions that affect the organization's ability to achieve its intended outcomes.' Climate change is an example of an issue that can affect an organizations purpose or be affected by its environmental aspects. The organization 'shall determine internal and external issues that affect the intended outcomes of its environmental management system and shall include those environmental conditions affected by or capable of affecting the organization.' The alignment of Climate Change Adaptation Guidance document with ISO 14001 can be found in Appendix A.

For those organizations that elect to self-assess, the assessment should be accompanied by an attestation of conformity signed by someone with the accountability and authority to do so. This process signifies that they are satisfied with the degree of assurance and that it aligns with the philosophy that top management has ownership of the issue.

For those organizations that choose the internal audit or third-party audit, neither self-declaration nor management attestation would be necessary. The audit conclusion would suffice.

This process aligns with the Steps in the guidance document and uses ISO management systems concepts and terminology. This is intended to provide assurance that the protocol is time tested and to allow for easy integration into an ISO audit.

Minimum objectives: Although many of the questions can be simply answered yes or no, the expectation is that there is sufficient documented evidence to support the answer per ISO 19011, *Guidelines for Auditing Management Systems*.

ISO 19011 requires objective evidence to support 'the existence or veracity of something' e.g. records, statements of fact or other information that are relevant to the assessed criteria and verifiable. Only information that can be verified to some degree should be accepted as evidence. Where the degree of verification is low, professional judgement should be used to determine the degree of reliance that can be placed on the results.

In the table below, there are eight steps, each with defined objectives. This information has been taken directly from the Guide. These objective statements constitute the assessment criteria and should be considered 'requirements'. The second column titled Evaluation Considerations sets forth the questions designed to assist the user in determining whether the managed process (Plan) conforms to the Guide. Discussion notes are provided to add clarity. To determine conformity the verifier simply needs to determine that the objectives have been met.

For example, the criterion that the Plan objectives are defined requires the assessor to determine whether there are clear, commonly understood objectives, and if so what they are. If there are clear, commonly understood objectives (endorsed or approved by the organization's leadership) then the Plan would 'Conform.'

Another example relates to the scope of the Plan. The guidance (assessment criterion) requires definition of the scope of what the Plan is intended to address. To meet this criterion, the scope must be defined along with any exclusions. For example, the scope 'includes all physical assets solely owned and or managed by the company, excludes the activities of partnerships, and excludes impacts associated with employee health.' The Plan must meet the minimum criteria set forth by the CEA, as well as any additional criteria agreed to by the company.

STEP 1: SETTING THE STAGE

The purpose of this step is to ensure that the rationale for undertaking the plan is clearly understood and is endorsed by the organization's leadership.

Overview

Clearly defining the objectives associated with controlling climate related risk(s) is essential to maintaining focus on the outcomes, to ensuring consistent understanding, and to aligning with existing corporate objectives such as reliability of supply.

To achieve success, it is essential to engage the organization's leadership early in the planning stages for the following reasons:

- The leadership team is ultimately accountable for the sound management of risk and opportunity. Adaptation planning is about risk management, asset protection, reasonable care, and fulfilling accountabilities—all points that will typically resonate with senior management.
- Success is dependent on commitment from all levels and functions within an organization led by top management.

Top management can:

- Effectively address risks and opportunities by ensuring the integration of climate change management into business process, strategic direction and decision-making, and aligning with other business priorities.
- Ensuring resources are available.
- Ensuring that the program meets the intended outcomes.

Objective: (as found in the guidance document)	**Evaluation Considerations:** (to assist the user in their determination of whether the managed process (Plan) conforms to the Guide)	**Status** **C (conforms), NC (does not conform)**
Step 1. Define objectives and engage leadership a. Identify the organization's objectives in pursuing a climate adaptation plan and define the scope of what the adaptation plan is intended to address.	a. Has the organization defined the objectives (intended outcomes) of the climate change adaptation plan? An example of an objective could be to improve resilience to key risks from climate change and extreme weather, and to ensure that such risks do not adversely impact on an organization's ability to deliver on its core mission and mandate (e.g. reliability). Has the scope of the plan been determined (e.g. the applicability-physical locations, processes etc.)	
	Are there any exclusions to the scope (e.g. human health effects)?	

STEP 1 (CONTINUED)

b. Align the adaptation planning objectives with the organization's mission.	b. Are the objectives aligned with the organization's mission?	
	Discussion: The plan should meet the minimum criteria set forth by the CEA, as well as any additional criteria agreed to by the company. Has the organization integrated the climate change risk and opportunity management strategy with enterprise risk and business planning?	
	Is the plan compatible with the organization's strategic direction and context?	
	What level of senior management is involved in the climate adaptation planning at the organization?	
	Is there an executive-level sponsor?	
	Are progress reports provided to senior management/ executive-level sponsor? How frequently? Does the form of the report provide adequate information of status and progress towards the climate adaptation planning?	

STEP 1 (CONTINUED)

c. Engage leadership by highlighting the economy-wide business case for adaptation, and the likelihood that climate change is an enterprise risk.	c. Is top management engaged?	
	Discussion: Does top management understand the issues that can affect achievement of the objective (intended outcome e.g. reliability or other high level objectives). Does top management understand that the impact can be either positive or negative? (e.g. do they understand the significance of climate change and extreme weather in terms of the risk it may pose to achievement of the organization's mission/objective (e.g. reliability) and other relevant high-level objectives?)	
	Are the objectives of climate change adaptation planning adequately understood at relevant levels and functions in the organization? (including leadership).	
	Does top management understand stakeholder expectations? Is this understanding factored into risk determination?	
	Engagement can be demonstrated through management's pre-existing commitment to process controls associated with ERM, asset management, EMS etc.	

STEP 1 (CONTINUED)

d. Obtain a commitment from top management that it will actively participate in the development and subsequent implementation of the adaption plan.	d. Has top management demonstrated commitment to the objectives of the plan, and to its development and implementation?	
	Discussion: Where climate change is integrated into an existing process such as ERM, asset management, EMS etc., the demonstrated commitment to climate change would likely exist within the overarching risk management process. How does top management demonstrate accountability for the effectiveness of the plan?	
	Has the organization determined and provided the resources necessary for the establishment, implementation and maintenance and continual improvement of the plan? Do the human resources have the requisite skills and competencies (how is this determined?)	
	Describe how top management directs and supports persons to contribute to the effectiveness of the plan. Does top management ensure that the plan achieves the objectives (intended outcomes)?	

STEP 2: SETTING THE STAGE

The purpose of this Step is to identify assets and operations that are both critical to the achievement of the corporate mission and mandate and vulnerable to climate and extreme weather.

Overview

To narrow the scope of analysis to the most material issues, thereby creating a management subset, it is recommended that companies ascertain which assets and operations are both critical to fulfillment of the objective AND vulnerable to climate and/or extreme weather.

Not all critical assets, process, goods and services are vulnerable e.g. conductors are critical, but if buried they may not be vulnerable to typical weather/climate impacts such snow and ice accretion or wind, and not all assets that are vulnerable to climate impacts are critical to the fulfillment of the overall objective.

Critical operations may include consideration of supply chain.

Objective: (as found in the guidance document)	**Evaluation Considerations:** (to assist the user in their determination of whether the managed process (Plan) conforms to the Guide)	**Status** **C (conforms), NC (does not conform)**
Step 2: Identify assets and operations that are both critical to the achievement of the corporate mission and mandate and vulnerable to climate and extreme weather.	Has the organization identified those assets (equipment) and operations that are critical to the achievement of the overall objectives (e.g. ensuring reliability of supply, and delivering electricity in a sustainable manner)? Examples may include conductors, cooling water intakes, transformers etc.	
	Has the organization determined which of the critical assets and operations are vulnerable to climate and extreme weather?	
	Discussion: Vulnerabilities may be based on design, operating or de-rating etc. criteria. Have key interdependencies been identified? Does the consideration extend to externally provided critical goods, products or services without which the critical assets or operations would be impaired?	

STEP 2 (CONTINUED)

	To assess the completeness of the 'list', consider whether the right people have been involved in the determination, and whether the list seems complete when compared to peer organizations with similar assets. Ultimately it is up to the organization to demonstrate why it is confident in the completeness of its list. Does the organization maintain documented information of its critical and vulnerable assets as well as the criteria used to assess risk and opportunity? NOTE: the documentation may or may not be a standalone document. If climate change were integrated into an existing risk management process such as ERM, the documentation would likely be found in the ERM records.	

STEP 3: SETTING THE STAGE

The intent here is to identify key potential climate (and weather) impacts. The focus of this Step is to identify existing and potential impacts that could affect critical and vulnerable assets and operations i.e. affect an organization's ability to deliver its core service.

Objective: (as found in the guidance document)	**Evaluation Considerations:** (to assist the user in their determination of whether the managed process (Plan) conforms to the Guide)	**Status** **C (conforms), NC (does not conform)**
Step 3: Identify key potential climate impacts. The intent here is to identify key potential climate (and weather) impacts. The focus of this Step is to identify existing and potential impacts that could affect critical and vulnerable assets and operations i.e. affect an organization's ability to deliver its core service. a. Identify relevant potential climate impacts.	a. Has the organization determined the potential climate related impacts that are relevant to the critical/vulnerable assets? Discussion: Examples could include such things as changes to mean temperatures and heat waves; changes to the type, timing, intensity and frequency of precipitation; changes to annual or seasonal patterns; broader ecosystem impacts (such as changes to invasive species); changes to the intensity or frequency of extreme weather such as microbursts, tornadoes or thunderstorms.	
	Have both acute and chronic impacts been considered?	
	Discussion: Acute impacts refer to those typically more immediate such as impacts associated with extreme weather, while chronic impacts are generally associated with longer-term exposure such as cumulative temperature changes year over year. Have both direct and indirect impacts been considered?	

STEP 3 (CONTINUED)

	Discussion: Direct impacts refer to those with a direct cause and effect; whereas indirect impacts may have one or more intermediate steps e.g. warmer air resulting in warmer water, resulting in increased growth of invasive species resulting in challenges to water intakes/cooling. Has determination of impacts considered force multipliers (e.g. ice accretion combined with winds gusts), and the combination of impacts (e.g. lack of rain + high temperature + prolonged drought + electrical storms)?	
b. Define parameters for analysis	b. Based on the potential impacts to the critical and vulnerable equipment, has the organization defined the parameters necessary to scope the data collection and analysis? Discussion: Key parameters to be considered in the data collection process include: the baseline period, the timeframe for future scenarios (e.g. near/mid or long-term), spatial and temporal resolution, and key potential climate impacts (e.g. precipitation, electrical storms, temperature, snow and ice loading, permafrost, wind – strength and gustiness, microbursts)	
c. Collect existing data on relevant projections d. Identify gaps in information regarding projections e. Collect additional relevant data	c / d / e. Has the organization collected adequate data related to relevant climate and weather projections to support analysis of risk?	
	Discussion: A great deal of credible information is readily available. Once the existing data sources have been identified the data/projections should be reviewed for their validity and applicability to the scope of analysis required. Has the organization identified areas where additional information is required (gaps) e.g., potential impacts that may require additional information and analysis?	

STEP 3 (CONTINUED)

	Has the organization determined how to deal with projections that do not provide the specific data required? Discussion: The gaps in information may be straightforward or complex. Examples of straightforward gaps in information include either the climate impact has not been projected (e.g., microbursts), and or the parameters do not meet the organization's needs (e.g., the available information may not be of sufficient resolution.). An example of a more complex gap in information is the need to assess multiple issues in combination e.g. the frequency (volume*) of freezing rain events, over a specified period (e.g. 72 hours associated with a particular weather event) during which time the temperature does not exceed zero C (i.e. no melting), with wind gustiness.	
	Further, the organization needs to ensure that the data available is relevant e.g., projections of freezing rain relate to the amount of ice buildup expected to accumulate on the ground, in all likelihood this amount of accumulation will be different than the amount of ice accretion expected on overhead conductors. Organizations will need to have determined how to correlate the projections with the requirements. Consideration should be given to how the organization identified gaps in needed information, and whether there been objective discussion about information gaps?"	
	Has the organization captured the additional information? Discussion: Describe the process by which the organization has collected information related to future projections. (e.g., literature search, peer collaboration, existing models)	
f. Select potential impacts applicable to the organization.	f. Has the organization selected those potential impacts that are applicable to their organization's critical and vulnerable equipment and processes? Discussion: The results of data collection will enable the organization to focus on those potential impacts that could result in significant risks to the organization's core objective.	

STEP 4: SETTING THE STAGE

The intent here is to determine the degree to which critical and vulnerable assets will be able to continue to meet their design intent, and key systems and processes will be able to withstand identified risks according to their current operational protocols.

Objective: (as found in the guidance document)	**Evaluation Considerations:** (to assist the user in their determination of whether the managed process (Plan) conforms to the Guide)	**Status** **C (conforms), NC (does not conform)**
Step 4: Assess risks to critical and vulnerable assets and operations. The intent here is to determine the degree to which critical and vulnerable assets will be able to continue to meet their design intent, and key systems and processes will be able to withstand identified risks according to their current operational protocols?	Has the organization identified both risks and opportunities associated with critical/vulnerable assets/operations?	
	Has the organization considered key risks from a combined, multiplier and/or cascading effect perspective?	
	Have key linkages been mapped together?	
	Have the process and results been documented? NOTE: the documentation may or may not be a standalone document. If climate change risks were integrated into an existing risk management process such as ERM, the documentation would likely be found in the ERM records.	
	Could person(s) working independently replicate the process? i.e., is it repeatable?	

STEP 4 (CONTINUED)

	Discussion: NOTE: the assessment can be performed as part of a more comprehensive risk management system. The expectation in such a case is that the Plan could point to where this step occurred. The process should be of sufficient rigor that competent persons working independently using the same data and criteria could replicate the results. Are evaluation criteria (scales) for probability and consequence appropriate?	
	Typically, they should align with business planning/ overall corporate enterprise risk evaluation methods?	
	Has inherent risk been assessed?	
	Has residual risk been assessed?	
	Has the risk assessment process taken risk mitigation control effectiveness into account?	
	Discussion: This process is the same probability/consequence approach used to assess any risk. It may be quantitative or qualitative. Existing process may be able to be applied or may require amendment of the consequence scale. Have regulatory requirements (and other commitments) been taken into account?	

STEP 4 (CONTINUED)

	Have stakeholder expectations been taken into account?	
	Has the organization determined their risk tolerance level? (i.e., acceptable residual risk – the risk level below which no further control action is planned) and determine those risks that exceed management's risk tolerance.	
	Discussion: Management's risk tolerance may vary from organization to organization or from one management team to the next. It may also change over time. Where the residual risk (i.e., the risk remaining after existing controls are applied) is acceptable to the organization (i.e. acceptable to those with the authority to assume risk) then the organization may decide that NO FURTHER action is required. This is an acceptable risk management practice. Has the organization prioritized the risks and opportunities (e.g. those that exceed top management's tolerance) for which further action is required?	
	Are those risks acceptable to management clearly identified?	

STEP 5: POTENTIAL ADAPTATION MEASURES

The purpose of this Step is to ensure that those risks exceeding management's risk tolerance have further controls identified. The purpose of the controls is to reduce the risk such that the residual risk is within management's risk tolerance. In the event that specific risks fall within management's risk tolerance, there is no need for further action—the existing controls remain adequate and suitable to meet the intended outcome/objective. In the event that there is no financially viable or technologically feasible control option, the expected action is to monitor developments.

Where there are no ultimate controls that can be applied, consideration should be given to interim actions that apply adequate yet not optimal control, e.g., if the ultimate control involves refurbishment or replacement, consideration should be given to interim actions such as operational controls as appropriate.

Overview

As with any risk management process, top management has the authority to assume some degree of risk. Typically, either the inherent or residual risk should fall within top management's defined risk tolerance. In the event that controls do not reduce the risk to a level that is within this tolerance limit, this must be clearly identified, the reasons documented, and approved interim actions applied. The relative success of actions controlling risks must be clearly communicated to those with accountability i.e., top management.

When identifying potential adaptation measures, organizations should consider the range of possible actions; for example, adaptation measures can range from hardening the asset, to modifying design, to modifying operations.

Certain adaptation measures may address multiple risks. For example, burying conductors would address issues related to wind (gallop, failure of conductors or supports), temperature (sagging, annealing and premature aging), and/or snow and ice accretion. Each potential action needs to be viewed from the standpoint of effectiveness in controlling risk, whether it introduces other risk, and whether it can be supported with an effective business case. Burying lines may address key climate related risks however, the incremental costs may not support the business case.

In this step, the process shifts from risk identification and prioritization to adaptation action planning.

There should be clear follow through from Step 4 to Step 5 in terms of how the organization has documented the conclusions made at Step 4 and brought forward into Step 5 (e.g., a risk register with "existing risk mitigation controls", "residual risk rating" and then Step 5 "additional risk mitigation control activities required".)

Objective: (as found in the guidance document)	**Evaluation Considerations:** (to assist the user in their determination of whether the managed process (Plan) conforms to the Guide)	**Status** **C (conforms), NC (does not conform)**
Step 5: Identify potential adaptation measures (risk controls) a. Generate a list of adaptation ideas to manage risks.	a. Has the organization determined appropriate actions to control the risk (take advantage of opportunity) to acceptable levels? Discussion: A wide range of possible measures should be considered, including such things as strengthening the asset, modifying operations, modifying designs, changes in organization, and strategic shift to new activities.	

STEP 5 (CONTINUED)

b. Group and categorize ideas to engage various internal departments, set the stage for filtering such ideas, and build a business case for promising ideas.	b. Has the organization grouped the activities based on factors such as subject matter expertise; accountability for actions that is external to the organization (e.g., municipal flood control); synergies among actions that enhance the business case etc.?	
	Discussion: The organization should identify actions that can logically be grouped based on such factors as similarity, degree of control, efficiency, synergy etc. If the accountability is shared, then collaborative opportunity should be sought. If the action to address submersion risk, is improved flood plain mapping and flood control on the part of an external organization, then it may be appropriate to handoff the actions to this group. Are the controls suitable to the degree of risk? (i.e. will they mitigate risk to within tolerance?)	
	Has the organization considered technological options and its financial operational and business requirements when developing action plans?	
	Have the actions been approved through business planning?	
	Are the plans adequately resourced?	
	Do the planned actions effectively prevent or reduce the undesired effects?	
	Does the planned actions effectively take advantage of any identified opportunities?	
	Do the plans contain sufficient information for informed decision making e.g., what is the objective being addressed?	
	Discussion: Do the plans identify discrete actions?	
	Have required resources been allocated? This includes financial/human resources etc. typically there is no absolute value that can be assigned here. The issue is whether the assigned resources are ADEQUATE to meet the intended outcomes.	

STEP 5 (CONTINUED)

	Have responsibilities been assigned?	
	Are specific implementation timelines identified?	
	Has the method of evaluation of results been determined?	
	Have the mitigation actions been mainstreamed into business process and strategy?	
	Does the organization keep documented records of planned actions and their status?	
	Discussion: The records may be part of a comprehensive risk management plan. The Climate Change Adaptation Plan may simply document where to find the records associated with this activity. The climate change records do NOT need to be separate and standalone. Are there appropriate metrics to measure and monitor progress?	
	Discussion: Consider both individual actions within the plan as well as the contribution to the overall objective (reliability). Are the right parameters being measured i.e., those things which provide meaningful/actionable feedback on progress?	
	Is the frequency of monitoring adequate to enable interim 'course correction' in the event that actions are off course?	
	Are the metrics measurable, normalized (comparable), and updated as appropriate?	
	Are the metrics used to evaluate the effectiveness of the actions?	
	Are the results of measuring and monitoring communicated to the right people? (i.e. those with accountability for success of the overall plan and those with authority to make changes if required?)	

STEP 6: DEVELOP A BUSINESS CASE FOR SELECTED MEASURES

The purpose of this step is to determine what criteria will be used to evaluate controls (e.g. cost-benefit measures, time period, discount rate, non-financial measures; to perform cost-benefit analysis for all potential measures); to prioritize control actions (e.g. cost curve, matrix, sensitivity analysis, best practices); and to refine based on potential interactions among measures (synergies or overlap).

Overview

Actions identified to control climate related risks may require the development of a business case for adaptation related expenditures/ investments. Wherever possible, organizations should make use of their existing process for making the business case around new investments and/or changes to resource allocations in business operations. Where existing processes lack clearly defined mechanisms for addressing new risks and opportunities, or for addressing *changes* in risks and opportunities as a result of climate change impacts and risks and the need for adaptation, they will need to be modified.

The business case should consider both risks and opportunities.

NOTE: There should be clear linkage between the outcomes of Step 5 and the business cases developed in Step 6. Conformance would require an organization demonstrate completeness of the risk mitigation activities Step 5 and the business cases developed at Step 6. The verifier should be able to verify this completeness.

With the exception noted in figure 1, there should be a business case developed for those mitigation actions identified at Step 5. If there is not an associated business case and the issue is not an exception, then the plan is incomplete. In the event that a single business case addresses more than one mitigating actions, it is up to the organization to demonstrate this.

Objective: (as found in the guidance document)	**Evaluation Considerations:** (to assist the user in their determination of whether the managed process (Plan) conforms to the Guide)	**Status** **C (conforms), NC (does not conform)**
Step 6: Develop a business case for selected measures a. Decide on criteria for evaluating adaptation measures: cost-benefit measure, time period, discount rate, non-financial measures.	Has the organization developed a business case to support identified control actions? a. Has the organization identified criteria for evaluating identified adaptation measures?	
b. Perform cost-benefit analysis for all potential measures.	b. Has the organization applied a cost benefit analysis for all potential measures?	

STEP 6 (CONTINUED)

c. Prioritize. Consider using various tools to support prioritization of measures (cost curve, matrix, sensitivity analysis, best practices).	c. Has the organization prioritized measures?	
d. Refine based on potential interactions among measures (synergies or overlap).	d. Have potential synergies and overlap between various control measures been considered?	
	Have ongoing climate adaptation measures been incorporated into the regular capital planning sustainment and maintenance process?" (This would be an indicator of the buy-in of senior leadership at Step 1, as well as incorporation of climate change risk management into the regular business planning cycle at Step 1). Discussion: Combining upgrades e.g. (hardening, design change, relocation) with established end of service life should be considered. Potential measures that are deemed not viable should be recorded by the organization as such.	

STEP 7: DETAIL AND DOCUMENT THE ADAPTATION PLAN

The purpose of this Step is to determine that the organization has a documented Plan. The Plan can take many different forms. For example, it can be part of an existing integrated business plan, risk management plans or environmental management systems. If it is integrated, climate change and associated controls should be mentioned explicitly; it can stand alone; or it can be an abbreviated Plan, which while being a specific climate change adaptation Plan is in fact a roadmap to other documentation and governance e.g., processes for management review/assessment of risk/determination of compliance obligations/evaluation of conformance etc. can be generic).

Overview

The extent of documentation should be such that it is adequate to support effective management, and that it can be used to demonstrate the rigor of the risk control process. The Plan can be part of other plans or programs. There may be however the need to create some specific records e.g., documenting the determination of critical and vulnerable assets and operations.

If the Plan is comprised of a suite of existing management plans, programs or processes, organizations may wish to consider creating a simple 'roadmap.' The roadmap is a means of ensuring that process steps are adequately addressed and demonstrating this to others.

The document may be of any appropriate format or media and should be managed in accordance with sound document management control processes, i.e., it should be uniquely identified approved, version-controlled, readily available/retrievable, protected from loss/deterioration and periodically reviewed.

Objective: (as found in the guidance document)	**Evaluation Considerations:** (to assist the user in their determination of whether the managed process (Plan) conforms to the Guide)	**Status** **C (conforms), NC (does not conform)**
Step 7: Detail and document the adaptation plan a. Create a summary 'road map' that connects key assets and operations, impacts, risks and planned adaptation measures.	a. Does the organization have adequate documentation to support effective management, and to demonstrate the rigor of the risk control process?	
	Does the organization maintain records of key process steps such as the determination of objective(s) and scope; critical and vulnerable equipment; criteria for risk and opportunity evaluation; action plans and their status; metrics and associated results?	
	Is the plan readily available to staff?	

STEP 7 (CONTINUED)

	Discussion: The extent of documentation should be sufficient both to support decision-making and to demonstrate the identification, determination and assessment processes that underlie the selected controls and adaptation responses. At a minimum, a concise document capturing approved implementation actions should be maintained. This list will enable tracking of implementation and support metrics and management review. The Plan and implementing actions (plans) should be available to staff. The organization should determine the scope of external publication. Documentation of the Plan can take many different forms: it can form part of an overall integrated business plan (climate change and associated controls should be mentioned explicitly); it can form part of a comprehensive risk management plan (climate change and associated controls should be mentioned explicitly); it can form part of the environmental management system with climate change and associated controls mentioned explicitly; it can stand alone; or it can be an abbreviated Plan, which while being a specific climate change adaptation plan is in fact a roadmap to other documentation and governance e.g. processes for management review/assessment of risk/determination of compliance obligations/evaluation of conformance etc..	
b. Identify how the adaptation measures can be integrated into existing risk management systems and governance. Highlight if any changes in systems and governance are necessary.	b. Are control actions approved?	
	Discussion: Do the approved controls (implementing actions/plans) include schedule, budget, milestones, accountabilities, resourcing, etc. for any proposed organizational changes and incremental investments?	

STEP 7 (CONTINUED)

c. Identify schedule, budget, milestones, accountabilities, resourcing, etc. for any proposed organizational changes and incremental investments.	c. Have schedule, budget, milestones, accountabilities, resourcing, etc. for any proposed organizational changes and incremental investments been identified?	
d. Determine the right metrics across the organization for tracking and evaluating both the planned actions and their outcomes.	d. Are appropriate metrics in place to measure and monitor key elements of the plan? (consideration should be given to both process and program/performance tracking metrics).	
	Discussion: Two related but distinct groups of metrics may be considered: 1. Metrics specific to tracking the progress of adaptation actions. These metrics are typically more discrete (often short term) actions. 2. Higher-level metrics that are intended to determine whether the overarching objective of adaptation is being met i.e. whether the organization has become more resilient. While it may be challenging to determine meaningful higher-level metrics, they form the basis for concluding whether the process is adequate and suitable to provide the intended results. This conclusion is essential for top management and other key stakeholders. Has consideration been given to whether the metrics developed for the adaptation plan align with existing reliability measures.	
	Has the organization has reviewed the impact of climate risks on their existing reliability measures in order to set expectations of how these are likely to change given climate risks and thus serve as "triggering event" measures and/or indicators that risk mitigation plans are not having the effect intended?	

STEP 7 (CONTINUED)

e. Determine what forms of external reporting might be necessary (for legal/ compliance reasons) or appropriate (as a voluntary commitment).	e. Has the organization determined its external reporting commitments?	
	Is the organization fulfilling is external reporting obligations? Discussion: While it is recognized that external reporting of adaptation plans do not necessarily translate to improved resilience, reporting is a key component of a managed process. The scope of reporting ranges from voluntary to mandatory and internal to external. Organizations must be aware of mandatory (e.g., regulatory) reporting requirements as well as other reporting commitments. The nature of reporting may be a consideration in determining metrics (what is monitored and measured).	

STEP 8: ESTABLISH A PROCESS TO REVIEW AND IMPROVE THE PLAN

The purpose of this Step is to ensure that the plan is periodically evaluated in terms of whether it is meeting the desired outcomes. Top management should review the Plan at planned intervals to ensure its continued suitability, adequacy and effectiveness.

Overview

Periodically, the Plan should be reviewed against the overall objective as well as specific performance metrics. The overall question is whether the climate change and adaptation Plan and associated controls continue to meet the intended outcome.

Additionally, the Plan should be periodically reviewed/assessed from the standpoint of continued suitability, adequacy and continual improvement. The field of climate change adaptation is ever-changing: science will continue to evolve, modeling will become more sophisticated, technology will advance, and interested party expectations will change. Top management must be involved in such reviews and should conclude whether the plan continues to be suitable, adequate, and effective.

Objective: (as found in the guidance document)	**Evaluation Considerations:** (to assist the user in their determination of whether the managed process (Plan) conforms to the Guide)	**Status** **C (conforms), NC (does not conform)**
Step 8: Establish a process to review and improve plan a. Determine the ongoing project management requirements of the plan– what will be measured, monitored and reported	a. Has the organization determined which aspects of the plan will be measured, monitored and reported upon? At what frequency and to whom. Discussion: Review of the plan may be part of a broader review process	
b. Establish a process or principles that will be used to monitor the plan, after it goes into effect, for its suitability, adequacy and effectiveness.	b. Has the organization assigned the responsibility for ongoing sustainment and monitoring of the plan? (i.e., identified the individual(s) responsible)?	

STEP 8 (CONTINUED)

c. Present the plan for senior management's approval.	c. Has the top management reviewed the organization's climate change adaptation plans at planned intervals, to ensure its continuing suitability, adequacy and effectiveness?	
	Does the management review consider the changes in: • external and internal issues? • compliance obligations & other expectations of interested parties? • risks and opportunities? • the critical and vulnerable asset inventory? (e.g., through divestment or acquisition)	
	Discussion: Accountability for adequately controlling risk lies with top management. Top management's engagement is essential for success of the Plan. They must therefore be involved in monitoring the Plan. Generally, a person or persons within the organization will have a centralized responsibility to collect performance results, report to those accountable, and to propose any future actions. Future actions may be to progress the plan, or may be in response to inadequacies, or new requirements, information, or science i.e., to ensure that the plan continues to be suitable, adequate, and effective. Does the management review consider the extent to which objectives have been met?	
	Does the management review consider performance (monitoring and measurement) results?	
	Does management review consider the adequacy of allocated resources?	
	Does management review consider communications from interested parties?	

STEP 8 (CONTINUED)

	Does the management review consider opportunities for continual improvement?	
	Do the outputs of the management review include: • conclusions on the continuing suitability, adequacy and effectiveness of the adaptation plan? • determination of continual improvement opportunities, and associated actions? • decisions on any need for changes to the climate change plan including resource needs? • actions if needed, when objectives have not been met? • identification of opportunities to improve integration of the climate change plan with other business processes? • determination of implications for the strategic direction of the organization?	
	Does the organization retain documented information as evidence of the results of management reviews? (This can take the form of minutes of meeting with associated supporting documentation).	

STEP 8 (CONTINUED)

Overall Conclusion	Is the Plan suitable, adequate and effective in meeting the intended outcome (i.e., supporting the organization's overall objective for the Plan – e.g., reliability)?	
	Discussion In addition to the performance results, the managed system should exhibit the following success criteria; leadership, commitment and participation at all relevant levels and functions in the organization; organizational culture that supports the intended outcomes; effective communication; consultation and participation; and alignment with overall strategic direction and business practices of the organization. Does the plan provide assurance to interested parties that the climate change and extreme weather management practices adequately control risk, and capture opportunity?	

GLOSSARY OF TERMS

Conformance	Conformance in its purest sense means that all of the objectives associated with each step have been met. The Plan conforms if: the organization has progressed all issues which do not fall into an exceptions category through all Steps; has progressed all issues to the extent practicable; has documented the factors which have contributed to an issue being held at an interim step; and has considered and implemented interim controls as appropriate.
Enterprise risk	An uncertain event or condition (a probability or threat) that could adversely impact on an organizations' ability to achieve its core objectives.
Exceptions	Exceptions (to conformance expectations) refers to issues on hold at intermediate steps due to barriers such as indeterminate science, the lack of technologically feasible or economically viable options etc. (see figure 1).
Extreme weather	Extreme weather is rare within its statistical reference distribution at a particular place, and the characteristics of what is considered extreme weather will therefore vary from place to place. It may include unexpected, unusual, unpredictable, severe or unseasonal weather. Definitions of 'rare' vary, but an extreme weather event would normally be as rare as or rarer than the 10th or 90th percentile. Examples include microbursts, electrical storms etc.
Guide	Refers to the companion document entitled "Climate Change and Extreme Weather: A Practical Guide to Adaptation Planning for Electricity Companies in Canada."

Leadership/Top Management	ISO definition (common to ISO 14001) meaning those that direct and control the organization at the highest level; those with accountability and authority e.g., authority to provide resources. Top Management: The senior officers and/or executives of a company who direct and control the company at the highest level. Of particular relevance they have overall accountability and authority for managing risks and opportunities in the company, as well as the power to delegate authority and provide resources.
Non-conformance	Issues for which exceptions do not apply, that do not meet the objectives are deemed non-conforming.
Resilience	Organizational resilience is the ability of an organization to anticipate, prepare for, respond and adapt to incremental change and sudden disruptions in order to survive and prosper.
Stakeholders/Interested parties	These terms are used synonymously and mean persons or organizations that can be OR perceive themselves to be affected by a decision or activity (or inactivity).
Verification Process	This document entitled "Climate Change and Extreme Weather Climate Change Adaptation Planning: Verification Process for Reporting Progress" is expressed in shorthand throughout as the Verification Process.

APPENDIX A: ALIGNMENT OF CLIMATE CHANGE ADAPTATION GUIDE WITH ISO 14001

The numbers in parentheses in the table below reference clauses in ISO 14001:2015ed.

General Alignment

Climate change and extreme weather can be managed as other risks, using standard processes for risk identification, characterization, assessment, and control such as those found in environmental (ISO 14001) and other management systems. Some existing controls in some companies may already be adequate to address climate considerations e.g., reservoir and vegetation management.

ISO management system standards are risk based (0.5); they recommend integration (0.5), they require competency and awareness. Climate change mitigation and adaptation are explicitly referenced – (0.1) Background; (4.1) context; (A4.1)

The PDCA approach is also consistent between the Guide and ISO. PDCA is fundamental to ISO and is also the basis of the Guide. The Guide focuses on planning (Plan) to set the stage for future implementation (Do), but it also references monitoring, measurement, analysis and evaluation (Check) and continual improvement (Act).

Phase of Plan Development	Step in Process	Potential Alignment/Integration with ISO 14001
Setting the Stage	1. Define objectives and engage leadership	(0.3) Success Factors – success depends on commitment from all levels and functions of a company led by top management. Companies can leverage opportunities to prevent or mitigate impacts and enhance opportunities. Top management can effectively address risks and opportunities by integrating environmental management into the organization's business processes, strategic direction, and decision making aligning them with other business priorities. (1.0) Scope – the standard helps companies achieve their intended outcomes (see 4.4, A.3), the standard is applicable to any organization. (4.1) Understanding Context – 'the organization shall determine internal and external issues that are relevant to its purpose and that affect its ability to achieve the untended outcomes – such issues shall include environmental conditions being affected by or capable of affecting the organization.'

		(4.2) Understanding The Needs And Expectations Of Interested Parties. (4.4) EMS – to achieve the intended outcomes (improved performance, compliance, and achieving objectives) companies shall establish implement and continually improve the MS. (5.1) Leadership And Commitment – top management shall demonstrate leadership by taking accountability for the effectiveness of the system; ensuring objectives are established and are compatible with the strategic direction and context of the company; ensuring integration of the EMS into business processes; ensuring required resources are available; communicating the importance of the MS; ensuring that the intended outcomes are met; directing persons to contribute to the effectiveness of the MS; and promoting continual improvement. (5.2) Policy – includes commitment to protection of environment including climate change mitigation and adaptation; and continual improvement. (6.2.1) Environmental Objectives – the company shall establish objectives at relevant levels and functions taking into account environmental aspects, compliance obligations, and considering its risks and opportunities. Objectives shall be consistent with policy, measureable (where practicable) monitored, and updated as appropriate.
Risk Assessment	2. Define objectives and engage leadership	(6.1) Actions To Address Risks And Opportunities – the company shall establish implement and maintain processes to address environmental aspects and compliance obligations, determine risks and opportunities related to its issues and requirements. (6.1.2) Environmental Aspects – the company shall determine its environmental aspects that it can control and those that it can influence – the company shall take into account change, and normal and abnormal and reasonably foreseen emergency situations.
	3. Identify key potential climate impacts	
	4. Assess risks to critical and vulnerable assets and operations	

APPENDIX A (CONTINUED)

Risk Response and Adaptation Planning	5. Identify potential adaptation measures (risk controls)	(6.2.2) Planning Actions To Achieve Objectives - in planning how to achieve its objectives the company shall determine what will be done, by whom, when it will be completed and how the results will be evaluated, including indicators for monitoring progress towards achieving its objectives.
	6. Develop a business case for selected measures	
Preparation for Implementation	7. Detail and document the adaptation plan	(6.1.4) Planning Action – the company shall plan a. to take actions to address its significant aspects, compliance obligations and risks and opportunities, b. how to integrate and implement actions into its EMS or other business processes, (see 6.2, 7 and 9.1), c. evaluate the effectiveness of the actions. Technological options, financial and business requirements shall be considered. ISO speaks more to overall integration.
	8. Establish a process to review and improve plan	(4.4) EMS – requirement to continually improve (6.2.2) Planning Action – includes timelines, and how results will be evaluated including indicators (7.4) Communication (7.4.2) – (reporting) – internal and external communication (9.1) Monitoring Measuring Analysis And Evaluation – the company shall monitor measure analyze and evaluate its performance by determining what needs to be monitored and measured, the methods to ensure valid results, the criteria against which to measure, appropriate indicators, when the monitoring and measuring will be performed, and the results are to be analyzed and evaluate. (9.1.2) Evaluation Of Compliance (9.2) Internal Audit (9.3) Management Review – top management shall review the system at planned intervals to ensure its continuing suitability adequacy and effectiveness. (10.3) Continual Improvement – the system shall be continually improved to enhance performance.

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