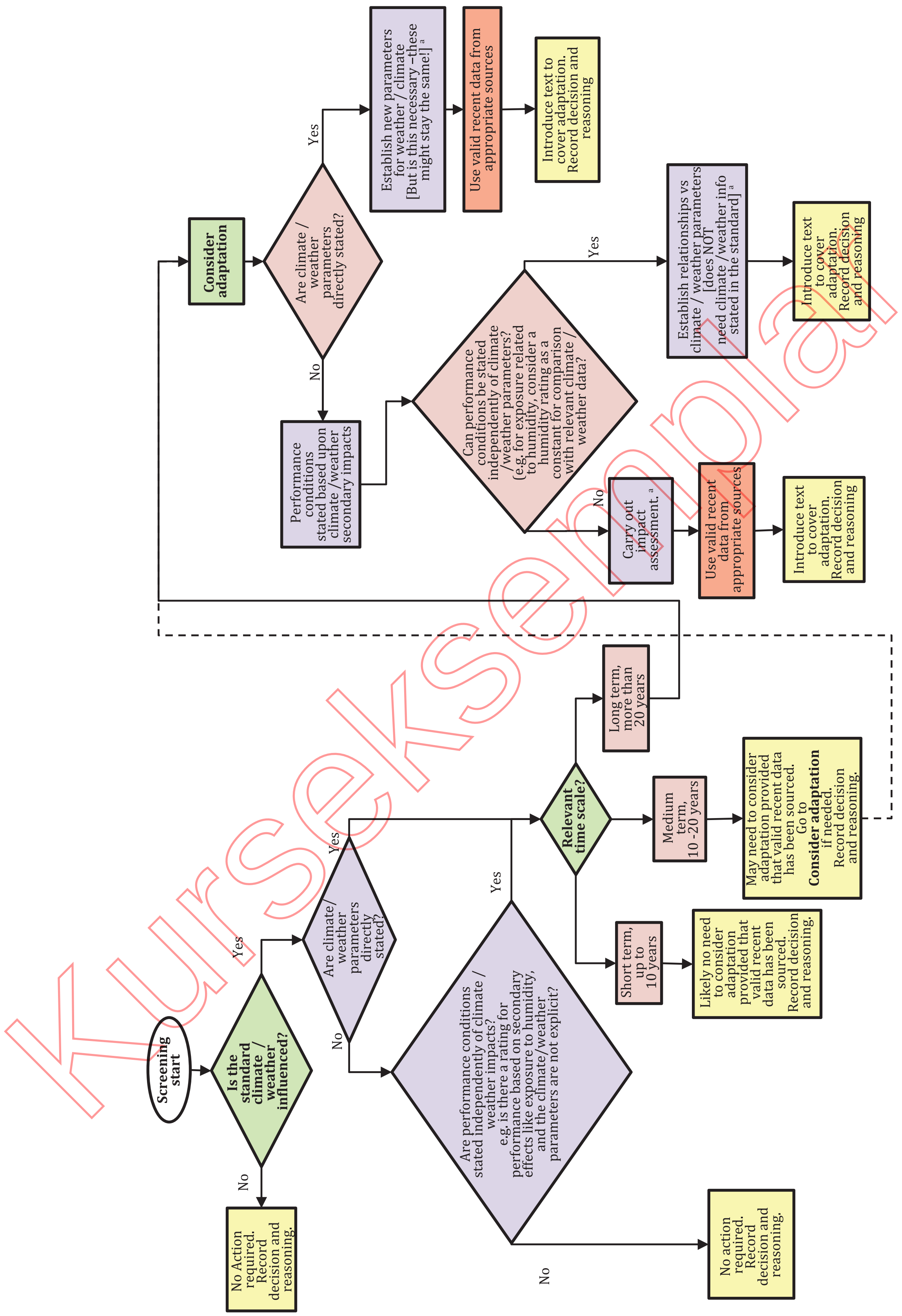


[a] Consider using for example ISO 14091.

Figure 6 — Screening process: Assessing the need for climate change adaptation provisions in standards

8.6.4 Process standards

Process standards, and standards specifying measurements and definitions, can directly or indirectly govern or affect physical or social processes. Consideration should be given to the nature of such underlying processes, their consequences, and impacts, risks and opportunities from or towards climate change. These can include, but are not limited to:

— the climate change impacts, risks and opportunities and their consequences on the process or production of the materials needed to implement the standard;

— the potential for cost saving by improving adaptation procedures, measurement and definitions through standardization;

— the potential for facilitating the development of technologies that promote new industries and employment, or that provide beneficial services or similar economic benefits (and any resulting benefits for ACC).

8.6.5 Product standards

8.6.5.1 Climate change issues for products

Product standards, including standards related to a TAP, can have many different ACC issues. Standards developers should consider the different climate change issues of the TAP, and how the scope and application of the standard can affect them over their life cycle.

Examples include assessing the sensitivity of the following to climate impacts:

— the resources used and the costs;

— the supply chain;

— the nature and distribution of adaptation action benefits that can result from the use of the products;

— the end-of-life stage.

8.6.5.2 Incorporating climate change adaptation at design stage

The measures for adaptation are often related to changes in the design of the product in all stages of its life cycle, including in the design process itself. Design changes should consider the effect of climate and weather factors, as well as extremes and potentially new hazards that have not been experienced previously, on the exposure or operating conditions for products and systems.

Product standards should:

— consider sensitivity/vulnerability of materials to weather and climatic conditions;

— take into account extreme end use conditions using appropriate calculations;

— consider material composition or structure to adapt to the potential changes in operating conditions;

— include testing in relation to projected changed end use conditions or new hazards (interfaces to testing standards);

— consider increasing maintenance to achieve the planned life of products and in spite of the changed end use conditions (interfaces to service standards); and

— recommend the testing and evaluation method after the product has undergone exposure to an extreme climate event in order to ensure the safety of any continued use of the product.

8.6.5.3 Incorporating adaptation in the product life cycle

8.6.5.3.1 General

This subclause describes how to integrate provisions regarding effects of climate change. It covers each life cycle stage and provides examples of climate change impacts, risks and opportunities and ACC provisions.

Standards developers should consider avoiding where possible the potential for unintended consequences where adaptation measures can result in more GHG emissions than before any standard revision or new standards development.

8.6.5.3.2 Acquisition

Climate change impacts on the acquisition of raw materials include:

— supplier disruption due to weather event, in particular where suppliers are in vulnerable locations;

— raw material production affected by climate change (e.g. agricultural products).

8.6.5.3.3 Production

Climate change impacts on production processes include:

— impacts on staff comfort or health and safety due to severe weather and its impacts;

— impacts on climate, weather or temperature sensitive production processes, such as those reliant on cooling, water use, energy supply, using long-lived assets;

— impacts on outdoor activities that are weather dependent.

8.6.5.3.4 Service provision

Climate change impacts on service provision include:

— impacts on staff or customer comfort or health and safety due to excessively high temperatures or inclement weather;

— impacts on staff or customer travel due to extreme weather events;

— impacts on climate, weather or temperature sensitive equipment or consumables, such as those reliant on cooling, water use or energy supply;

— impacts on outdoor activities that are weather dependent.

These impacts can lead to either a disruption, where service provision ceases entirely or to a change in the quality of the service provided. If resources such as equipment or premises require longer planning horizons, the future climate conditions, including slow-onset climate change effects, should be taken into account. This can even involve the relocation of a service facility.

8.6.5.3.5 Use

Climate change impacts on the use stage include:

— impacts on the effectiveness of a product that is climate or weather sensitive;

— impacts on users leading to changing requirements of products, especially for users in vulnerable locations or those with vulnerable supply chains;

— impacts on maintenance requirements.

8.6.5.3.6 End-of-life

Climate change impacts on a product at the end of its life include:

— some disposal or reprocessing activities can be weather or temperature sensitive;

— reusability can be affected by increased weather-related wear and tear;

8.6.5.3.7 Transportation

Transportation needs to be considered at all stages of the life cycle.

Climate change impacts to transportation include:

— weather events cause disruption to transport infrastructure leading to delays, in particular if travelling over long distances or through affected regions;

— product is damaged or degraded during transport due to temperature or humidity.

8.7 Adaptation and mitigation in management system standards

Management system standards (MSS) can provide a tool for mitigation considerations and also for ACC.

In 2015, ISO 14001 was substantially revised (see Clause D.1). The revised standard makes clearer reference to the two-way relationship between organizations and the environment, i.e. the organization needs to consider environmental conditions being affected by or capable of affecting the organization (see ISO 14001:2015, 4.1). It therefore continues the requirement for organizations to address their impacts on the environment, including their contribution to climate change (mitigation), but also now introduces the importance of resilience and adapting to our changing world (e.g. impacts on the organization from the changing climate). This combination of stewardship responsibility along with organizational response and resilience, is a principle that can be increasingly integrated into organizational management systems (not just environmental management systems).

The direct and indirect effects of climate change upon organizations range from carbon taxation to severe weather impacts. It is imperative that organizations address these impacts on their activities strategically and operationally. Many organizations have a form of MSS, whether based on ISO 14001 or not. Such systems form a ready opportunity to start, renew or continue their journey towards climate action.

MSS can help organizations address climate change impacts, risks and opportunities, for example through processes governed by the management system. Management systems can provide a framework for making decisions on activities of workers, the additional stakeholders involved, and the systematic strategies for identifying and managing climate change and related sustainability issues.

All ISO MSS are based on the same high-level structure, identical core text, as well as common terms and definitions. This common structure allows for climate change issues to be addressed in many MSS (not just environmental MSS such as ISO 14001). The subjects of relevant clauses include the following.

— The context of the organization, which determines why the organization is here: As part of the answer to this question, the organization can identify internal and external issues (such as climate change) that can impact on its intended outcomes, as well as all interested parties and their requirements. It also needs to document its scope and set the boundaries of the management system — all in line with the business objectives.

  NOTE 1 The clause is subdivided as follows: Understanding the organization and its context; Understanding the needs and expectations of interested parties; Determining the scope of the specific management system; the specific management system.

— Planning, which brings risk-based thinking to the front and again climate change will be relevant in many MSS. Once the organization has highlighted risks and opportunities, it needs to stipulate how these will be addressed through planning. The planning phase looks at what risks are addressed, by whom, how and when (and can include risks and dependencies related to climate change). This proactive approach replaces preventative action and reduces the need for corrective actions later on. Particular focus is also placed on the objectives of the management system. These should be measurable, monitored, communicated, aligned to the policy of the management system and updated when needed.

NOTE 2 The clause is subdivided as follows: Actions to address risks and opportunities; the specific management system objectives and planning to achieve them.

CCM and ACC interactions will increasingly be relevant to different MSS clauses, in particular (but not limited to) the “Context of the organization” and “Planning” clauses discussed above. Revisions to MSS should consider such climate change interactions and dependencies to ensure the MSS is both relevant and future-proof.

While the high-level structure cannot be changed in the development of an MSS, subclauses and discipline-specific text can be added. In this way, further climate change considerations can also be addressed.

Figure 7 provides an illustration for integrating ACC considerations into a revised MSS. In addition, Clause D.1 provides examples of how MSS clauses (e.g. in ISO 14001) can be used to address climate change.

NOTE 3 Management systems are typically characterized by the “Plan-Do-Check-Act” (PDCA) model.

High Level Structure of MSS — *Clause*	*Related clause*	***Possible intervention points*** *Consider inclusion of adaptation actions*
1. Scope	Can be relevant	Should any mention of specific climate change adaptation/mitigation requirements be included? Will there be an advantage to include adaptation/mitigation issues here?
2. Normative references	Can be relevant	Any specific adaptation/mitigation references to add as normative? Any industry standards on addressing climate change adaptation/mitigation?
3. Terms and definitions	Can be relevant	Any adaptation/mitigation terms used to be added?
4. Context of the organization	4.1 Understanding the organization + its context 4.3 Determining the scope of the management system 4.4 The management system	What does the organization do that will be affected by climate change (directly or indirectly)? Needs and expectation of interested parties? Establish scope and boundaries considering context, interactions, longer term, system thinking and lifecycle. Implement, embedded, continually improve the MS.
5. Leadership	5.1 Leadership and commitment 5.2 Policy 5.3 Roles, responsibilities and authorities	What is the organizational policy related to climate change? Who will be responsible? Consider within the policy –environment? resilience? Responsibility? Opportunity to review roles and to consider need for skills (ensure correct climate change skills in mitigation and adaptation).
6. Planning	6.1 Actions to address risks and opportunities 6.2 Management system objectives and planning to achieve them	What risks and opportunities might be related to climate change (aspects). Integrate into risk management or develop. What are the long term and medium term plans? Consider climate change in those plans. Develop new plans if needed with objectives and targets for climate change.
7. Support	7.1 Resources 7.2 Competence 7.3 Awareness 7.4 Communication 7.5 Documented information	What are the training needs, capacity on adaptation/mitigation issues, technical competencies in analysis of effects and impact to the system. Also wider resourcing e.g. technology/collaboration Develop awareness of climate change policy, approach and roles/contributions.
8. Operation	8.1 Operational planning and control	Which operations need to be developed in either mitigation or adaptation context? Integrate and operationalize actions to address climate change considerations. This can extend widely for example through the supply chain, through product design, through capital investment, etc.
9. Performance evaluation	9.1 Monitoring, measurement, analysis and evaluation 9.2 Internal audit 9.3 Management review	What are the monitoring requirements for relevant climate change parameters (mitigation and adaptation)? Audit the climate change related performance. Integrate climate change performance consideration within the management review.
10. Improvement	10.1 Nonconformity and corrective action 10.2 Continual improvement	Continual improvement process should include consideration of future impacts of climate change to the organization and the MS as well as to the organizations mitigation approach.

Figure 7 — Possible intervention points for considering climate actions in a management system standard

8.8 Other aspects for consideration

8.8.1 Organizational inventories

Product, sectoral and energy management standards can support organizational inventories of GHG emissions. Standards developers should consider the effect of the standard on the accounting of GHG emissions.

National level accounting of GHG emissions is conducted according to the Tier methodology provided in the IPCC Guidelines for National Greenhouse Gas Inventories[35]. National level accounting is carried out typically by countries who are members of the UNFCCC. Member countries report national inventories of GHG emissions to the UNFCCC. The most developed countries report annually, while developing countries report on a less regular timetable.

GHG emissions accounting can also be performed at the organizational level. Most organizations who report do so annually, often in a company "sustainability report" or through some other disclosure method such as via a reporting portal operated by a third party. GHG emissions reporting at the organizational level is performed within an organizational boundary and a defined operational boundary. This type of accounting, specifications for which are given in ISO 14064-1, usually addresses both the "direct" and "indirect" emissions of the organization. Direct emissions are those that issue from combustion of fossil fuels, industrial processes, and fugitive sources. Indirect emissions, on the other hand, occur when an organization imports electricity, steam, heat or cooling from a source outside its operational boundaries, usually by purchase. These emissions are "indirect" because the reporting organization is not directly responsible for generating them. Instead, they are the final user of the energy that has been generated by a provider, such as a utility company, that lies outside the organization's operational boundaries. In addition, indirect emissions include emissions associated with the organization's supply chain (upstream emissions), and emissions associated with the use and end-of-life phases of an organization's products (downstream emissions). Organizations can influence their indirect emissions through contract requirements and compensation measures.

8.8.2 GHG project monitoring

GHG "projects" are activities that cause GHG emission reductions or GHG removal enhancements compared to a specified GHG baseline beyond business as usual. A GHG project typically is distinguished from mere conservation efforts that an organization can undertake to reduce its GHG emissions, such as by taking steps not to waste energy or to recycle paper, glass and aluminium. GHG projects are formalized emission reduction/enhancement activities that are closely monitored and compared to a hypothetical alternative baseline scenario. When pursued in accordance with a defined methodology or protocol, GHG projects can generate emission reductions that are recognized by a third party and can be monetized through the issuance and sale of verified emission reduction units. A GHG project targeting GHG "removal enhancement" is a GHG project that increases the amount of CO_2 removed from the atmosphere, such as through enhanced forestry management or reforestation.

8.8.3 Per unit of product "footprints"

It is sometimes useful to quantify the total amount of GHG emissions and removals associated with a specific good or service (e.g. an event). The sum total of such values is normally referred to as a "carbon footprint of a product" (CFP). Standards developers considering per-unit-of-product GHG emissions and removals should recognize that values of the CFP can vary depending upon the quantification approach used and the applied system boundary of the CFP study. A partial CFP results when the system boundary does not include the entire life cycle of the product (or service) system under study. Knowledge of CFPs and partial CFPs provides a basis for reducing the carbon intensity of a product in all or some stages of its life cycle.

In some cases, the CFP can be based on secondary data from industry averages, while in other cases, the CFP can be localized to and based upon a specific manufacturing or processing site, and is consequently constructed with primary data based on the unit processes from that site.

Both approaches have legitimate purposes. The former can be utilized when the goal of the quantification of the CFP is to set a benchmark for evaluating relative performance. Standards developers or the users of standards can want to know what the "average" CFP is within a "sector", so that users of a particular product standard can subsequently evaluate the CFP for any particular supplier's product in that context. On the other hand, a standards writer or standards user can want to know that the GHG emissions attributable to the CFP have been localized to a particular production process or manufacturer of a product. This approach is particularly useful when evaluating the claim of any particular supplier for comparative purposes, and calls for the evaluation of site-specific data. CFP product category rules have an important role in facilitating the comparability of CFPs.

Such claims related to the carbon footprint of a product that attempt to localize the CFP to a particular manufacturing production process can use secondary industry average data for some portion of upstream emissions and for emissions associated with the use stage and the end-of-life stage of the life cycle of the product system studied. This suggests that it is most likely that only a partial CFP that is based on "gate-to-gate" emissions at a particular manufacturing location can actually be based solely on primary data.

NOTE 1 ISO 14067 describes principles, requirements and guidelines for the quantification and reporting of the carbon footprint of a product (CFP).

NOTE 2 ISO 14026 describes principles, requirements and guidelines for footprint communications for products addressing areas of concern relating to the environment.

8.8.4 Role of verification in monitoring and evaluation

Verification can play an important role in monitoring and evaluating GHG mitigation actions. Verification can be performed by a first party, a second party, or a third party. ISO 14064-3 is widely used as a methodological approach to determine, with reasonable or limited assurance, the accuracy of quantified GHG information and data.

Standards developers should note that monitoring and evaluation is also of relevance to ACC.

Standards developers should take into account ISO/IEC 17007 requirements when drafting normative documents suitable for use in conformity assessment.

Annex A
(informative)

Using systems thinking to set boundaries for climate change adaptation[3)]

A.1 Systems thinking — The concept

Systems thinking is about understanding the complex, nonlinear and interconnected system in which an organization operates. Many large organizations are complex, adaptive systems in themselves, meaning that the elements that make up an organization (for example, emergency response, transport pool, supply chain, finance, procurement teams) have a complex set of interactions that are dynamic and so do not always interact in the same or a consistent way. Organizations require techniques for managing these interactions effectively. This makes the organization adaptive in nature so that it responds according to the needs or circumstances at the time.

A.2 Systems thinking — Benefits

Systems thinking can help users to consider the full set of interactions and interdependencies affecting their organization, including influences within and from outside the context within which the organization operates. The approach can be used to set boundaries around adaptation activity such that the organization filters out elements less relevant to its activities, products and services while still understanding the importance of these elements. The organization will be left with tasks within a defined boundary, or scope, which results in a manageable set of adaptation activities.

Systems thinking can help to identify positive and negative feedback loops that can attenuate or exacerbate the impacts of change. Similarly, systems thinking can help to identify unintended consequences of decisions or actions before they are implemented.

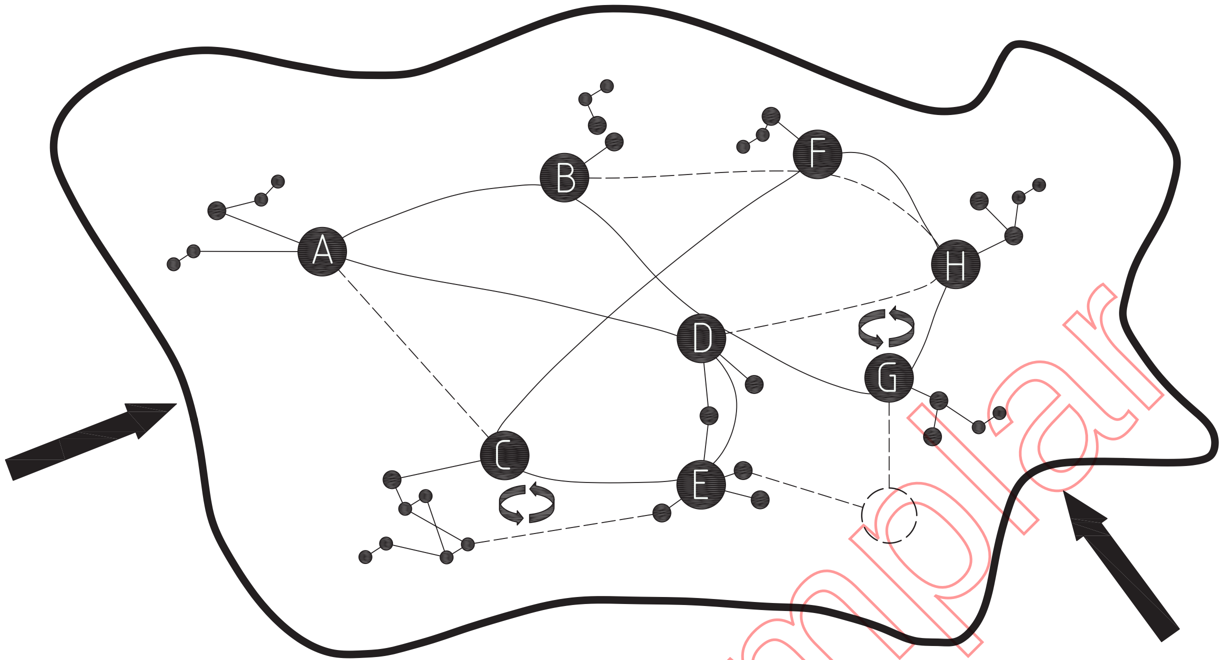
In other words, organizations can use systems thinking to identify, define and refine those activities that really matter and can be controlled by interventions. In this way, manageable boundaries can be set which make adaptation more achievable.

A.3 Interconnections, dependencies and interdependencies

Thinking about interconnected relationships in a system is crucial for understanding how an organization might be able to intervene in the system to influence the sustainable management of resources in its portfolio of activities, products and services (see Figure A.1). For example, in the case of services, this might include identifying all the interdependencies involved in bringing the service to customers, as well as the ways in which the changes in climate will impact service delivery over time.

NOTE Dependencies are one-way interconnections, meaning that organization A depends upon a product or service from organization B, but not the other way around; whereas interdependencies are two-way interconnections, meaning that organizations A and B depend upon each other. An example of the latter would be how an electricity power station depends upon rail transport for its supply of biomass, and the rail transport system depends upon electricity for its control and traction systems.

3) This annex is reproduced from ISO 14090:2019, Annex A.



Key

an organization: one part of a system


key actors or stakeholders: e.g. regulators, suppliers, communities, NGOs, technology providers, clients


external factors: e.g. environmental constraints, policy and regulation, consumer preferences, advances in technology


feedback loops: e.g. new communication channels, new relationships, customer feedback, recycling or reuse of products and materials, wider social value


system boundary: e.g. geographical/place based, sector, market

relationship link: e.g. formal (contractual, transactional) and informal (knowledge exchange, business support, community relationships)

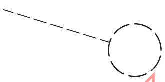

systematic intervention: new inputs, changing the total output of the system, e.g. standards or rating schemes, policy changes, product or service innovation, business model innovation, increase access to solutions, reshape supply, create user demand, implement new platforms

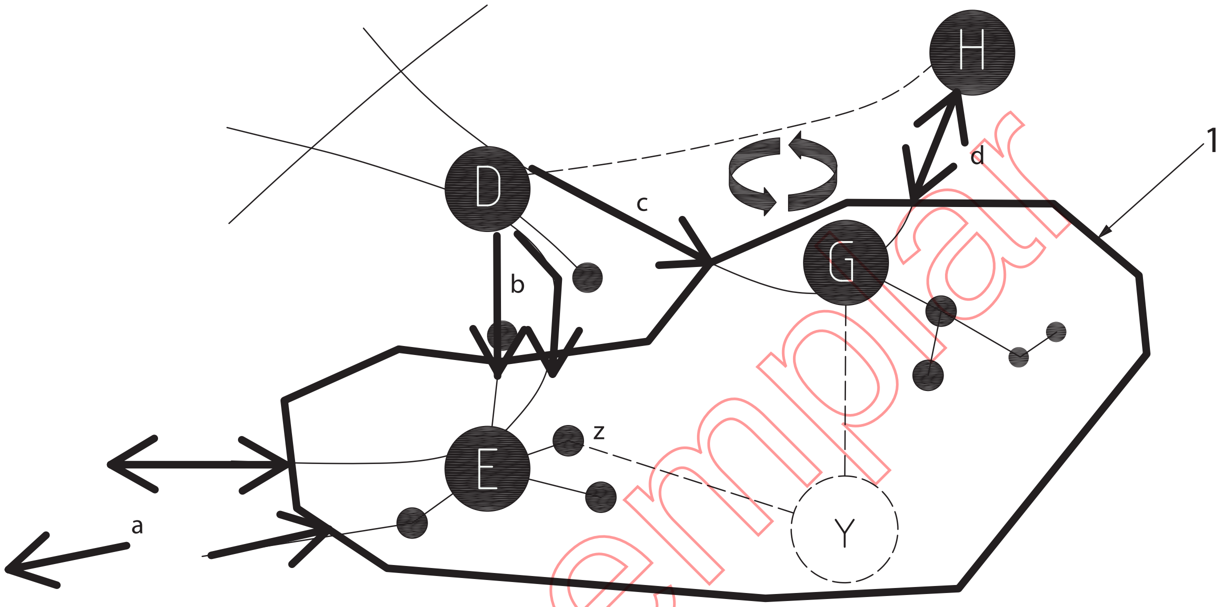
Figure A.1 — Systems concept showing a general systems concept with interventions highlighted

A.4 Mapping and identifying boundaries and sub-systems

Figure A.1 shows how eight organizations A to H are interconnected by relationships and have key actors or interested parties. A boundary has been drawn around the whole system showing external factors as outside of the boundary. An intervention is depicted between organizations G and E that would have come about through an adaptation plan.

Figure A.2 takes systems thinking to a more granular level. It depicts a filtered system that encompasses organizations G and E as a sub-system. This is a sub-system of the system shown in Figure A.1, however, it is a system in its own right. It has its own external factors and so (inter) dependencies on external organizations shown by arrows; arrow a from organization C from Figure A.1, arrows b from organization D in Figure A.1, arrow c from organization B and arrow d from organization H. The dotted area Y is an intervention between an actor within organization E called z and G.

This is an example of how a large system of systems (see Figure A.1) can be reduced further to a smaller system of systems (see Figure A.2).



Key

1 sub-system boundary

Figure A.2 — System of systems concept showing a filtered system based upon Organizations E and G

Hence, the sub-system in Figure A.2 has a boundary and can be looked at as a quasi-independent grouping that could be examined (for example, for its influence on adaptation) on its own; however, users of this map will recognize that decisions, or climate and weather-related impacts, in this sub-system can impact other sub-systems because of the (inter) dependencies apparent shown by arrows a and d.

A.5 Practical examples for Figure A.2

Table A.1 shows some broad illustrations explaining the systems mapping that organizations might make, based on the map in Figure A.2. Each illustration is not meant as an exhaustive set of explanations covering every aspect shown in Figure A.2 and is offered merely to show how the concept might be used. The systems map ordinarily needs to be drawn bespoke for every organization's situation, that used here is idealized.

Table A.1 — Illustration of how the systems map from Figure A.2 might be used by some organizations

Organization E might be a...	Actor z could be a...	Organization G might be a...	Organization D could be a...	Intervention Y might involve... to solve...
Farm	Purchaser	Local feedstock distributor	Feedstock distributor located abroad	Sourcing feedstock from D to shorten supply chains as D has a good stockpile facility
Energy transmission grid	Back-up power supply connection	Local solar energy source	Energy supply abroad	Sourcing energy from D to bolster robustness and reduce costs
Local authority	Drainage maintenance team	Drainage contractor	Central government support	Sourcing expertise from D to increase capacity
Coastal town	Coastal defence team	Other coastal towns within similar region	Regional flood authority	Setting up agreements with other like-minded towns to pool resources

Annex B
(informative)

Background information on approaches for responding to climate change

B.1 General

There are many components to consider in the phenomenon of climate change. Focusing solely on technology, markets, and policy in climate mitigation strategies is incomplete without including human and social factors, which can be a major driver for technology adoption, policy adoption and market creation.

A broad perception is needed to facilitate the development of realistic, substantive standards at each level. A polycentric approach allows a committee to develop more tailored provisions to address the various climate change issues.

B.2 Systems thinking approach

The effects of climate change are real. They influence many complex relationships within an organization regarding production processes, products and services susceptible to changes in the various climate stressors.

The potential threats posed by a changing climate cannot be combatted on only one front — they should be dealt with more holistically, with an organized approach that considers all of the relevant ramifications. In this case, where the standardization subject is operating within a dynamic wider system and where there are multiple direct and indirect interactions, the approach of systems thinking can be useful.

An overview of interconnections and interdependencies, derived from an understanding of the overall system, can help standards developers to scope and focus their considerations on priority sub-systems. This kind of thinking helps to cope with the challenge that the primary threats from climate change are in the future, but these causes stem from present, past, and future actions. Standardized solutions reducing the adverse climate change impacts and risks should consider both present and future actions; and can generally be grouped as mitigation or adaptation strategies. A mitigation strategy involves reducing GHGs through their prevention as emissions or removal from the atmosphere.

For many practical considerations, it is appropriate to develop a suite of system components that will efficiently meet the needs for considering the climate related issues.

Systems thinking views a problem not in isolation but as part of a larger system or context. Feedback is a key concept in systems thinking and corresponds to the ISO requirements to conduct a systematic review after a specific time using the standards.

B.3 Life cycle approach

As awareness about climate change increases and concerns grow, investors are demanding more transparency, and consumers are seeking greater clarity and accountability regarding climate change issues. For example, companies are increasingly receiving requests from stakeholders to measure and disclose their corporate GHG inventories, and these requests often include a company's products and supply chain emissions. Companies need to be able to understand and manage their product-related GHG risks if they are to ensure long-term success in a competitive business environment and be prepared for any future product-related programmes and policies.

Using the life cycle approach to address climate change in standards does not mean conducting or following a complete life cycle assessment. ISO 14040 and ISO 14044 are the primary ISO standards providing requirements and guidelines for the compilation and evaluation of inputs, outputs and potential environmental impacts of a product system throughout its life cycle.

In this document, adopting a life cycle approach means applying “life cycle thinking”. For example, for ACC issues, life cycle assessment is not an appropriate approach. However, the life cycle perspective can help ensure all relevant aspects of a process, service or product are considered. Applying life cycle thinking is about product sustainability operational for businesses that are aiming for continuous improvement. These are businesses that are striving towards reducing their footprints and minimizing their environmental and socio-economic burdens while maximizing economic and social values.

B.4 Risk-based approach

Coping with climate change involves making decisions in the face of uncertainty. There are uncertainties relating to the rate and geographical distribution of changes in climate variables and there are modelling uncertainties. Most importantly, however, there are uncertainties relating to how climate change will translate into climate change impacts, risks and opportunities related to materials, processes and systems and what the consequences of these impacts, risks and opportunities will mean for society. The use of a risk-based approach to adaptation allows for uncertainties to be acknowledged and embraced in the decision-making process and for climate change risks to be considered alongside and on an equal footing with other risks that are routinely managed.

Climate change risks are very particular in nature. In many cases, little can be said about their short- or long-term probability, and climate adaptation costs would increase substantially if the probabilities were determined first. In such cases, a conventional risk assessment (e.g. based on ISO 31000), which uses statistical probabilities, will not be able to draw a clear picture of the risks an organization faces due to climate change. For this reason, various approaches have been developed and partly tested in practice to assess climate change risks in particular. One solution is the use of climate impact chains that have proven in practice to be an effective instrument. By being based on a highly participatory process, they provide an opportunity to discuss in detail all relevant risk factors. In addition, they lend to both a further quantitative analysis where feasible and required and a qualitative analysis in other cases.

B.5 Precautionary approach

By placing a greater emphasis on direct measures to systematically monitor observable effects, a precautionary approach offers a way to be more responsive to harm when the first signals of it manifest themselves in the real world, however ambiguous these first signals can be. By an active search for early warnings, one can hope to significantly reduce society’s exposure to uncertainty and ignorance. For the case of the thermohaline circulation (THC), German scientists have shown that a monitoring system to detect changes in THC in time to be useful for climate policy is possible by more and more frequent observations. They argue that the benefits of such an improved ocean observation system would considerably exceed the costs[44].

NOTE The IPCC Assessment Reports[32],[33] constitute a respected and peer-reviewed source of information.

Other strategies that can help in anticipating surprises include focusing on the underlying principles of surprise, which is what happens in surprise theory and systematic “thinking the unthinkable”, by imagining unlikely and undesirable future events or future states of the environment. To follow reliable climate scenarios can be a better source than the information provided by the climate services centres.

B.6 Identifying climate change issues

In Table B.1 is an adaptation of Table 1 for use as a preliminary assessment as to whether a document addresses climate change issues. It has been filled in with data as an example for a standard addressing sustainable events.

Table B.1 — Example of Table 1 for the preliminary scoping of climate change (CC) issues/topics related to a sustainable events standard

Column A	Column B	Column C	Column D	Column E	Column F
CC issues/ topics relevant to the standard and/or its related TAP	**CC issue/ topic is specifically addressed in the standard or NWIP (Y/N/NA)[a]**	**CC issue/topic is typically addressed when the standard is used (Y/N/NA)[a]**	**Explanation as to how the standard/NWIP addresses CC issues (either specifically or when used)**	**Does the standard/ related TAP impact the issue or receive impacts from the issue? (Y/N/NA)[a]**	**Explanation of context where CC is a potential consideration**
Any general reference to CC (or aspects of CC)	Y (See various clauses)		There is passing reference to GHGs (example of significant issue that can be addressed in the MSS)		
Direct or indirect GHG emissions (e.g. from energy use, fuels, fugitive emissions)	N	Y — See 6.x.x Annex Y	Events have the potential to generate significant direct and indirect GHG emissions. Direct = on-site/venue energy generation or emissions from owned/ operated plant (e.g. gas boilers) and vehicles Indirect = purchased electricity Other Indirect = goods/ services sourced for event including merchandise, catering, uniforms, etc., business travel, third-party transportation (e.g. logistics, event specific spectator transport), waste management		Standard is not explicit on the issues to be addressed or the solutions to such issues — CC/GHG emissions identified as potentially relevant issues to consider
Quantification/ measurement of GHGs	N	Y — See 6.x 9.x	Required to monitor, measure, analyse and evaluate all objectives and targets set in relation to significant issues (e.g. GHG emissions)		Standard is not explicit on what should be measured or monitored
GHG removals (sequestration)	N	N		Unlikely to be applicable and typically is not something that an event organizer, supplier or venue would do	

[a] Y/N/NA: Yes/No/Not Applicable.

Table B.1 *(continued)*

Column A	Column B	Column C	Column D	Column E	Column F
CC issues/ topics relevant to the standard and/or its related TAP	**CC issue/ topic is specifically addressed in the standard or NWIP (Y/N/NA)[a]**	**CC issue/topic is typically addressed when the standard is used (Y/N/NA)[a]**	**Explanation as to how the standard/NWIP addresses CC issues (either specifically or when used)**	**Does the standard/ related TAP impact the issue or receive impacts from the issue? (Y/N/NA)[a]**	**Explanation of context where CC is a potential consideration**
Land use or land use change (in particular soils, forestry, peatland, impacts upon "carbon sinks")	N	Y — See 6.x.x Annex Y	Can be relevant for events involving development and operation of indoor and outdoor sites/venues		Standard is not explicit on the issues to be addressed or the solutions to such issues — biodiversity and natural preservation identified as potentially relevant issues to consider
Vulnerability or resilience to CC impacts	N	Y — See 6.x.x Annex Y	Potential for climatic impacts to be identified as a risk and significant issue for some events which can be impacted by extreme weather		Standard is not explicit on the issues to be addressed or the solutions to such issues
Adaptation to climate change	N	Y — See 6.x.x Annex Y	Potential for ACC to be identified as a significant issue for events which take place in extreme temperatures or locations at risk of extreme weather		Standard is not explicit on the issues to be addressed or the solutions to such issues
Communication or claims concerning CC	N	Y — See 7.x	Standard requires appropriate communication on significant issues (e.g. GHG emissions), steps taken to address such issues as well as key progress		Standard is not explicit on specific topics to communicate
Audit, certification, verification relating to CC	N	Y — See 9.x 9.x.x	Standard requires arrangements for managing/addressing significant issues (e.g. GHG emissions) to be subject to internal audit and management review		Standard is not explicit on assurance of specific topics

[a] Y/N/NA: Yes/No/Not Applicable.

Table B.1 *(continued)*

Column A	Column B	Column C	Column D	Column E	Column F
CC issues/ topics relevant to the standard and/or its related TAP	**CC issue/ topic is specifically addressed in the standard or NWIP (Y/N/NA)[a]**	**CC issue/topic is typically addressed when the standard is used (Y/N/NA)[a]**	**Explanation as to how the standard/NWIP addresses CC issues (either specifically or when used)**	**Does the standard/ related TAP impact the issue or receive impacts from the issue? (Y/N/NA)[a]**	**Explanation of context where CC is a potential consideration**
Skills and competencies relating to CC	N	Y — See 7.x	Standard requires all individuals with responsibility for aspects of the management system to be competent including those carrying out tasks relating to objectives and targets (e.g. managing or measuring GHG emissions)		Standard is not explicit on competencies relating to CC
Technology developments relevant to CC	N				Standard is not explicit on the issues to be addressed or the solutions to such issues
Other important developments of significance to CC such as carbon trading, environmental financing, investments and legal claims (loss and damage)	N	Y — See 6.x.x 6.x	Standard requires appropriate objectives, targets and plans to be in place for managing/ addressing identified significant issues (e.g. GHG emissions) which can include the use of market-based instruments		No explicit reference in standard

[a] Y/N/NA: Yes/No/Not Applicable.

B.7 Timescales and future considerations

Standards developers consider timescale dynamics over the short and long term and the consequence of climate change and its social, environmental and economic impacts for the subject of their standards. Standards developers should take into consideration changes in future climate, legal requirements, forthcoming low carbon economy challenges and ACC challenges.

Timescale dynamics over the short and long term are important when considering climate change and the implications for any standard.

The physical science is clear that atmospheric GHG emissions are at critical levels, therefore increasing the significance of further emissions within the short term (over the next decade). This has implications for policy makers to escalate policies and action for both mitigation and adaptation. Reference is sometimes made to the diminishing “carbon budgets” available.

Many of the implications are estimated in the IPCC Special Report[34]. This report maps out four pathways if global warming is to be restricted to 1,5 °C, with different combinations of land use and technological change. Reforestation is essential to all, as are shifts to electric transport systems and greater adoption of carbon capture technology. Carbon pollution would need to be cut by 45 % by 2030 — compared with a 20 % cut under the 2 °C pathway — and come down to zero by 2050, compared with 2075 for 2 °C. Standards developers should consider this timescale dynamic and its associated social and economic implications. As an example, the IPCC estimate that carbon prices will need to be three to four times higher than for a 2 °C target (noting that overall costs of delaying policy intervention would be significantly higher longer term).

A further relevant development for standards developers is to consider risk approaches over time.

B.8 Task Force on Climate Related Financial Disclosures (TCFD)

The Task Force on Climate Related Financial Disclosures (TCFD) initiative by the G20 Financial Stability Board has developed recommendations and guidance for voluntary climate-related financial disclosures that can provide decision-useful information to lenders, insurers, and investors. The TCFD members include both users and preparers of disclosures from across the G20 constituency covering a broad range of economic sectors and financial markets. The following are central within the TCFD recommended approach to assessing risk and to related organizational disclosures.

— Scenario analysis: A method to help understand the future and to help inform actions that can enhance resilience and flexibility to the future state. Use of scenario analysis for assessing climate-related risks and opportunities and their potential implications is an increasing activity. Its outcomes will be of interest to standards developers.

— Transition risks relating to the mitigation agenda: These are risks that organizations (and users of standards) will all face as economies transition towards low and zero carbon futures states. For example, these can include constraints on emissions, imposition of carbon tax, water restrictions, land use restrictions or incentives, and market demand and supply shifts.

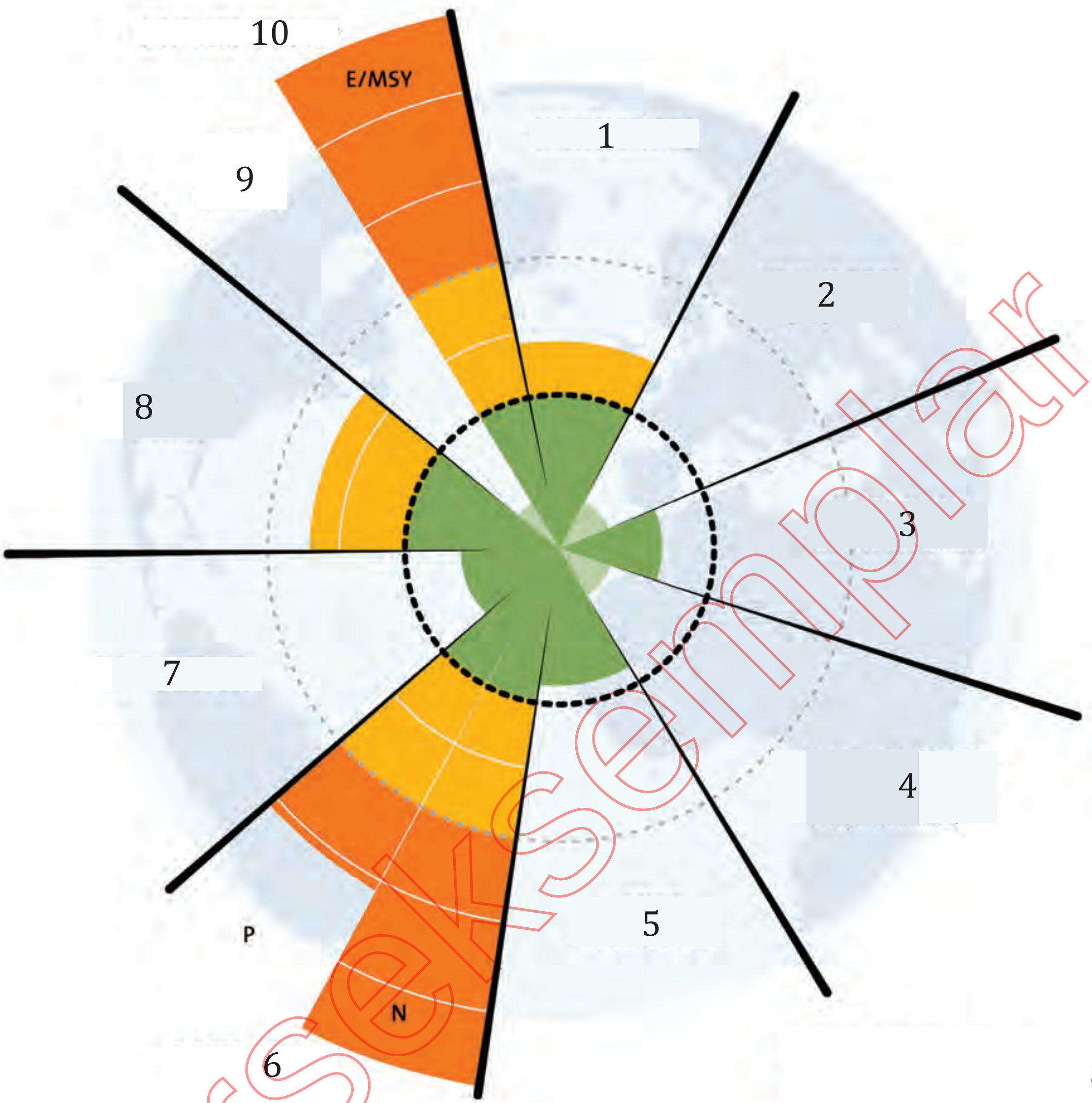
— Physical risks relating to the adaptation agenda: These include disruption of operations, supply chains, damage and destruction of property.

— New opportunities relating to both adaptation and mitigation, for example opportunities from weather and climatic changes at the local level (e.g. introducing new crops at local level) access to new markets and new technology associated with economic transitions (e.g. CCS technology).

Annex C
(informative)

Planetary boundary conditions

The concept of planetary boundaries describes a framework within which humanity needs to live in order to continue to develop and thrive for generations to come. Climate change, freshwater consumption, land use change and loss of biodiversity are examples of planetary boundaries. Crossing these boundaries can generate irreversible environmental changes, while respecting them significantly reduces risks. Planetary boundaries can be broken down in order to select measures that can be addressed at a regional, community organizational level, while taking into account the specific situation. As mentioned above, climate change issues (CO_2 concentration in the atmosphere <0,035 % and/or a maximum change of +1 W m^{-2} in radiative forcing) are explicitly identified as a planetary boundary. Within this background, the concept of planetary boundaries represents a useful approach to reducing risks. Developers of standards related to climate change should make use of this approach. They should take the concept of planetary boundaries as a source providing a sound basis for considering the interrelationships between adaptation and mitigation. To derive synergies or avoid trade-offs (in the meaning of goal conflicts) from this concept helps to develop a useful standard on ACC. Figure C.1 presents the planet boundaries as described by the Stockholm Resilience Centre.



Key

1 climate change
2 novel entities (not yet quantified)
3 stratospheric ozone depletion
4 atmospheric aerosol loading (not yet quantified)
5 ocean acidification
6 biogeochemical flows
7 freshwater use
8 land-system change
9 BII (not yet quantified)
10 biosphere integrity

- green: below boundary (safe)
- yellow: in zone of uncertainty (increasing risk)
- orange: beyond zone of uncertainty (high risk)

NOTE Source: Stockholmresilience.org — J. Lokrantz/Azote based on Steffen et al. 2015.

Figure C.1 — Planetary boundaries

Annex D
(informative)

Adaptation to climate change and climate change mitigation: Examples and supporting information

D.1 Climate change and ISO 14001 environmental management systems

Figure D.1 schematically sets out the link between key clauses in ISO 14001:2015 and CCM and ACC. It is intended to help users of ISO 14001 to show how they can address climate change challenges through their management system.

ISO 14001 deals with the need to adapt to any change in environmental conditions and include matters such as the need to adapt to other environmental consequences that are not due to climate change, for example loss of ecosystem services and biodiversity.

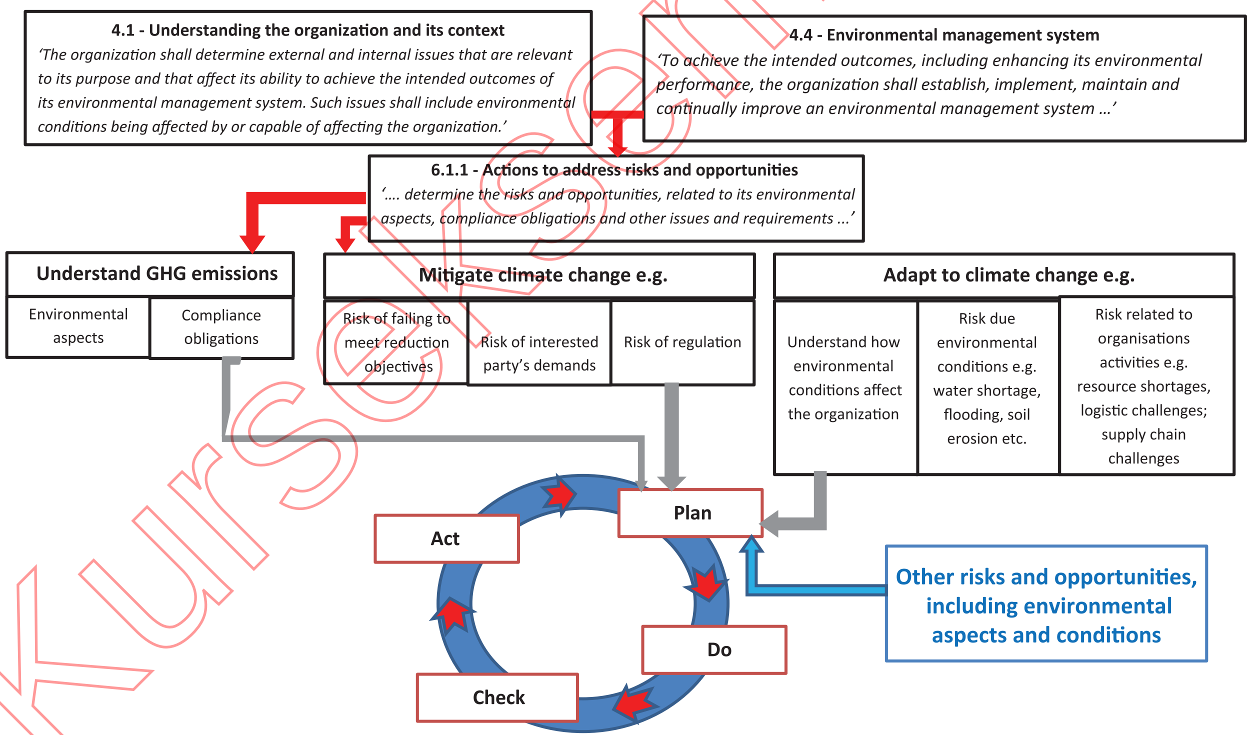
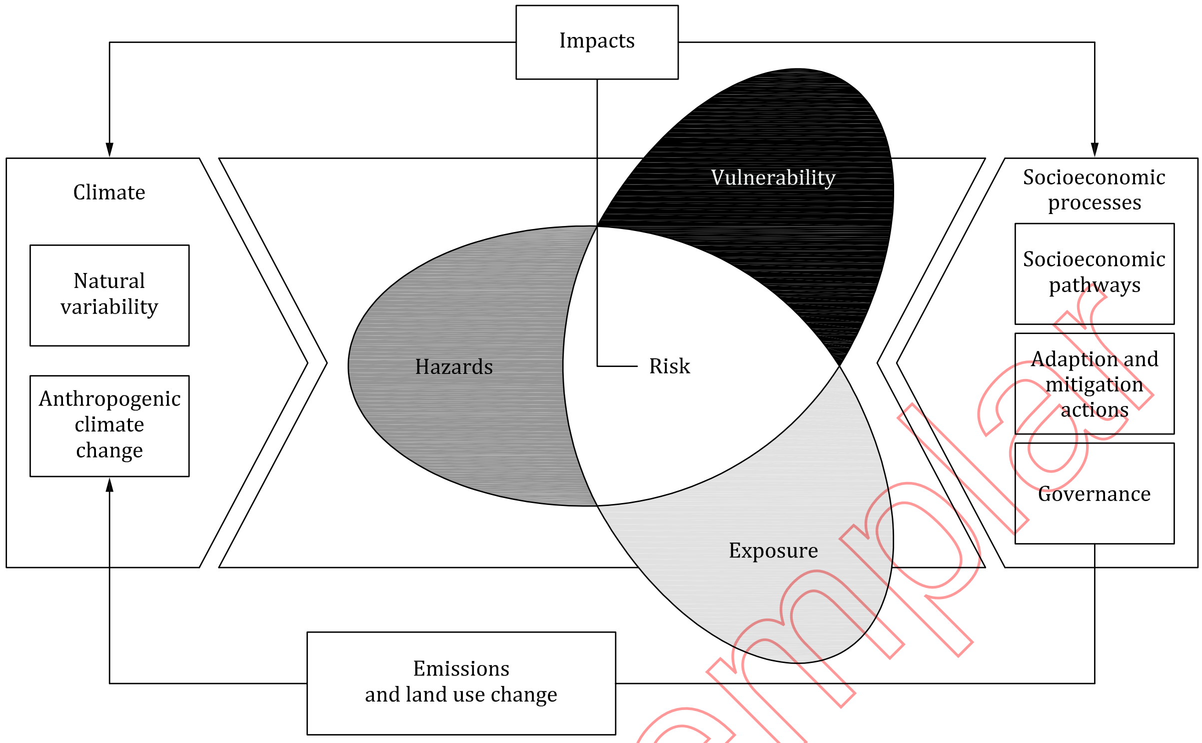


Figure D.1 — ISO 14001:2015 and climate change

D.2 Climate change risks from the IPCC Fifth Assessment Report

The IPCC Fifth Assessment Report[33] provides a focus on the assessment and management of risks from climate-related impacts as a result of the interaction of climate-related hazards (including hazardous events and trends) with vulnerable human and natural systems. This is illustrated in Figure D.2 where interactions between the climate system (left) and socioeconomic processes including adaptation and mitigation actions (right) are drivers of hazards, exposure, and vulnerability.



NOTE Source: IPCC Fifth Assessment Report[33], Figure 19-1.

Figure D.2 — Climate change risks

D.3 Climate change adaptation checklists

D.3.1 General

The lists provided in this annex are not intended to be exhaustive lists of considerations and are only examples of what should be analysed. The standards developer should seek further expertise on ACC issues related to the standard being developed.

NOTE All tables/considerations in this annex are taken from CEN/CENELEC Guide 32:2016, with some minor modifications.

D.3.2 Direct and indirect climate change impacts

The questions in Table D.1 can be used to check if the standard under development is affected by climate change impacts.

Table D.1 — Considerations for direct climate change impacts

No.	Impact of climate change
1	Does the production or service delivery depend on the supply of water (high volumes or specific quality), energy, agricultural or forestry products?
2	Is the climate or water a key input into the production process?
3	Does production or service provision involve any outdoor activities?
4	Are there any climate, weather or temperature or humidity sensitive production processes, such as those reliant on cooling, water use or energy supply?
5	Is the standard for a test method that is sensitive to temperature or humidity?
6	Is the effectiveness of the product affected by the weather or climate?
7	Does the weather or climate influence what properties are required of the product?
8	Are disposals or reprocessing activities likely to be weather or temperature sensitive?

If the answer is Yes to any of the above questions, then ACC considerations are likely to be relevant to the development of the standard.

If the answer is No to the above questions, then the questions in Table D.2 should be used to evaluate if there can be indirect impacts of climate change on the standard.

Table D.2 — Considerations for indirect climate change impacts

No.	Impact of climate change
1	Does the product rely on the supply of specific raw materials or inputs from a specific region?
2	Is production or service provision likely to rely on staff occupying premises where health, safety and comfort can be compromised by weather?
3	Is the service life of the product more than 10 years including its reuse? Is reusability important?
4	Does your standard deal with transportation or is transport involved in any stage of the life cycle?

If the answer is Yes to any of the above questions, then ACC considerations can be relevant to the development of the standard.

Any decision should be documented and an explicit reason should be provided, e.g. is this required or can we omit it?

If the answer is No to all of the above questions, then ACC considerations are not likely to be relevant to the development of the standard.

D.3.3 Examples of climate change adaptation provisions

Tables D.3 to D.8 provide examples of climate change considerations for every stage of the product life cycle.

Table D.3 — Acquisition stage related examples

Examples of provisions in standards	Choices, limitations or mutual benefits
	Any change in raw materials: — can affect quality, emissions, energy use at any life cycle stage; — can affect the costs of making the product and taking it to market; — can have implications for resource scarcity or end-of-life options. NOTE These apply to all of the following examples.
Give preference to materials that can be sourced from more than one place.	A choice between social objectives and resilience occurs where the production/export of the material with only one source is essential to support livelihoods.
For agricultural products, consider different ingredients or new climate resilient varieties.	The limit to this is where the more vulnerable ingredients or varieties are vital for sustaining a poor rural community. Changing raw material qualities and increased costs for raw material due to poorer harvests.
Design for flexibility so that adjustments can be made later on as more information becomes available.	Reorganization measures for existing products, processes and buildings, especially for historical buildings, cannot be carried out without any limitations.
Give preference to materials without climate sensitive production processes.	
Give preference to materials, the extraction of which will not increase the vulnerability of the area of origin.	
Provide suitable information for the producer, e.g. information about boundary conditions.	

Table D.4 — Production stage related examples

Examples of provisions in standards	Choices, limitations or mutual benefits
Encourage use of water efficient process equipment.	There can be choices to make between water efficiency and energy efficiency, quality or costs as well as with sensitivity to temperature or other weather variables.
Avoid designs that require weather or temperature sensitive production processes or equipment.	There can be choices to be made between temperature/weather sensitivity and water or energy efficiency, quality or costs.
Choose materials that can be easily stockpiled, i.e. those that do not degrade quickly and can be easily stacked.	
Design aids and recommendations, such as maps including information about driving rain zones, should be updated with projected climate information for appropriate future time periods, where this is available.	The limit to this is where the right kind of future climate information is not available.

Table D.5 — Service provision related examples

Examples of provisions in standards	Choices, limitations or mutual benefits
Ensure buildings can function and provide thermal comfort in a changing climate.	There can be choices to be made between water efficiency and energy efficiency, quality or costs.
Put in place remote working arrangements.	There can be choices to be made between quality or costs, e.g. of providing associated information and communications equipment.
Put in place flexible working arrangements.	There can be choices to be made between quality.
Use business continuity plans and procedures to minimize the impact of a disruption when it occurs including plans for recovery.	
Give preference to equipment that is not weather sensitive.	There can be choices to be made between quality or costs.
Design aids and recommendations, such as maps including information about driving rain zones, should be updated with projected climate information for appropriate future time periods, where this is available.	The limit to this is where the right kind of future climate information is not available.
Include different design approaches depending on the geographical factors of area of use and provide relevant supporting information, e.g. maps.	

Table D.6 — Use stage related examples

Examples of provisions in standards	Choices, limitations or mutual benefits
Choose materials that are more robust, heat resistant, porous, waterproof (depending on the context).	Any change in raw materials or design: — can affect quality, emissions, energy use at any life cycle stage; — can affect the costs of making the product and taking it to market; — can have implications for resource scarcity or end-of-life options; — will have implications for the functioning and vulnerability of the whole system.
Design for resilience/resistance, e.g. changed dimensions.	
Design for durability including improved reparability and maintainability.	
Optimize the design life.	This will have implications for resource efficiency.
Design for portability so it can be moved and kept safe from weather hazards, e.g. smaller, lighter, movable, easily assembled/ disassembled, can be controlled remotely, own power source.	
Inclusion of information for users, e.g. operating instruction that take into account climate change impacts and risks.	Uncertainties with respect to climate change and knowledge gaps.
Include different design approaches depending on the geographical factors of area of use and provide relevant supporting information, e.g. maps.	

Table D.7 — End-of-Life stage related examples

Examples of provisions in standards	Choices, limitations or mutual benefits
Development of a systematic evaluation procedure for cases of damage.	No known limitations or decision conflicts/ No example provided.
Assess that products at end-of-life will not be negatively affected by climate change in their reuse, recycling, recovery, disposal or decommissioning and look for new/alternative end-of-life options if necessary.	

Table D.8 — Transportation stage related examples

Examples of provisions in standards	Choices, limitations or mutual benefits
Traffic planning (not through vulnerable regions).	Longer delivery routes can lead to delay and higher costs.
Consider the location of raw material production (see acquisition).	
Choose the most resilient way of transport.	Choose the optimum between resilience and reduction of GHG emissions.
Choose new/ alternative ways of packaging.	Balance between waste and GHG emissions.

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ICS 01.120; 13.020.01

Price based on 61 pages