Tool 5: Model Invitation to Tender (ITT) for commissioning a climate risk and opportunity assessment

The following is a model ITT for a best practice Climate Risk and Opportunity Assessment based on the European Commission methods[[1]](#footnote-1). It has been taken from a real use setting from a financing organisation operating in Europe which provides lending for large scale infrastructure and regeneration projects. It consists of two parts – an overview of the task, and a companion methodological guidance note which sets out a broad approach which consultants can supplement with their own proposals.

The ITT represents good practice for developing a broad understanding of the long term climate risks to a project and should be applied to projects with a life cycle of more than 20 years. The assessment should consider investments that are proportional to the expected time required for a consultant (or an in-house adaptation manager) to do both a high level and detailed assessment and analysis which can be 6 months.

Key areas of flexibility or where you may wish to add your own details are highlighted in yellow.

1. Overview of the assignment

Climate risk and opportunity assessment (CROA) is a process which helps the Project Owner, and/or Project Manager do the following:

* Consider how the project is vulnerable to climate variability and change in a comprehensive way;
* Assess related risks to the success of the project any benefits from a changing climate; and
* Identify relevant adaptation options (structural, operational and/or organisational) to build climate resilience.

If necessary, the risk assessment process can help reassess some aspects of project feasibility in the light of these options and develop a subsequent optimised, more resilient project scope.

2. Detailed Description of the Assignment

*2.1. General description of the approach to be followed*

The Consultant will undertake a Climate Risk and Opportunity Assessment of the system of which the project is a part and will use its results to inform the design criteria and option analysis.

This ITT builds on the methodology proposed by the European Commission in the “Non-paper Guidelines for Project Managers: Making vulnerable investments climate resilient”[[2]](#footnote-2) and includes references to other methodologies and tools that may be used by the Consultant.

The Methodological Guidance Note included below explains in details the main steps of a suggested approach to the assignment. The Consultant can follow these steps or propose an improved methodology that remains consistent with the overall logic of the assignment as defined by the following phases:

1. The characterization of the project, its boundaries and relevant underlying system(s),
2. The risks to relevant climate variables and hazards (assessing the vulnerability and the exposure to climate hazards of project components), and any opportunities that may arise from climate change
3. The in-depth analyses and quantitative risk assessment (potential impacts, adaptive capacity and resulting risk assessment) and the preliminary identification of the risk response through the design criteria and adaptation options. These design criteria and adaptation options will further inform the option analysis.

It is particularly important that the Consultant early identifies relevant internal stakeholders in [the client’s organisation] (including present and future operators of the assets) and liaise with them during this assignment.

*2.2. Project scope: its components, boundaries and relevant underlying system(s)*

Thorough understanding of the project, its critical elements, dependencies and boundaries is essential for the completion of the key phases of the CROA.

The Consultant will:

* Briefly describe the project’s nature and purpose and its potential principal components, identify project’s critical elements, i.e. the elements whose failure may impair project construction and/or operation or in any other way impair the achievement of the project’s outputs and outcomes.
* Define project boundaries for the CROA analysis, which will generally extend beyond the infrastructure or other activities directly included in the project and include at a minimum the following aspects:
* On-site assets and processes (the “project” in its strictest sense);
* Inputs: the sources and supply chain of relevant inputs, including human resources;
* Outputs and outcomes: the distribution systems, markets or other delivery mechanisms for project outputs;
* Transport links: any network, means of transport, logistics processes constituting the project’s input/output delivery routes and that can be affected or damaged under current and future climate conditions e.g. roads, power and telecommunication linkages;
* Describe the nature and purpose of the system(s) of which the project is part of, focusing just on what is relevant based on the nature and purpose of the project[[3]](#footnote-3);
* Identify critical elements of these systems, i.e. the elements whose failure may impair their correct functioning or may cause severe strain of these systems[[4]](#footnote-4); and
* Identify and characterise key stakeholders including: a list of key stakeholders, their areas of interests and areas of project that affects them, stakeholders’ risk attitudes, and levels of stakeholder influence on the project.

*2.3. Assessment of potential climate impacts*

The potential climate impacts of the project’s system to climate variables and hazards is assessed by combining (i) the sensitivity of the specific infrastructure and activities included in the project and (ii) the vulnerability to the relevant variables of the location of the relevant elements of the project as identified in its characterisation in 2.2. The assessment can also include an optional assessment of adaptive capacity. Each element of the assessment and their outputs shall be validated through local stakeholder consultations.



2.3.1. Sensitivity analysis

The Consultant will identify the sensitivities of the type of activities concerned by the project in relation to a range of climate variables and secondary effects/hazards[[5]](#footnote-5). It is important to note that this first step in the analysis is solely linked with the type of activities that the project concerns and not with the specific project and its location. The first step aims only to select the climate variables that are relevant for the project so as to focus the scope of the rest of the analysis.

A non-exhaustive generic list of the variables and climate-related hazards is given in the Methodological Guidance Notes (at the end of this paper).

The Consultant will assess the sensitivity in relation to the above variables and hazards of at least the following project aspects (as defined above in 2.2):

* On-site assets and processes
* Inputs (e.g. water, energy)
* Outputs (products, markets, customer demand)
* Transport links

For example the Consultant may attribute a score of “High sensitivity”, “Medium sensitivity” or “No sensitivity”. In such a case, the Consultant will clearly indicate the meaning assigned to the respective scores (“High”, “Medium”). Example definition is given in Annex IVa.

It may be necessary to assess the sensitivity of individual components of the project particularly when these have been identified as “critical” in the project identification phase (see 2.2.).

As the output the Consultant may produce a sensitivity matrix for the project using “traffic light” representation. This matrix could later be combined with the assessment of exposure to the relevant hazards for the compilation of the overall vulnerability matrix.

The Consultant will also reference the methodology used to determine the scores and justify each of the scores. The Consultant will adopt a definition of a variable/hazard to which the project is sensitive that will serve to scope the further work. For example the project which scored at least ‘medium’ in respect to any variable or climate-related-hazard is considered to be sensitive to that variable/hazard.

2.3.2 Adaptive capacity assessment

The consultant will assess the adaptive capacity of the system (encompassing project and institutional environment in which it is to be implemented) taking into account, among others, the following aspects:

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| --- |
| Adaptive Capacity Assessment |
| Internal capacity (of project owner/organisation) | External Framework |
| * Institutional capacity (including risk management, change management, project management, decision-support instruments, assets management),
* (Systematic) processes currently in place to identify sensitivity, exposure, critical assets, vulnerabilities, and measures to address them,
* How lessons learnt are incorporated into system-level or project planning (design/implementation/operation) and operating procedures and practices,
* Awareness of climate risks of the assets and organisation
* Awareness of the best industry practices and adaptation practices in other projects, available resources and insurance,
* Emergency and contingency plans (and processes to adjust them when revised climate change data are available)
* Availability of updated reports on technical condition of infrastructure
* Available resources and insurance
 | * Availability of relevant datasets and higher resolution data on future climate variability and change, existence of relevant monitoring systems,
* Consideration of climate aspects in planning instruments, e.g. urban planning, river basin plans, flood risk management plans, etc.
* Existence of climate risk and vulnerability guidance notes, models or other tools developed at industry level
* Building codes and operating standards and practices that take the relevant climate variables and hazards into considerations,
* Emergency and contingency plans (and processes to adjust them when revised climate change data are available),
* Capacity of the entities involved in managing prevention and emergency activities
* Available resources and insurance,
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The Consultant will also provide recommendations of activities that may help build or improvethe adaptive capacity at the level of the project board, and/or relevant governing or administrativetiers (e.g. city, region, river basin competent authority).

As the **output** the Consultant will produce the adaptive capacity assessment in a form of aSWOT analysis with recommendations, not necessarily limited to the project board. It will alsodescribe the applied methodology and assessed aspects.

**2.3.3. Vulnerability Assessment**

If an adaptive capacity assessment is undertaken for the project, the consultant should consider the effects of the assessment on sensitivity, to produce an overall rating of vulnerability.

2.3.4. Exposure assessment

The Consultant will evaluate the current and future exposure to the relevant climate variables and hazards (identified in 2.3.1) of the location(s) where the project will be implemented, and any other locations that are relevant for the project, e.g. areas where key inputs are sourced or key outputs are delivered, and any critical transport route as defined above.

To this end, the Consultant will use relevant spatial data related to the climate-related variable(s) and hazards using information from global climate scenarios but also from any available scenarios that may have been developed at lower geographical scale for the locations that are considered relevant for the project. The Consultant should keep in mind that scenarios at a lower scale may be less reliable.

For the purpose of assessing future climate exposure the Consultant will take into account the economic life of assets.

As the output of this step the Consultant may produce an exposure matrix for the project and will explain how the scores were defined for the purpose of the assessment and briefly justify each of the scores (including relevant maps). References to the data sources and models used for the purpose of this step will be attached.

2.3.5 Summary risk likelihood matrix

The Consultant will assess the potential risk likelihood to the project from each relevant variable/hazard bycombining the outcomes of the vulnerability and exposure assessments using the risk matrix.

As the output the Consultant will present the level of potential risk likelihood to the various components of the project, in relation to all relevant variables. A “traffic light” matrix can be used to summarise the analysis. The interim report shall clearly identify (i) the elements of the project that are subject to potential climate impacts and (ii) the nature of this (e.g. the consequence of certain hazards, the time-horizon for their potential manifestation, the specific components of the project that may be affected, etc.).

The assessment of potential climate impacts will have to be discussed and validated through consultation with stakeholders.

*2.5. Risk assessment*

The Consultant will undertake a risk assessment in line with best practice and riskmanagement methodologies or standards applied in the sector, industry or project board’sorganisation**[[6]](#footnote-6).** The Consultant will justify its choice of methodology alongside an overview of its advantagesand potential drawbacks. As a minimum the methodology should include the riskidentification, risk analysis and risk evaluation steps.

In the risk assessment process, the Consultant will translate climate variables and climate-related hazards to which the project is vulnerable, into risks by quantifying the likelihood andpotential impact of each risk. The analysis should include and distinguish between currentclimate variability and future projections of the climate trends relevant to the project. First stage should estimate the likelihood and impact under current conditions based on existing data in order toclearly define the state of the system (baseline). Second, future risk can be determined based on projections of the system’sevolution from the previously defined state or model.

The Consultant will appropriately deal with the uncertainty linked with the implications of multiple climate and socio-economic, scenarios providing differing views on the likelihood of different events/future trends. The Consultant will propose ways to address difficulties such as threshold effects or rapidly changing patterns compared to past trends.

For the risks assessed as significant, the Consultant will undertake a detailed assessment in order to test the ability of the project to cope with the climate variability/hazard it will experience over its lifetime. That assessment will involve quantitative analyses of the project aspects in conjunction with the climate impact models (e.g. flood risk models).

Throughout the risk assessment, the Consultant will cooperate with the project board and other relevant stakeholders.

As the output of this stage, the Consultant will produce a Risk Register that will include as a minimum the following elements:

* Risk description, including the cause of the risk (climate variable or climate-related hazard), the event and its effect on the project,
* Corresponding climate-related critical threshold (If appropriate)[[7]](#footnote-7),
* Probability (likelihood) of the risk occurring[[8]](#footnote-8),
* Quantification of the impact (severity) of the risk on the project, should the risk materialise[[9]](#footnote-9),
* Proximity of the risk (estimation of the timescale for when the risk might materialise),
* Risk owner (i.e. individual responsible for management and control of the risk, including the implementation of the risk response),

The Consultant will prioritise risks identified in the Risk Register (The Methodological guidance note suggests one possible approach).

For each risk classified as significant, the Consultant will provide:

* A detailed description of currently identified risk response (i.e. current controls and any adaptation options identified in the adaptive capacity analysis)
* Expected residual risk after the response has been implemented,
* Identification of the project board’s risk attitudes and consequent indication of whether additional adaptation measures appear to be necessary,

The Consultant will provide reference to the methodology applied. It will also reference risk techniques applied to assess probability, impact and proximity. It will further reference models used in detailed analyses.

*2.6. Identification of adaptation options*

The Consultant will identify viable adaptation options[[10]](#footnote-10) and formulate design criteria that respond to the risks and vulnerabilities identified in the previous steps. In that process the Consultant will build on best industry practices, best adaptation practices, and internationally recognised guidelines[[11]](#footnote-11).

Identification of viable adaptation options should be consulted with the project board and other relevant stakeholders.

As the output the Consultant will produce design criteria and a list of identified options corresponding to the risks identified in the Risk assessment step.

Methodological Guidance Note

1. General description of the approach to be followed

This model ITT builds on the methodology proposed by the European Commission in the “Non-paper Guidelines for Project Managers: Making vulnerable investments climate resilient” and include references to other methodologies and tools that may be used by the Consultant.

The main building blocks of the methodology include:

* Definition of project scope – including boundaries and relevant system(s);
* Sensitivity analysis;
* Exposure assessment;
* Adaptive capacity assessment;
* Assessment of risk likelihood;
* Final Risk assessment; and
* Identification of adaptation options.

The logic of the approach summarised in the picture above can be described as follows. It starts with a clear characterization of the project, which includes a clear identification and description of:

1. its components and critical elements, i.e. the elements whose failure may impair project construction/ operation and prevent the achievement of its outputs/outcomes and
2. its relevant boundaries, as well as its interaction with the relevant physical (environmental, infrastructural) and socio-economic systems that surround it.

“Setting the stage” is crucial to ensure that a sufficiently broad perspective is taken when assessing the ways in which climate-related hazards may affect the project. Project boundaries for the Climate Risk and Opportunity Assessment will generally extend beyond the infrastructure or other activities included by the project. Further extending the vision to include in the analysis the broader system(s) of which a project is part ensures that their vulnerabilities and potential sources of resilience are also taken into consideration when assessing risks and identifying adaptation options. This will also help avoiding actions that may improve resilience of the project while reducing it elsewhere (“maladaptation”).

Once the context is well defined, the first step of the analysis is to rate the vulnerability to different climate variables and hazards of the generic type of activities needed to achieve the objective of the project (understood in the broader sense indicated above and not just limited to any specific infrastructure to be built). This comprises two parts – first assessing the sensitivity. This assessment is not location-specific and helps reduce the number of relevant climate variables that need to be considered in the rest of the analysis. This is complemented by an assessment of the adaptive capacity of the project board and of the system(s) the project is part of, which may help mitigate some of the potential impacts.

The second step is to assess the exposure of the project and its relevant system(s) to these selected variables/hazards, depending on their location. The outcomes of the vulnerability and exposure analyses are combined into an assessment of potential risks on the specific project from the priority set of climate variables and hazards. Together, these will provide a set of risk likelihoods.

The next step concerns taking these likelihoods and quantifying potential impacts on the project and its outputs/outcomes. On this basis, the Consultant will identify adequate responses (design criteria and adaptation options) to be used further in the option analysis.

1. Sensitivity analysis

The Consultant will identify the sensitivities of the type of activities concerned by the project in relation to a range of climate variables and secondary effects/hazards. It is important to note that this first step in the analysis is solely linked with the type of activities that the project concerns and not with the specific project and its location. The first step aims only to select the climate variables that are relevant for the project so as to focus the scope of the rest of the analysis.

A non-exhaustive generic list of the variables and climate-related hazards is given below. The Consultant may add other variables or climate related-hazards perceived as being key to the project.

Primary climate variables:

1. Average (air) temperature change (annual / seasonal / monthly),
2. Extreme (air) temperature change (frequency and magnitude),
3. Average rainfall change (annual / seasonal / monthly),
4. Extreme rainfall change (frequency and magnitude),
5. Average wind speed change (annual / seasonal / monthly),
6. Extreme wind speed change (frequency and magnitude),
7. Humidity,
8. Solar radiation,

Secondary effects/ climate-related hazards:

1. Sea level rise (SLR) (plus local land movements)
2. Sea / water temperatures
3. Water availability
4. Storm (tracks and intensity) including storm surge
5. Flood (coastal and fluvial)
6. Urban flooding (e.g. sewers overflows due to extreme rainfall)
7. Ocean pH
8. Dust storms
9. Coastal erosion
10. Soil erosion
11. Soil salinity
12. Wild fire
13. Air quality
14. Ground instability/ landslides/ avalanche
15. Urban heat island effect
16. Growing season length
17. Snow

The Consultant will assess the sensitivity in relation to the above variables and hazards of at least the following project aspects:

* On-site assets and processes
* Inputs (e.g. water, energy)
* Outputs (products, markets, customer demand)
* Transport links

and will attribute a score of “High sensitivity”, “Medium sensitivity” or “No sensitivity”. The respective scores could be defined as follows:

* High sensitivity: Climate variable/ hazard may have significant impact on assets and processes, inputs, outputs and transport links.
* Medium sensitivity: Climate variable/ hazard may have slight impact on assets and processes, inputs, outputs and transport links.
* No sensitivity: Climate variable/ hazard has no effect or is not applicable.

By way of example, a wastewater treatment plant may normally be considered highly sensitive to water availability in terms of inputs or to extreme temperature/rainfall changes in terms of on-site processes. Similarly, changes of frequency or intensity of rainfall events will affect various types of on-site assets including flood protection structures. Similarly, landslides or ground instability may potentially affect many types of physical infrastructure.

Attributing a medium level of sensitivity seems to be appropriate in cases where the relationship between the climate variable or hazard and the type of project is less direct.

However, these indicative matrices should not be seen as final and the Consultant will have to develop its own sensitivity matrices, including through consultation with local stakeholders. It may be necessary to assess the sensitivity of individual components of the project particularly when these have been identified as “critical” in the project identification phase.

2.4. Adaptive capacity assessment

These steps of the analysis will assess the capacity of the project board (and of the systems of which it is part) to deal with relevant climate variable/hazards (i.e. those to which the project is vulnerable), as well as a quantification of the risk associated with each of them. This phase will involve deeper analyses and quantitative assessments, as well as further stakeholder consultations. Those variables and hazards to which the project has been found vulnerable, will be further considered as relevant and the following steps of the analysis will assess:

* the preparedness of the project board to deal with the variables and hazards to which the project is vulnerable, in terms of
	+ structural interventions that are already planned to be carried our alongside the project,
	+ operational/organizational adjustments that are foreseen,
	+ emergency response systems that are foreseen in case of climate hazards occur or climate variables exceed critical thresholds (against which no other adaptation form is possible or whose cost would be prohibitive or at least higher than what is justified based on the risks that are considered acceptable by the project board).
* the adaptive capacity of the broader system that the project board belongs to, e.g. its economy, industry, its institutional and regulatory system, etc.
* the risk they represent for the project in terms of expected losses or other risk indicators.

2.2. Exposure assessment

The Consultant will rely on current best practice in assessing and predicting the probability of future climate trends. Exposure analysis will also rely on historical evidence of climate variability related to the relevant variable and hazards in the relevant locations. The consultant will clearly document the sources of such historical data, which will also include consultation with relevant stakeholders. The Consultant will attribute a score of “High exposure”, “Medium exposure” or “No exposure”. For the purpose of assessing future climate exposure the Consultant will take into account the economic life of assets.

2.3. Assessment of risk likelihood

The Consultant may assess the potential likelihood of risks on the project from each relevant variable/hazard by combining the outcomes of the vulnerability and exposure assessments using a matrix.

In such a case, as the output the Consultant will produce the final matrix listing the level of potential risk of the various components of the project to all relevant variables. The text accompanying the matrix shall clearly identify (i) the elements of the project that are subject to potential climate impacts and (ii) the nature of this (e.g. the consequence of certain hazards, the time-horizon for their potential manifestation, the specific components of the project that may be affected, etc.).

2.5. Risk assessment

The Consultant may prioritise risks identified in the Risk Register through a Risk Matrix built on the probability and impact scores of the risks.

2.6. Identification of adaptation options

The Consultant should identify and appraise options that perform well under conditions of uncertainty e.g. no/low regret options, flexible options or soft measures, as well as options whose viability depends on (i) certain events taking place when risks depend on certain threshold effects, (ii) further knowledge on uncertain elements of the system or (iii) the risk attitude of decision-makers.

A range of adaptation options may include among others: soft solutions (i.e. reallocation of resources, behavioural change, training and capacity building, institutional reforms), safety margins to cope with uncertainties, hard engineering solutions (e.g. retrofit of infrastructure, flexible designs allowing for future modification of infrastructure if needed), and insurance, emergency plans. Response to risks may include design criteria and/or measures to be included in operation.

The Consultant should pay attention to the fact that none of the identified options should increase vulnerability of other systems (outside the project boundaries). Options that are outside scope of the project or outside control of the project board, but which do enhance the long term resilience of the project should be made subject of clear recommendations for future action at relevant governing level.

1. The EC guidelines are based on the IPCC 4 Framework for risk management which differs slightly from the IPCC 5 Framework. This ITT has been updated to account for this difference. [↑](#footnote-ref-1)
2. “Non-paper Guidelines for Project Managers: Making vulnerable investments climate resilient”, available at:

<http://ec.europa.eu/clima/policies/adaptation/what/docs/non_paper_guidelines_project_managers_en.pdf> [↑](#footnote-ref-2)
3. These systems can include the set of infrastructure within which the project may be integrated (e.g. the existing network to which a new wastewater treatment plant will be added; regional transport network within which the road project is to be integrated), the urban area or region where it is located (geographical scale will vary depending on project nature), the relevant environmental system that may affect and be impacted by the project, the communities of beneficiaries and other relevant stakeholders. [↑](#footnote-ref-3)
4. This will be especially important to assess how the project or its possible adaptation measures affect the overall adaptive capacity of the system(s) they belong to, and to avoid maladaptation. [↑](#footnote-ref-4)
5. See the accompanying methodological guidance note for a detailed list of these variables [↑](#footnote-ref-5)
6. Examples of such standards are: ISO 31000:2009, COSO Enterprise Risk Management, Management of Risk. EC “Staff Working Paper on Risk Assessment and Mapping Guidelines for Disaster Management” may also be consulted. Some Promoters may also prefer HAZOP analysis. An overview of risk assessment techniques is provided in ISO 31010:2009. A brief presentation of a minimum elements of risk assessment can be found in Section 2.3.4 of “Non-paper Guidelines...” Consultants are also asked to account for the draft standard, ISO14091: “Adaptation to Climate Change — Vulnerability, impacts and risk assessment”. [↑](#footnote-ref-6)
7. Climate-related threshold represents the boundary between tolerable and intolerable levels of risk or performance criteria for the project options or components. [↑](#footnote-ref-7)
8. Example of a simple scale for assessing probability could be found in Table 11 of “Non-paper Guidelines …”. [↑](#footnote-ref-8)
9. Example of a simple scale for scoring risk impact could be found in Table 10 of “Non-paper Guidelines...”. [↑](#footnote-ref-9)
10. A range of adaptation options may include among others: no regret solutions (i.e. that deliver economic benefits without climate change), low-regret solutions (which are low-costs or are cost effective), or win-win which solutions which deliver large co-benefits. Other examples could include soft solutions (i.e. reallocation of resources, behavioural change, training and capacity building, institutional reforms), safety margins to cope with uncertainties, hard engineering solutions (e.g. retrofit of infrastructure, flexible designs allowing for future modification of infrastructure if needed), insurance, emergency plans. [↑](#footnote-ref-10)
11. Examples of useful guidance on adaptation options could be found on page 46 and in Annex X (Adaptation option checklist) of “Non-paper Guidelines...”. [↑](#footnote-ref-11)