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List of Acronyms

AfDB: African Development Bank
CC&S: Carbon Capture and Storage
CCKP: Climate Change Knowledge Portal
CIF: Climate Investment Funds
CIP: Climate Information Portal
CH₄: Methane
CO₂: Carbon Dioxide
CMIP3: Coupled Model Intercomparison Project, Phase 3
CMIP5: Coupled Model Intercomparison Project, Phase 5
CC&S: Carbon Capture and Storage
CV&C: Climate Variability and Change
CCKP: Climate Change Knowledge Portal
DfID: Department for International Development, United Kingdom
DSI: Decision Support Interface
ESMP: Environmental and Social Management Plan
EWX: Early Warning Explorer
FEWS NET: Famine Early Warning Systems Network
GCM: Global Climate Model
GeoWRSI: Geospatial Water Requirement Satisfaction Index
GHCN: Global Historical Climatology Network
GHG: Greenhouse Gases
HFC: Hydrofluorocarbons
JICA: Japan International Cooperation Agency
MDB: Multilateral Development Bank
N₂O: Nitrous Oxide
NCDC: National Climatic Data Center
NGO: Non-Governmental Organization
NOAA: National Oceanic and Atmospheric Administration
OECD: Organisation for Economic Co-operation and Development
PAR: Project Appraisal Report
PFC: Perfluorocarbons
QPE: Qualifying Project Element
RCP: Representative Concentration Pathways
SF₆: Sulphur Hexafluoride
SFM: Stream Flow Model
SRES: Special Report on Emissions Scenarios
WMO: World Meteorological Organization

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For any inquiries on this paper contact:
Mafalda Duarte m.duarte@afdb.org,
Chief Climate Change Specialist, Department of Energy, Environment and Climate Change, African Development Bank.
1. General introduction

1.1 Rationale for tracking climate finance

Financial resources from a variety of public and private sources have been, and will continue to be, committed to support climate change adaptation and mitigation. While there is wide agreement that rapid and successful deployment of this international public finance is a critical first step in allowing developing countries to adapt to climate change and pursue actions that will allow them to move onto a low carbon development pathway, it is also widely recognized, in particular by developing countries, the need to track and report financial flows that support climate change mitigation and adaptation, to build trust and accountability with regard to climate finance commitments and monitor trends and progress in climate-related investment.

A comprehensive picture of the climate finance landscape is critical to this end and, ultimately, a prerequisite for ensuring the effective and productive use of available financial resources. This is essential to inform governments and policy makers on how to spend their money wisely.

Recognizing this need and the shortcomings of the existing tracking systems, the Vice Presidents of the Multilateral Development Banks (MDBs) agreed in late 2010 to undertake joint efforts leading towards a joint methodology for tracking climate change mitigation and adaptation finance. The objective was to agree on key reporting principles, eligibility for aggregation and transparency. A Joint MDB Working Group on climate finance tracking was established, with the Inter-American Development Bank leading efforts on mitigation and AfDB leading efforts on adaptation.

The outcomes of this work were both a Joint MDB methodology for climate finance tracking and reporting and AfDB’s own methodology for climate finance tracking and reporting. AfDB’s methodology for adaptation finance tracking is the same as the Joint MDB methodology and as far as mitigation is concerned AfDB’s methodology is an extension of the Joint MDB methodology for tracking mitigation finance.
Box 1: Definitions

**Climate change**: A change in the state of the climate that can be identified by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer.

In this document, the term “climate variability and change” (CV&C) is used. This is to emphasise the point that changes in climate variability, without changes to mean temperature or rainfall variables, may also be the result of climate change. However, strictly speaking, the definition of climate change encompasses climate variability.

**Adaptation**: In human systems, the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities. In natural systems, the process of adjustment to actual climate and its effects; human intervention may facilitate adjustment to expected climate.

**Vulnerability**: The propensity or predisposition to be adversely affected.

**Mitigation**: A human intervention to reduce the sources or enhance the sinks of greenhouse gases.

Note that the term “mitigation” is also used in the context of risk management (particularly in the results based logical framework) to describe a measure that reduces a risk. In the risk context, the term has a different meaning. The description of measures that mitigate risk does not mean that the project qualifies as a climate change mitigation project. Measures that reduce risk are not usually climate change mitigation measures, unless the risk itself relates to the emission of greenhouse gases.

**Greenhouse gases**: Carbon dioxide (CO$_2$), methane (CH$_4$), nitrous oxide (N$_2$O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF$_6$) as defined by the Kyoto Protocol.

1.2 Climate finance tracking in the AfDB

AfDB has developed guidance to make tracking adaptation and mitigation finance consistent across the different sectors of the Bank. This general guidance is included in AfDB’s Methodology for Tracking Climate Adaptation and Mitigation Finance, available on the Bank’s website. The information generated through the application of the methodology will be used for reporting both internally and externally, and will show how climate finance is changing over time within sectors or across the Bank portfolio. Moreover, the system may be used to attract new investments. Outline of the structure of guidance

This guidance document is intended to provide additional guidance and support for climate finance tracking in the Transport sector in the AfDB.

The guidance begins with an outline of the climate tracking process (who does what, and when) in Section 2. The general principles are discussed in Section 3. These cover the identification of qualifying project elements, the calculation of associated climate change finance and the breakdown between internal and external sources of finance. A sector specific explanation of qualifying activities for adaptation and mitigation is provided in Sections 4 and 5 respectively. Comprehensive tables of example activities are provided. Finally, some of the more problematic issues for the sector are addressed in Section 6.

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2. Preparing for tracking climate finance

2.1 When does climate finance tracking take place?
The system tracks finance upon Board approval of the project. However, the process of tracking climate finance begins in the design stage of a project. Incorporating the guiding principles discussed here into the project design will help task managers write the Project Appraisal Report and technical annexes. The information should be clearly presented in the Project Appraisal Document submitted to the Bank’s Board of Directors. The information will also be inputted in the Bank’s Project SAP module once it is adjusted to be able to track this information.

The qualification of project activities under this methodology does not imply evidence of the eventual delivery of climate change resilience benefits.

2.2 To what is this guidance applied?
The guidance for climate finance tracking can be applied to all Bank projects in all sectors. Specific guidance documents have been developed for Agriculture, Energy, Water and Sanitation and Transport (roads and railways) sectors because these projects currently dominate the Bank’s portfolio. These sectors were chosen to begin with, with the expectation that guidance for other sectors will also be prepared in the near future. The Bank’s Private Sector Department covers projects from a range sectors, so will apply the guidance to projects in the sectors listed above.

The approach outlined in the methodology aims to report on finance dedicated to climate adaptation and mitigation at a reasonable level of granularity. Therefore, rather than considering an entire project for climate finance reporting eligibility from the outset, eligibility might need to be assessed at the activity or component level in case of projects that contain both adaptation and or mitigation activities/components but also other activities/components that might not qualify.

2.3 Who is responsible?
The task managers are responsible for applying the methodology and determining the amounts of adaptation finance and mitigation finance associated with the project and making that information clear in the Project Document. Support is available from the Bank’s Energy and Climate Change Department who will in any case ensure quality review.

2.4 What information is required?
In order to determine which elements of a project qualify for reporting, the task manager must have a good understanding of:

- the tracking methodology as described in this guidance document;
- the project concept and context;
- the project components, sub-components and activities, the data analysed in formulating the project, the technical alternatives considered, and the project location(s);
- the amounts and sources of finance associated with different elements of the project.

2.5 How are the results reported?
The Bank has already begun compiling annual climate finance data to report to the OECD, where the AfDB numbers are combined with those of other MDBs. Thus far, focal points in each department have been
responsible for collecting the information within their respective departments which is then assessed for quality review purposes by the team within the Energy, Environment and Climate Change Department. This has been a very time consuming and challenging process because many project documents do not currently contain sufficient information for an objective assessment. In future, it will be necessary for task managers to provide sufficient information in the PAR to enable climate finance to be quickly and objectively assessed.
3. How to track climate finance

The climate finance tracking process is illustrated in the flowchart above. There are a maximum of three steps to apply, depending on the number of qualifying project elements. In this guidance document, the word “element” is used to describe project components, sub-components, and activities. Detailed descriptions of each step follow here.

3.1 STEP 1: Define qualifying project elements
The climate finance tracking process takes a top-down approach: analysis should begin at the project level. If the entire project does not qualify, then the components should be examined, followed by sub-components and activities if necessary. If the entirety of a component qualifies, there is no need for further assessment at the sub-component or activity level. For example, it may be the case that the entirety of Component 1 qualifies, but only Sub-component 2.3 within Component 2 qualifies. If all of a project qualifies as adaptation or mitigation, Step 2 can be bypassed. If none of the project elements qualify, then the finance tracking is completed. The process for defining qualifying project elements is different for climate change mitigation and climate change adaptation (defined in Box 1). The following two sections explain the different approaches.

3.1.1 Adaptation
A project must fulfil the three criteria below to be reported as adaptation finance. It must:

- Include a statement of purpose or intent to demonstrate that the qualifying project element(s) reduces current and/or future vulnerabilities to climate;
- Set out the context of climate vulnerability specific to the location of the qualifying project element based on current available data (climate data, exposure and sensitivity), considering both the possible impacts from climate change-related risks as well as climate variability-related risks;
- Link the qualifying project elements to the context of climate vulnerability (e.g., socio-economic conditions and geographical location). Good development practice on its own does not qualify for climate finance because it is represents business-as-usual; therefore it may be necessary to explain why the project elements go beyond good development practice.

A list of typical, sector-specific qualifying project elements (QPEs) is provided in Section 4. This list of examples has been derived from the Joint MDB methodology, but it is illustrative rather than exhaustive.

A list of typical, sector-specific qualifying project elements (QPEs) is provided in Section 4. This list of examples has been derived from the Joint MDB methodology, but it is illustrative rather than exhaustive.
The range of potential adaptation QPEs is simply too broad for a single list to capture. Moreover, the qualification of a project element is highly context-dependent. The list provided contains key, sector-specific examples that will be useful for a task manager to consider in formulating the project.

A description of the statement of intent, vulnerability context and linkage must be included in the Project Appraisal Report or equivalent and/or its technical annexes in order for finance to be reported as adaptation finance. The section in the PAR that addresses Climate Change may be a suitable place to include some of this information. However, the component, sub-component, or activity identified as qualifying must be listed in the project description; this requirement aims to ensure that the adaptation element is part of the core of the project, rather than a remedial measure.

The approach is conservative. It is designed to prevent the mislabelling of development activities as adaptation. Components, sub-components, and activities that do not explicitly meet all three criteria are not included in climate finance reporting.

3.1.2 Mitigation

A project element is considered to be mitigation if it involves efforts to reduce or limit greenhouse gas (GHG) emissions or enhance GHG sequestration.

It is not possible to set out simple criteria for components, sub-components, and activities that qualify for mitigation finance. Determining whether or not a project element leads to a net reduction in GHG emissions requires some relatively sophisticated analysis (including boundary setting, application of emission factors and examination of project externalities that may lead to an increase in emissions elsewhere). This analysis is beyond the scope of this guidance.

Therefore a more prescriptive approach has been developed. A comprehensive list of mitigation examples has been compiled with input from AfDB sector experts along with contributions from other MDBs. The list of sector-specific examples is provided in Section 4, and a broader list of mitigation activities that qualify for all sectors is available in the methodology document.

This list of examples is very comprehensive, but there may be some qualifying elements that are not included. If an activity has been identified that is not on the list but is considered to reduce GHG emissions, it may be included if evidence can be provided in the form of past experience from similar projects or a technical analysis carried out by a suitably qualified expert. This evidence should contain a balanced view, considering both the positive emission reducing benefits as well as the potential increases in GHGs of the project. It is not acceptable to provide evidence for the part of the project that reduces emissions and ignore the other parts of the project that may increase them.

The selection of mitigation examples is underpinned by the following principles:

- It is the type of component, sub-component or activity to be executed that determines whether or not it qualifies for mitigation finance.
- Project elements that may not immediately reduce emissions or enhance sequestration but have the potential to lead to future mitigation activities can still be classified as mitigation. Thus, research and development, planning and feasibility studies, pilot projects, and real options in projects can qualify as mitigation. Section 6.3 in this document addresses these at length.
A project element may qualify if it is one among a set of options available to decision-makers that leads to a relatively significant emission reduction as compared to the other options (even if the decision-makers make their decisions based merely on the non-climate benefits of the activities).

As further experience is accumulated, project elements may be added to or removed from this list. A type of activity may be mainstreamed to such an extent that it may become virtually the only option, in which case it will no longer be considered as contributing to climate change mitigation. The guidance will be revised periodically, in order to capture these changes over time.

The PAR’s section on climate change may be used to highlight the project elements that qualify for mitigation; for example, information on the expected CO$_2$ reductions of a particular component can be included here to eliminate any uncertainty over the component’s qualification. However, as with adaptation, the component, sub-component, or activity identified as qualifying must be listed in the project description; this requirement aims to ensure that the mitigation element is part of the core of the project, rather than a remedial measure.

3.2 STEP 2: Attribute finance to qualifying project elements

The process of attributing mitigation or adaptation finance to QPEs in practice is less clear than it may appear in theory. Therefore, a number of rules have been developed to facilitate practical application. The aim of the rules (set out in the following sections) is:

- To achieve consistency in estimates of finance attributed by different users
- To ensure that the estimates are neither exaggerated nor underestimated
- To provide a straightforward, efficient method for task managers to report finance

All types of instruments deployed by the AfDB (debt, equity, grants, guarantees) are included in climate finance tracking.

Some projects are dedicated adaptation or mitigation projects, and it may be possible to attribute 100% of finance to adaptation or mitigation. In these cases, the user can proceed to Step 3.

3.2.1 Breaking down finance by QPEs

Climate finance should be estimated at an appropriate level of granularity. Accordingly, following from Step 1, the finance should be broken down by qualifying project elements. If an entire component is identified as qualifying in Step 1, then the entire component cost should be included in reporting; on the other hand, task managers should not assume that an entire project financing is reported if only specific components qualify.

In short, a project element is deemed as “in” or “out”, and no further financial breakdown is required. Applying this rule eliminates the need to calculate the additional cost incurred for “climate-proofing,” or the incremental cost that transforms a project element from non-qualifying to qualifying unless if it has been estimated as part of project preparation or is readily available. For more information please see Box 2.

Finally, the cost of the QPE must be itemised and identified in the PAR or technical annexes. This ensures that the component, sub-component, or activity has been properly budgeted.
Box 2. Why, in some cases, is it not possible to report the incremental costs of adaptation or mitigation?

For certain projects, there is a clear additional cost that transforms a component, sub-component or activity from “non-qualifying” to “qualifying.” For example, the cooling technology for a power plant can be upgraded from wet cooling to dry cooling in order to cope with water scarcity at the plant location. The upgrade causes a very specific cost increase, which can be identified as the incremental cost of climate change adaptation. If the information on incremental costs is readily available and was estimated during project preparation only the additional cost incurred by using dry cooling instead of wet cooling should be highlighted to be reported. Alternatively, there might be proxies available and used elsewhere that indicate a % increase in costs when the alternative technology is used. In this case this proxy can be used to estimate the incremental costs to be reported. The total project cost option should only be used as a last resort and needs to be clearly highlighted so that it can be re-examined by the specialists at the quality review phase. In many cases the incremental cost approach is, however, not feasible.

First, in many cases, it is very difficult to discern the incremental cost required to transform a “standard” activity into a qualifying adaptation activity. For example, imagine trying to quantify the cost difference between an agroforestry project that is designed to increase both productivity and drought resistance of tree and crop species from an agroforestry project that simply aims to increase productivity. How do you decide what elements of the latter are excluded from the former in the incremental cost calculation?

Second, even where it is feasible to quantify the difference between an “adapted” design and a “standard” design, it would require significant effort and time input from the task manager. The task manager would have to fully cost the alternative design solely for the sake of quantifying the incremental cost. By taking the entire cost of the QPE, the finance tracking process can be completed with information that task managers already possess.

Finally, it should be noted that, in terms of mitigation finance tracking, the full project cost approach is used rather frequently. When constructing a hydroelectric plant, the entire cost is reported – not the additional cost of a hydroelectric plant over that of a comparable coal-fired plant.

3.2.2 Attributing project support budgets

There are certain elements that are required in order for the project to be approved. These “project support” elements include project management, contingency, Environmental and Social Management Plan (ESMP), and resettlement budgets. While not adaptation or mitigation in themselves, they are critical to the completion of the adaptation or mitigation aspect of the project. The budgets associated with project support elements should be included, pro rata.\(^2\) In other words:

- If a project qualifies for climate finance in its entirety, then 100% of the project support costs should also be reported as climate finance (adaptation or mitigation); but
- If only a proportion of a project qualifies, project support costs should be allocated pro rata. Thus, if the activities that qualify for climate finance (adaptation or mitigation) represents 15% of total non-project support costs (the total project cost, minus project support costs), then 15% of project support costs should be added to the total amount of finance reported.

\(^2\) While these budgets may seem unrelated to QPEs, it is necessary to maintain consistency with projects that are 100% climate finance. If the ESMP and resettlement costs associated with a renewable energy power plant (100% mitigation) are counted in full, then those costs must also be included in some way for partially qualifying projects.
If certain project support elements are not separately itemised, no additional amount should be added to the total reported. The pro rata percentage should only be applied to the project support elements that have associated budgets.

Box 3. Keeping a sense of perspective

Depending on the type of projects approved, the Bank will provide climate finance worth tens to hundreds of millions of dollars in a single year. Therefore, a qualifying activity worth hundreds of thousands of dollars should be examined, but a judgement about the value of a qualifying activity worth thousands of dollars should not become a time-consuming, analytical exercise.

3.3   STEP 3: Attribute finance to internal and external sources

The financial resources attributed to climate finance are divided based on the source of finance. Doing so aims to avoid instances of double counting when AfDB climate finance figures are aggregated with those of other organisations.

For the sake of climate finance tracking, internal resources are defined as African Development Bank statutory resources: the African Development Fund, the African Development Bank and the Nigerian Trust Fund.

External resources are:

- AfDB-managed donor resources (e.g. African Water Facility, Congo Basin Forest Fund, Sustainable Energy Fund for Africa, Bilateral Trust Funds)
- Additional external resources for which AfDB is an implementing entity (e.g. Climate Investment Funds, Global Environment Facility)

Resources from other organisations, such as host country governments, other MDBs, DfID, JICA, etc. are completely omitted from the climate finance numbers as those institutions will track their own resources.

Division between these different sources should be done based on the information available to the task manager, which will vary from project to project. If it is possible to match sources of finance to the specific QPE, then the breakdown is simple. For example, if Component 1 qualifies, and the breakdown is $10 million from the AfDB, $30 million from CIF, and $10 million from the World Bank, then the reporting is straightforward: $10 million is internal finance and $30 million is external finance.

In other cases, the breakdown is not as clear. Percentages can be used to divide the qualifying finance pro rata between sources. For example, contributions to the overall project budget can be used to allocate finance for a qualifying component pro rata, and contributions to a specific component budget can be used to allocate finance pro rata for qualifying sub-components or activities. Because the situation will differ from project to project, the task manager should simply divide QPE finance between sources in the most accurate way possible.

The qualifying project support finance (project management, contingencies, ESMP and resettlement budget) should also be broken down by sources of finance. Sometimes, whole elements of support finance are provided by host country governments or other MDBs or donors, and can be ignored: for example, if the
government of the project country funded 100% of the resettlement budget, it can be omitted from the finance reporting. Where the project support finance is provided by a combination of internal, external and/or other sources, then the qualifying support finance is shared out accordingly and relevant internal and external finance is included in the finance reporting.

A table to help with the calculations has been provided in Annex 1. Examples of its application are described in the case studies in Section 7.
4. Defining adaptation in the transport sector

4.1 Categories of QPEs

Project elements should reflect one or more of the following adaptation categories. These are:

- Addressing current vulnerabilities that could be exacerbated by CV&C, specifically when designed to support poor countries or communities exposed to climate risk:
  - E.g. building local roads and bridges to provide escape routes for populations in flood-prone areas;
- Building resilience to future climate risks through preserving ecosystem services, diversifying livelihoods, introducing new techniques, investment in adaptation products and services, or supporting effective early warning systems:
  - E.g. diverting a road around an area of forest that is itself at risk from fire due to an expected reduction in rainfall;
- Incorporating climate adaptation into investments in infrastructure with a long lifespan:
  - E.g. increasing the capacity of road drainage to cope with an increase in soil saturation and surface run-off;
  - E.g. increasing the span of a bridge to avoid sections of river bank that could become unstable with an increase in peak river flows;
- Incorporating climate adaptation into development plans and policies from local to national levels:
  - E.g. developing transport plans that recognise the implications of projected changes in climate for transport routes and that modify routing where necessary.

In most cases transport projects fall into the last two categories. Transport projects do address some of the issues in the first two categories, but tend to do so indirectly. For example, new transport links will often create many opportunities through diversification of livelihoods. However, generally speaking, transport projects are not designed to create livelihood diversification in order to address problems related to CV&C. The adaptation benefits are indirect.

Of course, there will be exceptions. For example, a road building project may be designed specifically to help communities that are suffering from climate related problems which have implied destruction of their livelihoods. A railway project may be designed to avoid a wetland specifically to preserve the integrity of an important ecosystem that is particularly susceptible to CV&C. However, examples of transport projects like these are not common.

4.2 Examples of adaptation QPEs

This section sets out a wide range of sector-specific QPEs that could qualify for adaptation finance (see Table 1). The meanings of key terms used are discussed below:

- **Element**: This is an example of a component, sub-component, or activity that may be found in an AfDB project that could qualify for adaptation finance, assuming certain criteria are met (see below).
- **Vulnerability**: This refers to the vulnerability of the assets of the project, the assets of the project stakeholders, or the project stakeholders themselves to CV&C in the project location(s). To determine this vulnerability, it will be necessary a) to review baseline climate data and recent climate trends and/or climate change projections; b) to consider what impacts a future climate could have; and c) to identify what or who is most vulnerable to those impacts (sometimes considered in
terms of exposure and sensitivity). This analysis can be brief, but needs to be based on evidence. Useful sources for such information are included as an annex to this document.

- **Intent:** The statement of intent or purpose is a simple statement that the project intends (through the QPEs) to reduce vulnerability to current climate variability and/or future climate through the project activity.

- **Activity linkage:** This explains a) how the QPE addresses the previously identified vulnerability; and b) how it was designed for adaptation purposes, differentiating it from good standard practice. The explanation can be brief.

- **Non-qualifying elements:** These are examples that could be confused with QPEs, but are actually examples of good development, rather than adaptation. A broader discussion of non-qualifying elements is provided in Section 6.

- **Qualifying cost:** This explains what can be included as adaptation finance.

In the following table, the “Element” column consists of a list of potential components, sub-components, or activities pertaining to the sector that may qualify for adaptation finance. These are grouped according to the Bank’s coding structure. Each row consists of one project element or two similar elements. In order for it to qualify, the PAR must contain statements resembling those that follow in the next three columns (Vulnerability, Intent, and Activity Linkage). The statements do not need to match verbatim, but should address the points outlined in the bullets above. They should be explicit, not inferred from the rest of the PAR.

The “Non-qualifying elements” column is intended to help define the boundaries of what qualifies as adaptation and what does not. The examples in this column fail to qualify as adaptation due to context, intent, or the activity itself. If the project element appears in this column, no finance should be attributed to adaptation.

Note that Table 1 excludes DA0, Air Transport / Airport, and DD0, Water & Fluvial Transport / Ports. These sectors may be added at a later date.
Table 1. Examples of adaptation QPEs for the transport sector

<table>
<thead>
<tr>
<th>Element</th>
<th>Vulnerability</th>
<th>Intent</th>
<th>Linkage</th>
<th>Non-qualifying elements</th>
<th>Qualifying Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>DB0: Road Transport/Highways and DC0: Railways Transport</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>see also: DZ0: More than One Transport Sub-Sector (below)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The development of flood-related contingency plans for road or rail</td>
<td>Changes in the frequency and severity of large-scale floods and storm surges</td>
<td>Maintenance of individual mobility and transport of goods in the event of severe flooding</td>
<td>By making arrangements for flood-related traffic disruption (through planning of alternative routes and nodes or use of alternative modes), the economic impacts of flooding events can be reduced</td>
<td>Normal traffic planning activities</td>
<td>Cost of flood-related contingency planning</td>
</tr>
<tr>
<td>traffic management</td>
<td>prevent the use of economically important highways and/or railways</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improvement in frequency of drain and culvert maintenance</td>
<td>Projected changes in rainfall patterns lead to overloading and localised</td>
<td>Maintenance of drainage systems to cope with runoff that exceeds the drainage capacity</td>
<td>Keeping drains and culverts clear of silt and debris increases capacity to cope with an increase in intensity or period of rainfall</td>
<td>Normal maintenance measures</td>
<td>Cost of maintenance measures that provide necessary climate resilience (normal plus additional)</td>
</tr>
<tr>
<td></td>
<td>flooding</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change in culvert and roadside drainage system design specification</td>
<td>Projected changes in rainfall patterns lead to overloading and localised</td>
<td>Design and/or construction of drainage systems to cope with runoff that exceeds the drainage capacity</td>
<td>Increasing dimensions of drainage infrastructure and/or capacity of soak ways/temporary storage facilities</td>
<td>Roadside and rail drainage systems that have not been designed to cope with an increase in intensity or period of rainfall</td>
<td>Entire cost of climate resilient works</td>
</tr>
<tr>
<td></td>
<td>flooding</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Fortification of existing bridge supports</td>
<td>Projected changes in rainfall patterns lead to localised damage to transport</td>
<td>Reinforcement of bridges to cope with river flows that exceed existing design strength</td>
<td>By increasing the strength of existing bridges, resilience to increases in the flow and the erosive</td>
<td>Bridge rehabilitation projects that do not involve the use of additional fortification for roads and railways</td>
<td>Cost of bridges that are strengthened to specifications that go beyond standard practice</td>
</tr>
<tr>
<td></td>
<td>infrastructure by river erosion</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Modification of proposed bridge design (e.g. use designs that can withstand greater flows, longer spans to bridge unstable river banks)</td>
<td>Projected changes in rainfall patterns lead to localised damage to transport infrastructure by river erosion</td>
<td>Design and/or construction of bridges to cope with river flows that exceed “normal” design strength</td>
<td>By increasing the strength of new bridge designs beyond standard practice, resilience to increases in the flow and the erosive potential of rivers is increased</td>
<td>Standard bridge designs that have not been modified to take account of future river flows</td>
<td>Cost of bridges that are strengthened to specifications that go beyond standard practice</td>
</tr>
<tr>
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</tr>
<tr>
<td>Fortification of existing valley or coastal roads or railways (e.g. use of gabions, concrete walls)</td>
<td>Projected changes in rainfall patterns lead to localised damage to transport infrastructure by river or by land slip due to slope stability. Projected sea level rise may lead to localised damage to transport infrastructure by coastal erosion.</td>
<td>Reinforcement of road foundations and/or embankments to cope with river flows that exceed existing design strength</td>
<td>By increasing the strength of existing roads and railways above standard requirements, risk of damage by increases in erosive forces or land-slip is reduced</td>
<td>Repair and rehabilitation projects that replace like with like</td>
<td>Cost of sections of road/railway that are strengthened to specifications that go beyond standard practice</td>
</tr>
<tr>
<td>Changes to road and railway design to increase stability and resilience to erosion (e.g. changing composition of base materials, reduction in cut and fill slope angles, use of stabilisation)</td>
<td>Projected changes in rainfall patterns lead to localised damage to transport infrastructure by river or by land slip due to slope stability. Projected sea level rise may lead to localised damage to transport infrastructure by coastal erosion.</td>
<td>Design and/or construction of bridges to cope with river flows that exceed “normal” design strength</td>
<td>By increasing the strength of new roads and railways above standard requirements, risk of damage by increases in erosive forces or land-slip is reduced</td>
<td>Designs that have not been modified to take account of future rainfall conditions or river flows</td>
<td>Cost of sections of road/railway that are strengthened to specifications that go beyond standard practice</td>
</tr>
<tr>
<td><strong>Realignment of roads/ railways to avoid areas that could become prone to flood, erosion or landslip in the future</strong></td>
<td><strong>Projected changes in rainfall patterns and/ or sea level rise reduce viability of existing transport routes</strong></td>
<td><strong>Realignment of transport routes to increase long term resilience of transport infrastructure to climate change</strong></td>
<td><strong>Where there are doubts about the long term viability of existing roads or railways, it may be appropriate to use alternative routing options to increase climate resilience.</strong></td>
<td><strong>Sections of roads/ railway where the alignment decision is not influenced by climate change considerations</strong></td>
<td><strong>Cost of sections of road that have been realigned</strong></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
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</tr>
<tr>
<td><strong>DZ0: More than One Transport Sub-Sector – Urban Transport</strong></td>
<td><strong>Change in choice of pavement to maximise infiltration/ reduce runoff</strong></td>
<td><strong>Projected changes in rainfall patterns lead to excessive runoff and localised flooding</strong></td>
<td><strong>Design and/ or construction of permeable road surfaces to cope with runoff in flood prone urban areas</strong></td>
<td><strong>By increasing the permeability of road surfaces in urban areas, pressure on drainage and risk of urban flooding is reduced</strong></td>
<td><strong>Gravel/ unpaved roads</strong></td>
</tr>
<tr>
<td><strong>DZ0: More than One Transport Sub-Sector – General Transportation</strong></td>
<td><strong>Transport planning and associated construction to</strong></td>
<td><strong>Projected changes in rainfall patterns and/ or sea level rise reduce</strong></td>
<td><strong>National or local planning (and construction) of new</strong></td>
<td><strong>Incorporation of climate change considerations into</strong></td>
<td><strong>National or local transport planning that does not consider</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Cost of development of a climate resilient national or local</strong></td>
</tr>
<tr>
<td>Avoid areas that could become prone to flood, erosion or landslip in the future</td>
<td>Viability of the transport network</td>
<td>Transport routes to increase long term resilience of transport infrastructure to climate change</td>
<td>Transport planning activities will increase climate resilience</td>
<td>Climate change issues in detail</td>
<td>Transport plan, or similar.</td>
</tr>
<tr>
<td>---</td>
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<td>---</td>
</tr>
<tr>
<td><strong>Transport planning and associated construction to avoid areas (e.g. forests) whose climate resilience could be harmed directly or indirectly by the proximity of new transport links; or to avoid adverse effects of new transport links on these areas</strong></td>
<td>In this instance, vulnerability relates to the area avoided, not the transport infrastructure, so there are many possibilities. For example a forest, which is crucial to a local community, may be exposed to increasing incidences of drought and forest fire. A new road could increase the likelihood of the latter.</td>
<td>National or local planning of new transport routes (and construction) to reduce additional harm to communities or ecosystems that are themselves sensitive to climate change</td>
<td>Planning routes to avoid the vulnerable area or establishment of measures to protect the vulnerable area from the effects of a new route will maintain the resilience of the area.</td>
<td>Alteration of routes in response to ESIA findings, except where the ESIA specifically highlights the fact that the area or community is vulnerable to climate change AND that the transport plan will exacerbate this vulnerability</td>
<td>Cost of development of a climate resilient national or local transport plan, or similar and/or cost of construction of affected routes.</td>
</tr>
<tr>
<td><strong>Transport planning and associated construction activities that are part of emergency planning for climate related disasters</strong></td>
<td>Projected changes in rainfall patterns and/or sea level rise increase likelihood of catastrophic flooding events and increasing the vulnerability of communities and/or economic activities</td>
<td>Planning of new transport routes as part of national emergency planning (and construction) to reduce economic loss and/or loss of life</td>
<td>Inclusion of transport infrastructure modifications in emergency planning will reduce economic damage or loss of life due to failure of existing networks</td>
<td>General emergency planning (unless covered by other sectors). Transport planning and construction that is not carried out in response to climate change related emergencies.</td>
<td>Cost of development of the transport component of an emergency plan, or similar. Cost of construction of affected routes.</td>
</tr>
<tr>
<td><strong>Research into engineering design and materials to improve</strong></td>
<td>A variety of infrastructural vulnerabilities relating to conditions of increased impermeability</td>
<td>Development of cost-effective means of improving infrastructural resilience to climate change</td>
<td>Where solutions to particular climate conditions are unavailable or where adaptation is required</td>
<td>Research not related to transport. Research that does not address a problem</td>
<td>Cost of the relevant components of the research project or programme</td>
</tr>
<tr>
<td>performance under future climate</td>
<td>run-off, higher temperature or other changes under a future climate</td>
<td>performance to cope with specific climate challenges</td>
<td>unaffordable, research may identify a new approach</td>
<td>related to climate.</td>
<td></td>
</tr>
</tbody>
</table>
5. Defining mitigation in the transport sector

5.1 Coding of mitigation QPEs
Under the Bank’s coding structure, potential mitigation QPEs in the transport sector can be grouped into the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>DA0</td>
<td>Air Transport/ Airports</td>
</tr>
<tr>
<td>DB0</td>
<td>Road Transport/ Highways</td>
</tr>
<tr>
<td>DC0</td>
<td>Railways Transport</td>
</tr>
<tr>
<td>DD0</td>
<td>Water and Fluvial Transport/ Ports</td>
</tr>
<tr>
<td>DZ0</td>
<td>More Than One Transport Sub-Sector: Urban Transport</td>
</tr>
<tr>
<td></td>
<td>More than One Transport Sub-Sector: General Transport</td>
</tr>
</tbody>
</table>

5.2 Examples of mitigation activities
This section sets out an extensive, but not exhaustive, list of sector-specific relevant elements that could qualify for mitigation finance (see Table 2). Others not listed here may qualify, if they fulfil the criteria described in Section 3.1.2.
<table>
<thead>
<tr>
<th>Element</th>
<th>Non-qualifying element</th>
<th>Qualifying cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DAO: Air Transport/ Airports</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduce airport congestion before take-off and landing</td>
<td>Measures that reduce congestion but do not also reduce fuel consumption</td>
<td>Cost of designing measures, developing systems, roll out</td>
</tr>
<tr>
<td>Improvements in aviation facilities that reduce GHG emissions</td>
<td>Improvements that lead to a significant increase in short or medium-term GHG emissions during construction, for example due to increase in taxing distance or reduction in efficiency of customer transport modes</td>
<td>Cost of designing facilities, construction</td>
</tr>
<tr>
<td>Introduction of lower carbon aviation technologies</td>
<td>As above Technologies that are better than existing, but that perform worse than standard practice benchmarks</td>
<td>Cost of new aviation technologies</td>
</tr>
<tr>
<td>Shift from high carbon to lower-carbon transport modes</td>
<td>As above</td>
<td>Cost of lower-carbon transport modes</td>
</tr>
<tr>
<td>Reduction of carbon-content in aviation infrastructure facilities</td>
<td>Use of biofuels where emission reduction claims are made for same emission reductions</td>
<td>Cost (to the project) of lower-carbon content fuel or materials</td>
</tr>
<tr>
<td><strong>DB0: Road Transport/ Highways</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improvements in traffic flow to reduce GHG emissions per unit transported (e.g. toll roads)</td>
<td>Road repair projects. Improvements in traffic flow in one area that could lead to increased congestion in another. Improvements in traffic flow where clear evidence of GHG savings cannot be provided.</td>
<td>Cost of technology and infrastructure relating to traffic flow improvements (but not other road improvements)</td>
</tr>
<tr>
<td>Traffic management to reduce GHG emissions per unit transported (e.g. speed limits, high occupancy vehicles, cars to buses).</td>
<td>Changes that lead to adverse consequences elsewhere that are not quantified. Changes in traffic management where clear evidence of GHG savings cannot be provided.</td>
<td>Cost of planning, awareness raising initiatives, subsidies and incentives for road users and monitoring/ enforcing (but not costs borne by road users)</td>
</tr>
<tr>
<td>Shift to lower-carbon modes of road and</td>
<td>Changes that lead to adverse consequences</td>
<td>Cost of making the shift, including research,</td>
</tr>
<tr>
<td>Category</td>
<td>Examples</td>
<td>Notes</td>
</tr>
<tr>
<td>----------</td>
<td>----------</td>
<td>------</td>
</tr>
<tr>
<td>Highway transport including research &amp; development</td>
<td>Shifts where clear evidence of GHG savings cannot be provided.</td>
<td>planning and/or construction of low carbon alternatives</td>
</tr>
<tr>
<td>High-efficiency, heavy-duty or light-duty vehicles retrofit (including the use of lower-carbon fuels, electric or hydrogen technologies, etc.)</td>
<td>Use of vehicles that are better than existing, but that perform worse than standard practice benchmarks. Use of biofuels where emission reduction claims are made for same emission reductions.</td>
<td>Cost (to the project) of qualifying vehicles and fuel</td>
</tr>
<tr>
<td>Road freight logistics projects that streamline logistics and reduce empty running</td>
<td>Logistics projects that do not reduce fuel consumption.</td>
<td>Cost of projects</td>
</tr>
<tr>
<td>Information campaigns and training to influence driver behaviour</td>
<td>Road safety campaigns or other campaigns that do not aim to reduce fuel consumption.</td>
<td>Cost of campaigns</td>
</tr>
<tr>
<td>DC0: Rail Transport/ Stations</td>
<td>Changes that lead to adverse consequences elsewhere that are not quantified. Changes where clear evidence of GHG savings cannot be provided.</td>
<td>Cost of changes</td>
</tr>
<tr>
<td>Railway transport (improvement of existing lines or construction of new lines, leading to shifting freight or passenger transport from road to rail). New railway lines for electricity based railcars. Convert diesel or coal railcars to electric. Introduce lower carbon engine/vehicle technologies. Improve and expand rail networks, locomotives and wagons to reduce GHG intensity per unit of transported (goods and people) (e.g. introduction and expansion of high speed trains). Rail retrofit.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DD0: Water &amp; Fluvial Transport/ Ports</td>
<td>Changes that lead to adverse consequences elsewhere that are not quantified. Changes where clear evidence of GHG savings cannot be provided.</td>
<td>Cost of changes</td>
</tr>
<tr>
<td>Research &amp; development to reduce the GHG intensity in sea and lake bound transport operations</td>
<td>Research that does not relate directly to reducing GHG emissions.</td>
<td>Cost of research</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>--------------------------------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Boat fleet retrofit</td>
<td>Use of technologies that are better than existing, but that perform worse than standard practice benchmarks. Retrofits where clear evidence of GHG savings cannot be provided.</td>
<td>Cost of retrofit</td>
</tr>
<tr>
<td>DZ0: More than One Transport Sub-Sector: Urban Transport</td>
<td>Changes that lead to adverse consequences elsewhere that are not quantified. Changes in traffic management where clear evidence of GHG savings cannot be provided.</td>
<td>Cost of planning, awareness raising initiatives, subsidies and incentives for road users and monitoring/ enforcing (but not costs borne by road users)</td>
</tr>
<tr>
<td>Urban traffic management to reduce GHG emissions per unit transported (e.g., speed limits, high-occupancy vehicle lanes, congestion charging/road pricing, parking management, restriction or auctioning of license plates, car-free city areas, low-emission zones)</td>
<td>Changes that lead to adverse consequences elsewhere that are not quantified. Changes in traffic management where clear evidence of GHG savings cannot be provided.</td>
<td>Cost of making the shift, including research, planning and/ or construction of low carbon alternatives.</td>
</tr>
<tr>
<td>Shift from high carbon to lower-carbon modes of transport (expand bus, rapid transit and other mass transit systems - mass transit systems that serve peripheral areas qualify only if mechanisms exist to avoid urban sprawl)</td>
<td>Integration where clear evidence of GHG savings cannot be provided</td>
<td>Costs of integration</td>
</tr>
<tr>
<td>Integration of transport and urban development planning (dense development, multiple land-use, walking communities, transit connectivity, etc.), leading to a reduction in the use of passenger cars</td>
<td>Urban renewal where clear evidence of GHG savings cannot be provided</td>
<td>Costs of provision of new transport infrastructure only</td>
</tr>
<tr>
<td>Urban center renewal projects focused on attracting city dwellers back to urban centers, leading to a reduction in the use of passenger cars (in cities where centers have been partially deserted).</td>
<td>Research on air quality. Research that is not directly related to GHG emission savings.</td>
<td>Cost of the components of relevant research projects or programmes</td>
</tr>
<tr>
<td>Research and development of lower-carbon modes of urban transport</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### DZ0: More than One Transport Sub-Sector: General Transportation

<table>
<thead>
<tr>
<th>Description</th>
<th>Shifts where clear evidence of GHG savings cannot be provided</th>
<th>Cost of making the shift, including research, planning and/or construction of low carbon alternatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shift from high carbon to lower-carbon transport modes such as from airplanes to trains, from cars to busses, from busses to trains and from trains to bicycles and walking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improve traffic flow to reduce carbon emission per unit transported</td>
<td>Road repair projects. Improvements in traffic flow in one area that could lead to increased congestion in another. Improvements in traffic flow where clear evidence of GHG savings cannot be provided.</td>
<td>Cost of technology and infrastructure relating to traffic flow improvements (but not other road improvements)</td>
</tr>
<tr>
<td>Substitution of high carbon by lower carbon or non-fossil fuels thereby reducing carbon intensity per kilometer travelled</td>
<td>Use of biofuels where emission reduction claims are made for same emission reductions. Use of non fossil fuels where whole of life production and combustion related GHG emissions exceed whole of life production and combustion related GHG emissions for fossil fuels.</td>
<td>Cost (to the project) of qualifying vehicles and fuel</td>
</tr>
<tr>
<td>R&amp;D in low-carbon or non-fossil fuel transport technologies</td>
<td>Research on (prevention of) pollution that is not caused by GHG emissions. Research that is not directly related to GHG emission savings.</td>
<td>Cost of the components of relevant research projects or programmes</td>
</tr>
<tr>
<td>Improve vehicle emission standards</td>
<td>Improvement in reduction of particulates, sulphur dioxide or any non-GHG related emissions</td>
<td>Cost of planning, implementation, monitoring and enforcing</td>
</tr>
<tr>
<td>Improve fuel efficiency standards</td>
<td>Use of technologies that are better than existing ones, but that perform worse than standard practice benchmarks</td>
<td>Cost of planning, implementation, monitoring and enforcing</td>
</tr>
</tbody>
</table>
6. Resolving problematic issues in the transport sector

6.1 Non-qualifying activities

A number of project activities that, at first sight, could be seen as qualifying may not qualify. The rationale behind determining whether or not these activities qualify is addressed in the following sections.

6.1.1 Non-qualifying adaptation activities

- Rehabilitation or renovation activities that are not modified in any way to address climate change issues. This is because such activities are required for continued operation of an asset with or without climate change. If a new technology, plan, or design is incorporated on account of adaptation purposes, then the activity budget is attributed.
  - Repair of roads, or paving of unpaved roads
  - Repair of bridges to pre-repair specifications
- Resumption of maintenance activities that do not involve new procedures to address climate change issues. This is because such activities are required for normal operation of an asset with or without climate change. If new procedures are established to address adaptation, then the budget for the activity does qualify.
  - Resumption of normal road maintenance operations such as drainage clearance to reduce localised flooding

6.1.2 Non-qualifying mitigation activities

- Activities that relocate emissions rather than reduce emissions
  - A traffic flow improvement that solves traffic flow problems in one part of the city but creates new problems elsewhere, thus negating the emissions savings
- Rehabilitation or renovation activities that are not modified in any way to reduce emissions. This is because such activities are required for continued operation of an asset with or without climate change. If a new technology, plan, or design is incorporated on account of mitigation purposes, then the activity budget is attributed.
  - Repair of roads, or paving of unpaved roads

6.2 Qualifying finance of real options

Occasionally, a project includes a “real option”. In this context, a real option is the opportunity, not obligation, to take future action that will qualify as mitigation or adaptation. A real option entails the design of an asset or system that provides the option to implement a mitigation or adaptation QPE at a future date: inclusion of the real option does not itself constitute mitigation or adaptation, but the opportunity to do so later is preserved.

A real option is not the same as an option or technical alternative. If a task manager is considering two valid alternatives, only one of which qualifies as adaptation or mitigation, selecting the one that qualifies will be followed by the application of Step 2 (the process for attributing climate finance already described in Section 3).

An example of a real option is described here. Consider a project that involves construction of a bridge to addresses a problem of congestion at a border crossing point. The task manager has three options:
1. Construct a bridge that includes both a road and railway tracks at a cost of $170 million.

2. Construct a bridge with no railway track at a cost of $147 million. If the railway tracks were to be added, extensive retrofitting would be required in order to integrate the railway tracks in the bridge.

3. Construct a bridge with consideration in its design for including railway tracks in the future. This design minimises retrofitting required if the railway tracks are to be added to the bridge. This would cost $162 million.

Option 1 would qualify immediately for mitigation finance because of the built-in railway tracks – the entire $170 million would be reported. However, the task manager may not have the funds required to build such a costly plant. Options 2 and 3 do not include a mitigation element: when the plant is constructed and begins operating, no train will be using the bridge. Option 3 differs from Option 2 in one way: the bridge has been prepared for accommodation railway tracks, so implementing railway tracks in the future will be much cheaper and easier. This preparation raises the cost of the bridge from $147 million to $162 million.

Option 3 includes a real option: the asset has been designed in a way that provides the option to implement mitigation in the future. For the purposes of climate finance, the qualifying cost is the difference between the cost without the option and the cost with the option. Therefore, in this example, the qualifying cost would be $162 million - $147 million = $15 million.

While real options occur rarely, they are extremely important to consider because they provide a means of preparing for the future without spending huge sums of money in the present. Given the uncertainty surrounding climate impacts, the flexibility of real options in adaptation is particularly valuable.

6.3 Research and development, planning, and feasibility studies

Project activities that gather information on and increase understanding of mitigation and adaptation qualify even when they do not directly lead to mitigation or adaptation benefits. That is, research concerning mitigation qualifies even if performing the study does not reduce emissions; research concerning adaptation qualifies even if performing the study does not reduce vulnerability to climate variability and change. This rule extends to include master planning activities and feasibility studies that address climate mitigation or adaptation goals. For example:

- Revision of a national transport plan to respond to a Nationally Appropriate Mitigation Action (NAMA), or National Adaptation Plan (NAP).

6.4 Dealing with multi-sector projects

It is possible that a single project activity appears on multiple sector-specific lists of qualifying activities. Transport planning may, for example, be part of a large hydro-electric project. However, once an activity is identified as an adaptation activity, it should only be counted once for adaptation regardless of how many sectors it may fall under. Likewise, once an activity is identified as a mitigation activity, it should only be counted once for mitigation regardless of how many sectors it may fall under.
6.5 Dealing with adaptation and mitigation co-benefits

Some project elements provide both mitigation and adaptation co-benefits. If a project element qualifies for both adaptation and mitigation, its financial value must be divided between adaptation and mitigation. The split can be done 50:50 for adaptation and mitigation unless expert opinion recommends a different ratio. This division is necessary in order to avoid double counting when summing adaptation and mitigation finance.

This situation could arise quite frequently in the case of community forestry projects, where trees are planted both to increase the resilience of the communities to climate change impacts, such as drought, and to sequester carbon.

In the context of a transport project, as part of an urban traffic management plan to reduce GHG emissions, a new bridge may be constructed to relieve congestion problems in one part of a city. This will increase the average speed and fuel efficiency of road vehicles. At the same time, the bridge may be designed with a broader span than is required for current peak flows because there is evidence to suggest that in future, given climate change, peak flows may increase substantially. In this instance, the same construction activity could qualify for both mitigation and adaptation finance.
7.  Case studies

In this section, two case studies are presented, one for tracking adaptation finance and one for mitigation finance. The case studies discuss the important issues that need to be addressed by the project manager during the project design stage and in the writing of the PAR.

An explanation of the climate finance tracking table used in the cases below is included in Annex 1.

7.1  Adaptation case study

Project Description
The project is to rehabilitate a 150 km mountain road between two regional centres. The road has been poorly maintained and parts have been badly damaged by surface run-off, which has been caused by unusually intense rainfall during the wet season. In one area the slope above the road needs stabilisation in order avoid risk of land slip, which could destroy villages above and below. Three bridges will be repaired. One of these is built across a river that has particularly unstable river banks at the crossing point. The bridge, which was designed to a 1:100 year event was overtopped in the last wet season. A 5 km stretch of road along the edge of the river needs substantial underpinning at regular intervals in order to avoid risk of slippage due to undercutting by the river. The pavement over a 10 km stretch was washed away at intervals because the drainage capacity was inadequate. Drain clearing maintenance activities along the whole length of the road will be resumed to reduce flooding along other sections.

Climate Change

How is climate changing in the project area?

Data are available from the host country Meteorological Department that describe the recent climate record for the project area, based on two weather stations. These show that over the last 15 years there has been an increase in both the intensity of individual rainfall events, and an increase in total rainfall during the wet season. However, during the rest of the year rainfall appears to be declining.

The climate change expert at the Bank has provided the climate change projections for the area. These are not very clear. It appears that there is little agreement between the various climate models for this part of East Africa with regards to rainfall. There is some evidence for an increase in the intensity of rainfall events in the wet season over the coming decades. However, the projections for the next few decades contain no meaningful quantitative data.

Therefore, it is assumed that the current climate trends will continue.

How is the project vulnerable to climate change?

The risk of a major landslide caused by unstable area above the road could increase as a result of climate change. Two of the three bridges are old but not a risk from higher peak flows. However, the bridge built on unstable river banks is dangerous and needs to be completely replaced. The vulnerable 5 km section of road along the river is liable to be washed away without substantial underpinning, even under current climatic conditions. The drainage capacity for the 10 km section
that was damaged by surface runoff is already inadequate and more intense future rainfall could leave the road at even greater risk of damage.

How can the project address these vulnerabilities?

Road rehabilitation is considered to be part of normal development activities. It may result in a reduction in vulnerability of the road or road users to climate change, but unless the road design is modified to address specific climate related vulnerabilities, it does not qualify for adaptation finance. Therefore the project does not qualify in its entirety, but components do qualify, as discussed below.

The unstable area above the road needs to be stabilised regardless of whether or not climate change will increase rainfall intensity. However, the stabilisation work is a modification to the original design and will also increase future climate resilience. Therefore, this project element is deemed to qualify for adaptation finance.

Two of the three bridges are not a risk from greater flows and can be repaired without any need for an upgrade. Repair work to existing standards does not qualify for adaptation finance.

The bridge built on unstable river banks could be replaced like-for-like with a design that can cope with a 1:100 year event. However, taking into account recent climate trends, the engineers decide to adopt a design that can cope with a 1:500 year event. This means increasing the span of the bridge by 40 meters. This project element qualifies for adaptation finance.

The vulnerable section of road along the river will be supported by gabions that will be cut into the river bank. This will make the ground below the road more resilient to higher river flows. However, the engineers do not propose modifications to the road because there is not much scope for doing more than these essential repairs (apart from moving the road to higher ground). They accept that the road may be swept away entirely if current climate trends continue. As this project element increases resilience to current climate (even if it does not increase resilience to future climate), it does qualify for adaptation finance.

The drainage capacity for the 15 km section that was damaged by surface runoff will be expanded to accommodate more intense rainfall events in future, since the additional costs of doing this as part of a road maintenance project are relatively small. Deeper drains will be built, and large culverts used at 8 or so key locations. This project element therefore qualifies for project finance.

Project Elements and Cost Structure
Project cost breakdown

*all costs in million $US

<table>
<thead>
<tr>
<th>Element</th>
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<td>-----------------------------</td>
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<td>Sub-Component 3.2</td>
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**Contributions by source**

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*a only a portion of Sub-Component 1.2 qualifies. However, the source-by-source breakdown is only known for the entire component, so these figures will provide the percentages for the breakdown of Sub-Component 1.2.

**Climate Finance Table**

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
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**Explanation of finance table**

Of the 150 km of drainage work in Sub-Component 1.2, 15 km were adapted for future climate impacts. Therefore, 1/10\textsuperscript{th} of the Sub-Component 1.2 cost is taken for its qualifying cost in B1: 1/10 * 77.51 = 7.75. Based on the Contributions by Source table, we calculate that the AfDB funded 170.54/278.10 = 61.3% of Component 1. This percentage is applied to 7.75 to find D1, 4.75.
The numbers in Rows 2 and 3 are taken directly from the Contributions by Source table as the AfDB funds 100% of Sub-Components 2.1 and 2.3. All values in Row 4, Sub-total, are the sums of the values in Rows 1, 2 and 3.

The total budget not dedicated to project support is equal to Component 1 + Component 2 + Component 3: 278.1 + 8.1 + 0.77 = 286.97. Of that, 11.66 (from B4) qualifies. So, we take 11.66/286.97 = 4.06% as the percentage of project support budget that qualifies.

The total project support budget is ESMP Implementation + Contingencies: 0.44 + 11.43 = 11.87. 4.06% of 11.43 = 0.48, which is the value in B5.

Of the total project support budget, the AfDB contributed 0.44 (ESMP Implementation) + 10.40(project contingencies) = 10.84. The AfDB % of project support is equal to 10.84 / 11.87 = 91.3% (in C5). This percentage is applied to 0.48 to calculate 0.44 (in D5).

JICA and government contributions to these elements are excluded from reporting. The final amount to report is $9.10 million as AfDB finance.

Additions to Project Appraisal Report
Based on the discussion above, Sub-Components 1.2, 2.1 and 2.3 qualify for adaptation finance. In order to ensure that internal and external reviewers examining the project come to the same conclusion, a few brief statements are added to the PAR. As illustrated below, these reflect the consideration and analysis given during project design.

Context of vulnerability

Based on an evaluation of available climate data and recent trends, the project area is likely to experience more intense rainfall. Surface run-off is likely to increase, rivers are expected to have higher peak flows and the ground is likely to become more saturated at certain times of year. In this area of mountainous terrain, these changes are likely to increase pressure on road drainage systems add to the erosive forces of rivers, and reduce slope stability, all of which can have a damaging effect on road infrastructure.

Statement of intent

This project aims to increase climate resilience of the road through modification of drainage design, slope stabilisation and modification of bridge design at vulnerable points along the road.

Activity linkage(s)

Because the qualifying project elements provide different means of coping with the climate vulnerability, different linkage statements are required in the PAR.

- Increasing the stability of the slope above the road will reduce the likelihood of landslide under future conditions of more intense precipitation and soil saturation.
- Increasing the span of the bridge to avoid unstable river banks and raising the bridge to reduce probability of overtopping will reduce likelihood of damage to bridge as a result of rising peak flows.
• Modifying the drainage along the most vulnerable part of the road to flooding will reduce damage to the pavement caused by greater surface run-off expected in the future.

7.2 Mitigation case study

Project Description
The project addresses the problem of congestion at a border crossing point. Currently vehicles must cross a river by means of an old ferry that can only carry one vehicle at a time. The main project components comprise the construction of a new bridge, new border post facilities and access roads on border. As an alternative to the “road only” bridge, the structure selected is capable of supporting a railway line as well as a road. This adds US$15 million to the project cost. The railway line across the bridge may be constructed at a later date if demand and finance is sufficient. The project includes capacity building to enhance trade between the two countries and soft infrastructure to ensure full operation of a complete border infrastructure system. In addition, consultants will provide technical advice on the bridge design and undertake a feasibility study of the construction of railway spurs to each end of the bridge.

Project activities and GHG emissions
Which project elements qualify for mitigation finance?

The carbon benefits of improving traffic flow across the border are difficult to calculate. Water transport is usually more fuel-efficient than road transport so, given that the vehicles have to stop at the border anyway, the bridge may not reduce fuel-related GHG emissions. However, in this particular case, the existing ferry, which is old and can only carry one vehicle, would clearly consume more fuel to cross the river than a vehicle crossing a bridge. The use of a bigger ferry is impossible because the river is too shallow. Therefore the bridge construction qualifies because it reduces GHG emissions by improving traffic flow.

It is worth noting that if, for some reason, the bridge construction was deemed not to reduce emissions by improving traffic flow, it would still have been possible for some of the construction to qualify. This is because the bridge has been built to enable the addition of a railway line across it at some future date. This constitutes a “real option”, so the additional cost of road/rail bridge over the road bridge (US$15 million) would be included as mitigation finance.

The new border post may process vehicles faster and increase the speed of movement across the border. However, given that vehicles must stop anyway, and that most drivers turn off their engines at this point, it is difficult to demonstrate an emission saving here. Therefore, the new border post does not qualify.

Because the bridge qualifies in its entirety, the advisory services on bridge design also qualify. In addition, the feasibility study for new rail spurs will qualify because new rail infrastructure that takes vehicles off the road reduces GHG emissions per tonne of material transported. Although this element does not involve the construction of the railway, it is part of the necessary process of developing new rail infrastructure.
Which project elements may significantly increase emissions?

The new bridge is likely to increase the volume of traffic moving between the two countries. This absolute increase in emissions is acceptable because the relative emissions (emissions per vehicle) will fall.

The new border crossing point will consume more electricity to run the new lighting and ICT systems at the border point. However, the additional energy consumption and GHG emissions are not considered to be significant in comparison with the emissions saved through improved traffic flow.

There are no other significant sources of GHGs associated with the project (for example, due to displaced emission producing activities). Therefore there are no issues that require a reconsideration of the net mitigation benefits of the project.

Project Elements and Cost Structure

*all costs in million $US

<table>
<thead>
<tr>
<th>Element</th>
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<tr>
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Contributions by source

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Climate Finance Table

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Explanation of finance table

Based on contributions to the total project budget, the AfDB contributed 93.25/162.06 = 31.5% of finance. This is the percentage applied in Column C. Contributions from JICA, ITF, and host country governments are excluded from reporting.

The figures in B1 and B2 are taken directly from the project cost breakdown, and the numbers in Column D are 31.5% of these values.

Component 4 and contingencies make up the project support budget, which costs 3.78 + 3.06 + 28.30 = 35.14. The budget for non-project support elements is equal to 96.19 (Component 1) + 14.62 (Component 2) + 16.11 (Component 3) = 126.92. Of this, 95.81 (from B3) qualifies, so we take 95.81/126.92 = 75.49% as the percentage of project support budget that qualifies.

75.49% of 35.14 = 26.53, which is the value in B4. The same percentage, 31.5%, is applied to find 8.36 as the AfDB contribution to qualifying project support (in D5). The final amount to report is D5, $38.55 million as AfDB finance.

Additions to PAR

In order to make it clear to potential reviewers, the analysis outlined in Section II should be included in the PAR. The addition can be very brief, such as “Based on expert analysis and experience with similar projects, the GHG emissions savings from improved traffic flow will reduce emissions per passenger and per unit transported across the border when compared with the “no project” scenario.”
8. **Annex 1: Climate finance tracking table**

Task managers can use the following table to assist them in calculating the amount of finance to report. The case studies in Section 7 include filled-out versions of this table. The final values to report are the Totals at the bottom of Columns D and F.

<table>
<thead>
<tr>
<th>A</th>
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<td>Amount</td>
<td>% applied</td>
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<td>=SUM (rows 6-7)</td>
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* Qualifying project support cost = Project support cost * (B6 / (Total project cost - project support cost))

**NOTES:**

The Qualifying Cost in Column B does **not** need to equal the sum of the costs in Columns D and F. The values in Column B should be taken directly from the project cost structure. When dividing that amount into Columns D and F, finance from excluded sources (e.g. other MDBs, host country governments) is omitted. For example: if Component 2 qualifies (total cost of $13 million) and is funded by AfDB ($5 million) and JICA ($8 million), then $13 million goes in Column B, $5 million goes in Column D, and 0 goes in Column F.

If the source-by-source breakdown of funding for the QPE is provided, then no percentage needs to be applied, and Columns C and E can remain blank. The amount of finance contributed is input directly to Columns D and F.
9. Annex 2: Further information on climate and climate scenarios

There are a great many portals, factsheets, guidance notes and research articles on climate change! And no single place where you will find tailor-made answers to all your questions. The field of climate sciences is rapidly moving forward, so what seemed useful a few years ago may be out of date in the next few years.

This annex helps orient you to this world of data and information. We have sought to capture our own reasoning as if we were at your desk.

9.1 Start with the big picture: global climatic zones

Climate is hugely variable across the world. A good starting point is to identify the climatic zone of the area you are interested in. Hot semi-arid areas may already be marginal for agriculture. Highlands may suffer from cold temperatures. Small changes in future rainfall may not mean much in humid regions.

The Köppen-Geiger climate classification is a classic. The Köppen -Geiger portal provides global data, world maps and computer animations of updated Köppen-Geiger climate classifications. The Köppen climate classification scheme divides climates into five main groups; equatorial (A), arid (B), warm temperature (C), snow (D) and polar climates (E), each having several types and subtypes. The information is based on recent data sets from the Climatic Research Unit (CRU) of the University of East Anglia and the Global Precipitation Climatology Centre (GPCC) at the German Weather Service.

http://koeppegeiger.vu-wien.ac.at/
9.2 Start with the big picture for Africa

At the country level and for a sector overview, there are several key messages that we find consistently across Africa. The observations for temperature are common throughout Africa, with relatively minor regional differences:

1. Temperatures are rising, as observed since the 1990s or so. Annual average temperatures at a regional scale (e.g., COMESA) have increased about 1 °C above the long term average (1900 – 2010).
2. This trend of increasing temperatures is captured in global climate models, only when they include historical emissions of greenhouse gases. Model simulations without GHGs do not capture this trend, which diverges around the 1990s.
3. Climate model projections show a further increase in annual temperature of 0.5 to 1.5 °C from the present (circa 2010).

The results for rainfall are also common, although with less clear signs of change:

4. Historical rainfall varies quite a lot, within a band of +/- 30% for annual totals (but with a larger range for drier regions).
5. Climate model results with GHGs overlap almost completely with results without GHGs. That implies that the observed variability still dominates the additional effect of increased GHGs.
6. This variability is likely to continue in the future. Although some climate models show conditions getting wetter in some regions, this is not a shared result across all models.

These results are robust and have not changed significantly over the past five years. The next IPCC assessment report captures this conclusion as well. They are likely to be most useful for country and sectoral strategies as the context for planning major investments.

Key for figure below:

Black lines represent observed climate data.

Top: Annual temperature. Green band is global climate models without greenhouse gas emissions; red band is GCMs with GHGs

Bottom: Annual rainfall. Blue band is range of global climate models with GHG emission; climate models without GHG emissions cover nearly the same range (cross hatching)

A stylised representation of actual regional plots for Africa that are based on 32 simulations from 12 climate models from the CMIP3 and CMIP5 archives.

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3 Plots of annual rainfall and temperature results from the current IPCC suite of models can be provided for specific regions and countries.
Stylised figures of the range of climate change for Africa.
9.3 A first-order impact analysis of climatic zones

Go back to the Köppen-Geiger world site. Scenarios are available that show the shifts of climate zones within the 21st century from different IPCC scenarios. There are many different maps and computer animations available for the extended period 1901-2100, as well as downloadable data (on a regular 0.5 latitude/longitude grid) and maps of observed and predicted climate classifications. Among them is a new digital Köppen-Geiger world map on climate classification based on potential climate conditions over the second half of the 20th century.

Köppen-Geiger classifications for present climate, 1976-2000 (left) and an A2 scenario for 2051-207 (right)

Such climate classifications are helpful. However, they present averages for long-run climate conditions at a coarse regional scale.

9.4 I see the big picture, what results are available for specific sites?

Climate data begins with observations from individual stations. Climate scenarios have been interpreted to the network of observing stations. Downscaled scenarios on a monthly basis show the patterns of change given both the global dynamics of climate models and the local conditions that govern weather.

The best site for such information in Africa is from the Climate System Analysis Group at the University of Cape Town. The Climate Information Portal (CIP) provides an easy-to-use map based interface of viewing climate data. CIP has an extensive database of climate stations from Africa and Asia with the data provided in textual form, using various graphical methods and downloadable data (suitable for users more familiar with climate data). The map shows each climate station as well as
on-going projects from around the world. A number of different maps are available and the datasets are easily compared within a grid with other stations or compared to variability ranges or anomaly percentiles.

Two portals are available. Both portals contain observed and downscaled series for each station location that include all three primary variables: rainfall and minimum and maximum temperatures.

- **CMIP3** is a merged set of stations sourced from the Global Historical Climatology Network (GHCN) and World Meteorological Organization (WMO). The downscaled projections are based on the CMIP3 models for the A2 and B1 emissions scenarios for the two time periods of 2046-2065 and 2081-2100. CMIP3 contains global climate models used in the IPCC’s fourth assessment report.
  

- **CMIP5** is a merged set of stations sourced from GHCN, WMO and country Met data. The CMIP5 archive contains newer climate model scenarios, which are included in the forthcoming fifth report of the IPCC. The downscaled projections are based on newer greenhouse gas emissions scenarios, known as RCP 4.5 and RCP 8.5.
  

The CIP portals are regularly revised. The more complete data is in the CMIP5 archive, with monthly results for rainfall, wet days, dry spell, maximum and minimum temperature and hot days.

Levels of **future emissions** are highly uncertain, models/scenarios provide tools with which to analyse how driving forces may influence future emission outcomes and to assess associated uncertainties. A2 and B1 are scenarios within the Special Report on Emissions Scenarios (SRES); each scenario make different assumptions for future greenhouse gas emissions, land-use and other driving forces.

- **A2** describes a very heterogeneous world. The underlying theme is self-reliance and preservation of local identities. Fertility patterns across regions converge very slowly, which results in continuously increasing global population. Economic development is primarily regionally oriented and per capita economic growth and technological changes are more fragmented and slower than in other scenarios.

- **B1** describes a convergent world with the same global population that peaks in mid-century and declines thereafter, but with rapid changes in economic structures toward a service and information economy, reductions in material intensity, and the introduction of clean and resource-efficient technologies. The emphasis is on global solutions to economic, social, and environmental sustainability, including improved equity, but without additional climate initiatives.

RCP 4.5 and RCP 8.5 are scenarios within Representative Concentration Pathways (RCPs) which select scenarios from four modelling teams: integrated assessment modelling, climate modelling, and modelling and analysis of impacts. They are sets of projections of only the components of radiative forcing.
• RCP 8.5 - Rising radiative forcing pathway leading to 8.5 W/m² in 2100
• RCP 4.5 - Stabilisation without overshoot pathway to 4.5 W/m² at stabilisation after 2100

The climate change signals for the A2 and RCP 8.5 scenarios are stronger than for the B1 and RCP 4.5 scenarios due to the increased GHG concentrations. The B1 and RCP 4.5 scenario projections have greater uncertainty attached to them as stochastic processes and natural variability form a significant part of the results. Appropriate guidance would be to use the A2 or RCP 8.5 scenarios in order to obtain a clearer picture of GHG induced changes while using the B1 and RCP 4.5 scenarios to add some indication of the possible range of future projections under different emission scenarios.

<table>
<thead>
<tr>
<th>SRES</th>
<th>Lower climate change</th>
<th>Higher climate change</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1:</td>
<td>Global environmental sustainability in a more homogenous world</td>
<td>A2: Regionally oriented economic development</td>
</tr>
<tr>
<td></td>
<td>1.1 to 2.9 °C</td>
<td>2.0 to 5.4 °C</td>
</tr>
<tr>
<td>RCP</td>
<td>4.5: Stabilisation of radiative forcing at 4.5 W/m²</td>
<td>8.5: High greenhouse gas emissions, based on A2r scenario from SRES</td>
</tr>
<tr>
<td></td>
<td>1.6 °C</td>
<td>5.6 °C</td>
</tr>
</tbody>
</table>

Global emissions scenarios make different assumptions about the future, leading to a range of scenarios of future global-average climate change (compared to pre-industrial temperatures)
**weADAPT** links to the climate data from CIP, with a similar map based service. The website also provides links to articles and allows users to get in touch and share information with site members and organisations.

http://weadapt.org/placemarks/maps

Screenshots from weADAPT. The top two are the same as on the CIP.
9.5 The range of uncertainty is clear, but I’d like to see more variables and spatial distributions

The World Bank Group’s Climate Change Knowledge Portal (CCKP) offers a huge variety and number of worldwide datasets, from temperature and rainfall data to wider observations of impacts on agriculture, natural hazards and water as well as a vulnerability indicator. The CCKP contains environmental, disaster risk, and socio-economic datasets, as well as synthesis products, such as Climate Adaptation Country Profiles. The country profiles give a general background of a country, highlighting major cities, rivers, key sectors, recent temperature trends, adaptation backgrounds etc.

The CCKP utilises a map interface that is easy to use and navigate through the several data layers. The information available is flexible; you can map, compare, chart and summarise key climate-related information. The portal also provides intelligent links to other resources and tools.


Examples of data available in the World Bank’s CCKP.

The Famine Early Warning Systems Network (FEWS NET) provides climate data from 29 countries across Sub-Saharan Africa, Central America and the Caribbean, and Central Asia. One piece of software the FEWS NET uses is the Early Warning Explorer (EWX) which is an interactive mapping
tool that allows users to visualise continental-scale rainfall estimates, land surface temperature and total precipitable water and anomalies at varied time steps and review time series analysis.

FEWS NET provides access to spatial data and satellite imagery for all products they offer, separate data tables are available for continental, regional and national scales where applicable. Further images and data are available to download. Additional software including the Geospatial Water Requirement Satisfaction Index (GeoWRSI), Decision Support Interface (DSI) and Geospatial Stream Flow Model (SFM) are available to download.


Examples of the FEWSNET portal.

SERVIR Africa, based in Nairobi, Kenya, monitors and forecasts very up-to-date, worldwide data on areas including population, agriculture, disasters, ecosystems and health as well as sea surface temperature and rainfall. The information is updated every 3 hours, and can be viewed in 3 hour, 1 day, 7 day or 30 day periods.

SERVIR’s information is accessible through an Interactive Mapper and a Data Catalog. The Interactive Mapper allows you not only to access and display SERVIR data and functionality, but also to create new services by obtaining information from external sources. You can also choose specific data sets and information products, display them on a base map, and further manipulate them for analysis (e.g. creating a rainfall animation over a certain period). Information comes from SERVIR regional hubs as well as partner organisations.

https://www.servirglobal.net/EastAfrica/MapsData.aspx
ERVIR map example.
**NOAA’s National Climatic Data Center (NCDC)** remains the world's largest climate data archive to users worldwide. Land-based, marine, model, radar, weather balloon, satellite, paleoclimatic and severe weather are just a few of the types of datasets available from the NCDC from a huge number of locations around the globe (especially USA). Records in the archive range from paleoclimatic data to centuries-old journals to data less than an hour old. The data is available through an interactive map to search by countries, states, cities, ZIP code, climate divisions and hydrologic units. Datasets can also be selected by proximity or attributes and represented hourly, daily, monthly or annually.


Coverage of climate data in the NOAA archive.
For more information on climate finance tracking at the AfDB please contact Mafalda Duarte, Chief Climate Change Specialist, Energy, Environment and Climate Change Department, AfDB m.duarte@afdb.org