Holistic Approach towards Climate Proofing of Infrastructure Investments

The integration of climate risk management into different investment decision-making contexts requiring tailored types of risk assessment.
**Decision making context for Climate and treatment Assessment**

- **Proofing / Evaluation**
  - Based on Multi-Criteria Analysis, select most feasible policy, planning and regressive measures to inform climate resilience in the sector
- **PIEVC classic?**
  - Based on Multi-Criteria Analysis, select most feasible project site based on climate considerations
  - Identify and select measures that ensure the resilience framework for project development
  - Mainstream measures that ensure the resilience framework for the project development
- **PIEVC classic?**
  - Identify and select measures for identified sensitive infrastructure assets and operations and test their performance for the climate resilient budgeting, design, operation and maintenance schemes
  - Mainstream selected measures into the budgeting, operation and maintenance of the infrastructure investment
- **Economic PIEVC?**
  - Climate resilient insurance policy covering climate risk (monetary loss) identified.
- **PIEVC?**
  - Development of standard operation procedures (SOPs) for the construction site with regard to warning and immediate response options to protection of assets and people in case of climate related events
- **PIEVC classic / scanner / rapid**
  - In case changes risks are identified, implementation of operation related measures to increase the resilience of the project
  - Implementation of operation related measures to increase the resilience of the project

**Entry points for**

- **Scoping**
  - Can the sector policy, planning & regressive objectives be met under conditions of climate change and what are the response options to enhance climate resilient policy formulation and law enforcement?
- **Risk Assessment**
  - Understand future climate change risks for the sector given future climate change and infrastructure demand scenarios:
    - Spatial climate risk screening: Understanding robustly exposed, climate sensitive areas and infrastructure
  - PIEVC Scanner?
    - Based on Multi-Criteria Analysis, select most feasible policy, planning and regressive measures to inform climate resilience in the sector
- **Risk Treatment**
  - Based on Multi-Criteria Analysis, select most feasible project site based on climate considerations
  - Identify and select measures that ensure the resilience framework for the project development
  - Mainstream measures that ensure the resilience framework for the project development
- **Monitoring and Evaluation**
  - Monitor & re-assess whether key policies, planning systems and regulatory frameworks comply with the resilience objectives of the sector infrastructure portfolio
  - Decide whether a climate stress test may be carried out under the project preparation and resource mobilization stages.

**Project Site Identification**

- **Project Site Identification (Reconnaissance)**
  - Desk studies of water resources
  - Individual projects vs Basin plans
  - Priority plans
- **Feasibility study**
  - Preliminary investigations
  - Screening of project, selection
  - Project formulation
  - Investigation of alternatives
  - Preliminary layouts and project plan
  - Cost estimates
  - Design
  - Investigation program
- **Prefeasibility Report**

**Project Preparation**

- **Field Investigations**
  - Demand Studies
  - Bio-physical conditions
  - Ground and ecological surveys
- **Feasibility Study**
  - Review of pre-feasibility
  - Selection of alternatives
  - Water, Power, demand studies
  - Layout and project plans
  - Optimization of preliminary design
  - Cost estimates & Cash Flow tables, economic & financial analysis
- **Environmental, Social Impact Assessment (ESIA)**

**Resource Mobilization**

- **Financing Plan**
  - Appraisal by Donors / financiers
  - Financial closure

**Construction**

- **Execution of Works**
  - Tending and Contracting process
  - Contract management
  - Material control
  - Shop control
  - Construction management and supervision
  - Commissioning
  - As built drawings
  - Operation and maintenance manuals
  - Instrumentation for monitoring
  - Operation personnel training

**Operation & Maintenance**

- **Operation**
  - Operational procedures
  - Infrastructure safety
- **Maintenance**
  - Maintenance schemes
  - Monitoring & Evaluation
  - Feedback loops to all other stages of the project cycle
- **Results of Monitoring and Evaluation inform the other planning steps for future investments and O&M of existing and planned infrastructure.
Decision making context for Climate and treatment Assessment

- Spatial climate risk screening: Understanding roughly exposure, climate sensitivities and impacts on alternative project sites and the impact of climate change on overall service that the project intends to deliver.
  - Climate stress test: Identify impact thresholds for assets, operations and service development and duration and frequency curves for them (Climate Scenarios).
  - Cost of recovery analysis.

- Based on Multi-Criteria Analysis, select most feasible project site based on climate considerations.
  - Identify and select measures that ensure the resilience framing for the project development.
  - Mainstream measures that ensure the resilience framing for the project development.
  - Identify and select measures for identified sensitive infrastructure assets and operations and test their performance for the climate resilient budgeting, design, operation and maintenance schemes.
  - Mainstream selected measures into the budgeting, operation and maintenance of the infrastructure investment.

- Risk treatment: Monitor & re-assess whether key criteria for the investment are valid or need to be changed due to changing climate conditions.
  - Decide whether a climate stress test may be carried out under the project preparation and resource mobilization stages.

- Operation & Maintenance:
  - Results of Monitoring and Evaluation inform the other planning stages for future investments and O&M of existing and planned infrastructure.

- Are the key quality criteria regarding service of the planned infrastructure, the design and operations under risk from changing climate conditions at alternative project sites?

- Are the planned infrastructure assets and their operational procedures and services sensitive to climate change?

- Are standard funding and insurance schemes adequately considering climate risks?

- During construction, is the construction site able to respond to the climate related extreme events?

- Is the performance and serviceability of existing infrastructure potentially under risk due to climate-related hazards?

- Can the sector policy, planning & regulatory objectives be met under conditions of climate change and what are the response options to enhance climate resilient policy formulation and law enforcement?

- Understand the economics of loss and damage.
  - Climate resilient insurance policy covering climate risk (monetary loss) identified.

- Detailed scenarios for climate-related hazard risks on the construction site during different phases of construction.

- Continuous performance and vulnerability assessment (physical design, operations) under conditions of climate change (like risk assessment in project preparation phase).

- In case changes in risks are identified, identification and selection of measures to increase the resilience of the project.

- Implementation of operation related measures to increase the resilience of the project.

- Monitor & re-assess whether key criteria for the investment are valid or need to be changed due to changing climate conditions.

- Decide whether a climate stress test may be carried out under the project preparation and resource mobilization stages.

- Implementation of standard operation procedure (SOPs)