Annex 22a

Mitigation

1. **Selected methodological approach.**

Please select the option applied in the case of the project/programme.

☐ ~~Existing methodology (ies) applied in their fullness [Please provide the title, version and source]~~

☐ ~~Elements of existing methodology (ies) [Please provide the title, version and source and explain why the methodology (ies) cannot be applied in its/their fullness]~~

☒ **Project-specific methodological approach** (as described below)

2. **Main elements of the proposed subproject-specific approach (if applicable)**

Methodology challenges

AFD hired EE specialist to develop a tailor-made methodology for assessing mitigation and adaptation impacts of PEEB Cool. Because of its programmatic structure, the investment portfolio of PEEB Cool is not entirely known at the time of the submission of the funding proposal.

Hence, to assess the mitigation impact of the program, AFD set a database of subprojects that is representative of the portfolio of subprojects that could be attained for PEEB Cool.

Methodology steps

- **Preparation of a database of subprojects**

  This database is composed of (i) subprojects already studied or supported as part of the PEEB program which country is either part of the countries eligible to PEEB Cool or with similar climatic conditions, and (ii) subprojects in PEEB Cool's pipeline. Those subprojects represent a total investment of 1,099 M EUR. To assess the mitigation impact of PEEB Cool, the consultants (i) assess the mitigation impact of the subprojects database (at operating phase and construction phase), and (ii) extrapolated the results to assess the impact of a portfolio of a similar size a PEEB Cool's (1,287 M EUR).

- **Carbon footprint per sqm at operating phase**

- **Baseline**

Each subproject of the database was categorized depending on (i) the climate zone of the country (each of the country was attributed with one climate zone); and (ii) the building type (residential, hospital, school, small office building, retail). The baseline of the program is assessed based on the baseline of each subproject, that is the energy consumption (per sqm and per year) of:

- The building before renovation for refurbishment projects;
- A counterfactual building designed by the software EDGE for building construction projects.

- **Investment projects**

For each of the project of the database, the consultant modelled through EDGE the set of EE measures that could allow reaching a 20% improvement compared to baseline or a 40% improvement compared to baseline, based on the ambition of the subprojects.

- **Conversion of energy gain to CO2 reduction**

It was assumed that heating and DHW measures affected gas consumption, and that other EE measures affected electricity consumption. Based on the emission factors of the countries (as defined in the IFIs dataset for harmonized grid emission factors) and gas emission factor, the methodology could assess CO2 reduction thanks to EE measures.

- **Carbon footprint per sqm at construction phase**
  - **Baseline**

To assess embodied energy, the experts first used the EDGE software. The data was fine-tuned based of the experts' experience and adjusted with the French E+C tool (this tool is a regulatory tool used in France to assess the carbon footprint of the energy used in buildings and of the materials used in buildings). To translate energy content of construction materials to CO2 emissions, since there is no database of country-specific values for the PEEB Cool countries of the building services engineering works and other finishing works, the consultants applied ratios from the E+C tool with adjustments taking into account experience gained in PEEB projects.

- **Investment subprojects**

To assess the avoided emission relating to construction phases, the experts used EDGE software and established a matrix for determining the carbon gain from construction materials by building type and country type.

- **Calculation of the total avoided emissions per sqm**

Finally, the experts combine carbon footprint at operation phase and carbon footprint at construction phase to get the total avoided emissions of subprojects. Assuming a 15-year lifetime, they took into account the need for the renewal for the finishing works and building services engineering works.

- **Calculation of the total avoided emissions**

Based on the total sqm of the database subprojects and taking into account a 15% engineering cost, the consultants extrapolate to assess the surface of a 1,287 M EUR investment. This allows to know the total avoided emissions of PEEB Cool.

3. Programme boundary

Programme boundaries

The programme's boundaries are established according to the following assumptions.

The mitigation calculation considers the GHG emissions of buildings that are built or renovated, through direct financing or intermediated financing with funds from the Programme.

The emissions that are considered **include**:

- Electricity consumption for:
    - Space cooling
    - Lighting
    - Appliances
    - Cooking
    - Fans
    - Pumps
- Gas or fuel oil consumption for:
    - Space heating
    - DHW
- Embodied energy of the following elements:
    - Floor
    - Roof
    - Exterior walls
    - Interior walls
    - Ground floor
    - Windows and joinery
- Suppress demand if the building type is housing. Suppress demand is defined as the minimal amount of electricity use for cooling that is needed to reach an acceptable indoor comfort level (i.e. 26°C maximum indoor temperature).
- Renewable energy generated on site for the supply of the building's energy needs (solar PV, solar water heater) expressed as energy savings.

The emissions considered **exclude**:

- Any emission from a subproject that did not benefit form PEEB Cool loan financing (output 1.2), even if it benefited from upfront TA activity.

- Emissions related to the implementation of the technical assistance activities (1.1 and component 2): travel, workshop, report preparation, training activities.

4. Baseline analysis

The subproject baseline for each of the building types in each of the climate zone were modeled using the EDGE software. When more sophisticated energy simulations from previous PEEB supported projects were available for a given building type, the EDGE model assumptions were updated accordingly. For each type of building, the consultant chose an existing project to serve as a reference case for the building type using realistic parameters. The majority of these reference cases were drawn from projects currently supported under the PEEB program. A minority of projects were drawn from projects unrelated to the PEEB program but with similar characteristics.
The baseline analysis leads to energy consumption data per sqm per type of building and per climate.

5. Additionality analysis

In the absence of the program, existing buildings would not be refurbished and buildings to be built would not adopt bioclimatic design. The mitigation impacts are fully linked to the program as it fosters the construction and renovation of green buildings as well as the establishment of an enabling facility to encourage the transformation of the building sector.

6. Subproject emissions

Subproject emissions are included in the approach described above.

7. Leakage

AFD is currently developing a proposal with the Fonds Français pour l'Environnement Mondial (FFEM) to support "innovative" actions within buildings cooling (with studies and investments) – including related to "clean refrigerants" with no global warming potential nor ozone impacts as part of these innovative actions.

8. Emission reductions

E.g., Excel attached.

9. Monitoring approach

GHG emissions reductions will be monitored by a combination of 3 approaches:

- Ex-ante technical assessments followed up by on-site verification of the technical parameters of construction / renovations.

- Ex-post sampling of residential sector investments to monitoring energy use once the buildings are occupied / renovated. At least 10 buildings for each jurisdiction will be carried out in the sampling.
- Ex-post monitoring and reporting of energy consumption for larger investments.
- For indirect emissions reductions, a market survey will be carried out near the end of the subproject to assess building / construction practices to estimate the indirect impacts of the programme.

The monitoring approach is also described in annex 11.

10. Data sources

- EDGE software About | EDGE Buildings
- E+C label tool
- IFI dataset for harmonized grid emission factors