

Climate Action Reserve  
818 W. 7th Street, Suite 710  
Los Angeles, California 90017  
[info@climateforward.org](mailto:info@climateforward.org)

## Comments on the Solar PV Forecast Methodology

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We thank you for the opportunity to comment on the Solar PV Forecast Methodology version 1.0 (Methodology) of Climate Action Reserve's efforts to establish a credible, *ex-ante* greenhouse gas (GHG) mitigation program - Climate Forward.

Ramboll  
5 Park Plaza  
Suite 500  
Irvine, CA 92614  
USA

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T +1 949 261 5151  
F +1 949 261 6202  
<https://ramboll.com>

Over the past two years, Ramboll was involved in the development of the pilot version of the solar PV forecast methodology. In general, Ramboll believes the pilot version of the solar PV forecast methodology established a well-designed, conservative, and credible approach to estimate emission reductions into the future. We believe that Climate Forward can help with GHG emission reduction projects.

We appreciate the challenge of creating this new GHG mitigation registry and we understand that the Climate Action Reserve (CAR) continues to seek approaches to optimize the approach. We have the following comments for the Climate Action Reserve to consider (in the order the text appears in the methodology).

### 1. Section 3.3.2, The Legal Requirement Test

**Text as shown in the Methodology:** "In addition to the attestation, the Project Implementation Report must include procedures that the Project Proponent will follow to ascertain and demonstrate that the project at all times passes the Legal Requirement Test." [emphasis added]

**Comment:** We understand that the Climate Forward program is intended to take an *ex-ante* approach toward issuing Forecasted Mitigation Units (FMUs). In an *ex-ante* approach, the FMUs would be issued up-front based on projections of future emissions reductions. This is the foundation of this novel approach and we believe the protocol better fits this concept by holding true to that concept of providing a means where FMUs can be used "up-front". The third paragraph in Section 3.3.2 (page 7) states that the "legal requirement test is applied at the time of a project's start date." [emphasis added] We believe that the approach to apply the test at the time of a project's start date is appropriate in regard to providing a basis for project proponents to use this new approach. It is otherwise unknown and potentially impossible for a project to continually evaluate and assess the Legal Requirement Test "at all times". We

suggest that CAR edit this text to be internally consistent and in alignment with the central concept of the program to allow the issuing of FMU's "up-front".

## 2. Section 3.7, Project Resilience Measures

**Text as shown in the Methodology:** "[T]o address the risks of project abandonment, underperformance, and/or failure", this section requires "energy services contracts with solar PV performance guarantees" and "long-term service contracts for continued monitoring and maintenance and periodic inspections".

**Comment:** We believe the incorporation of a performance guarantee is inconsistent with the conceptual approach of the Climate Forward program. As discussed in comment #1, we understand that the goal of issuing FMUs in an *ex-ante* ("before the event") approach is that Project Proponents can mitigate expected future streams of emissions without waiting to monitor or measure reductions. In this context, the Climate Forward program methodology is designed to incorporate conservative quantification assumptions including discount factors, degradation factors, and limited crediting periods with the understanding that these conservative assumptions account for any risk of underperformance. By further incorporating a performance guarantee, the protocol in essence changes the calculation of all of those variables to provide a conservative estimate, and thus conceptually, should be more of an option as a means to gain greater FMUs (i.e., a performance guarantee can eliminate the need to assume particular discount factors).

We understand the concern that CAR would like to help ensure that projected GHG reductions are achieved, however, potential underperformance is addressed through the system losses parameters of the calculation methodology. For purpose of the GHG calculations, the panels are conservatively assumed to underperform relative to their rated power output. This is reflected by the "system losses" inputs in the PVWatts® program. In addition to aging (which reflects degradation over time), the system losses include reduced performance due to soiling, shading, mismatch, wiring, nameplate rating, light-induced degradation, and availability (system shutdowns). The total system losses by default sum to 14% in the first year of solar panel output, with higher losses assumed in subsequent years. These are conservative assumptions.

It is also notable that the protocol currently incorporates a warranty aspect with the solar panels that helps ensure continued operation of the solar panels (as required in Section 3.2). We are not currently aware of evidence that solar panels have a systematic underperformance relative to their design criteria. Thus, the currently limitation of the crediting period is itself a highly conservative assumption, as the panels may well continue to produce electricity past the end of their warranty period.

Furthermore, we believe that CAR should consider that a performance guarantee will add costs to each project which serve to disincentivize project implementation. Given the various factors which are already included in the protocol, we believe that a performance guarantee is a duplicative requirement and thus it may be an unnecessary cost burden for future projects.

### 3. Section 3.8, Market Expansion Objective

**Text as shown in the Methodology:** “Furthermore, with an emission cap in place for the power sector in the State of California, it is not possible to issue offset credits for renewable energy projects that affect emissions at capped power plants because doing so would result in the double counting of emission reductions.”

**Comment:** The text highlighted does not make sense in terms of assessing if the installation of solar panels on a residential home is additional. We do not believe that this consideration is relevant as written. We understand the need to assess for Additionality and believe the other discussions in the protocol (e.g., Sections 3.3.1 and 3.3.2) adequately address this.

### 4. Section 5.1.1, Emission Factor Selection

**Text as shown in the Methodology:** “Solar-generated electricity generally replaces electricity that otherwise would be generated and supplied by the local utility’s electricity grid (likely from marginal, rather than baseload, generating facilities). Thus, emission reductions from projects under this methodology are reductions from marginal emitting generating facilities on the grid due to the installation and operation of the solar PV systems at the installation sites. Given the small output of rooftop PV systems (as compared to baseload generating stations), marginal emission factors (MEFs) that represent the power generation sources at the time of the solar electricity production are the most reasonable metrics for assessing the avoided grid GHG emissions due to projects implemented under this methodology. Therefore, when available, MEFs must be used.” [emphasis added]

**Comment:** We understand the preference to use MEF’s, however, we suggest that the protocol create less of a mandate given that just because a MEF may be available, it does not necessarily make it the better or more conservative emission factor for an analysis to use. We believe that the language as written may result in inaccurate or non-conservative accounting of FMUs when less reliable MEFs may become available. We suggest that CAR consider revising the wording of the last line of the highlighted text to continue to allow flexibility pending CAR’s review of applications.

### 5. Section 7.3, Reporting and Confirmation Period

**Text as shown in the Methodology:** “Confirmation activities cannot commence until the Project is submitted and approved by the Reserve, and the PV systems have been operational for at least one year. Confirmation must conclude, and a Confirmation Statement must be issued, no later than two years after the project start date. The confirmation period for solar PV projects corresponds to the project crediting period. Successful confirmation fixes the start and end dates of the project crediting period for the duration of the mitigation project.”

**Comment:** As first discussed in comment #1, the Climate Forward Program has a concept approach that we believe should be maintained to make it effective, and we believe requiring a one-year confirmation period is conceptually inconsistent with the idea of the Climate Forward program. The goal of issuing FMUs in an *ex-ante* approach is that Project Proponents can

mitigate expected future streams of emissions up-front; the projected reductions are based on scientific understanding and contain conservative factors and discount factors due to this approach. The initial confirmation requirements will ensure that the projects are properly installed and generating electricity. There is currently no evidence to suggest that solar panels will not function properly once they are initiated. Given the requirements for warranties and maintenance, there are multiple safeguards already in place that will ensure that the solar PV systems will be installed properly and will produce electricity throughout the crediting period. We believe that in the concept approach of the program and with the various safeguards and calculational discounts incorporated, a one-year operational period prior to confirmation is not necessary and would increase associated costs of implementation thereby disincentivizing future investment in projects.

## 6. Solar PV Forecast Methodology Parameters

**Text as shown in protocol:** "This document contains the set of parameters to be used in the Climate Action Reserve's Solar Photovoltaic Forecast Methodology under Climate Forward."

**Comment:** We understand CAR would like this protocol to have flexibility and potential use in as broad of situations as possible. The text and tables do not appear to express this flexibility. We suggest that CAR include clarification in the protocol and the Solar Photovoltaic Forecast Methodology Parameters document that the parameters shown in the tables are not fixed or required to be used as-is for projects. We understand that they are provided to facilitate applications and to provide some measure of consistency. However, CAR should highlight that applicants can propose other methods for other situations or as data changes. For example, the protocol could note that additional regions or parameters may be added based on data submitted by Project Proponents (e.g., electricity intensity factors for different utilities and years) and that input parameters set as "default" in PVWatts® may change with model updates over time.

We thank you for the opportunity to provide and your consideration of these comments.

Yours sincerely,



**Eric Lu, MS, PE**  
Principal

D 949-798-3650  
[elu@ramboll.com](mailto:elu@ramboll.com)



**Shaena Ulissi, MS**  
Managing Consultant

D 415-426-5033  
[sulissi@ramboll.com](mailto:sulissi@ramboll.com)