

Scientific and Technical Advisory Panel

The Scientific and Technical Advisory Panel, administered by UNEP, advises the Global Environment Facility
(Version 5)

STAP Scientific and Technical screening of the Project Identification Form (PIF)

Date of screening: March 14, 2016
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Consultant(s):

I. PIF Information *(Copied from the PIF)*

FULL SIZE PROJECT	GEF TRUST FUND
GEF PROJECT ID:	9355
PROJECT DURATION:	4
COUNTRIES:	Tonga
PROJECT TITLE:	Outer Island Renewable Energy Project
GEF AGENCIES:	ADB
OTHER EXECUTING PARTNERS:	Ministry of Finance and National Planning, Kingdom of Tonga
GEF FOCAL AREA:	Climate Change

II. STAP Advisory Response *(see table below for explanation)*

Based on this PIF screening, STAP's advisory response to the GEF Secretariat and GEF Agency(ies):
Concur

III. Further guidance from STAP

1. This is a well formulated project aiming to develop 1.32 MWp solar PV capacity on 9 outer islands of Tonga. It appears to be well structured with stringent plans to include capacity building (that is essential) and the social issues involved with such new technologies. Continued maintenance and supervision is essential for such projects, as evidenced by similar projects elsewhere in the South Pacific that have failed after a few years. The Project Administration Manual is a good concept to assist project development and help avoid pitfalls.

2. The total power demand consumption (55 GWh) and future projections by Tonga Power Limited (to 62 GWh by 2020) are presented, but details of current demand and projections for each of the islands under question are not given. The claim that 600,000 liters/year of diesel will be saved assumes that such calculations have been made. The resulting 2000 t CO₂eq per year reduction equates to around 3.3 kg CO₂eq per liter which is a little higher than expected, unless the fuel used to deliver the diesel to the islands is also included. In Table A2, the current project to generate 103 MWh / yr (not "MWp" as stated) of solar electricity is claimed to avoid 1700 t CO₂eq. That equates to around 500g CO₂eq /kWh generated that is somewhat low (e.g., Sovacool, 2008 gives 778 g from a life cycle analysis https://en.wikipedia.org/wiki/Life-cycle_greenhouse-gas_emissions_of_energy_sources). The "overall project" gives an additional 381 MWh and avoids 308t CO₂eq "€" equating to 808 g CO₂eq /kWh. This apparent discrepancy needs to be checked. The total assessed direct avoided emissions over the 25 year project lifetime is 50,200 t CO₂ (page 7) with an additional consequential emission reduction estimated to be 75,300 t CO₂. Thus the total emission reduction for the project is 125,500t CO₂-eq as should be reported in Table F (thus replacing the 75,300 t CO₂ as at present). It would also be useful to provide the assumed capacity factor for the installed solar PV systems that could not be provided from the information provided.

3. The title "renewable energy project" is perhaps misleading as only one technology, solar PV, is involved. The islands no doubt have good solar insulation levels, (though this is not stated) but was any consideration given to other technologies or other renewable resources monitored? Could wind power be integrated with

solar PV perhaps? Is there any micro hydro potential on any of the islands? Has biomass or biogas any merit using local waste resources and crop residues to provide heat for cooking and food processing and/or power? The case to use solar PV alone could be sound but it has not been justified. This comment is related to the proposed in the project feasibility studies of technology options to achieve the national goals of 50% of RE by 2020. STAP recommends using project GEF resources and co-financing to start developing realistic sustainability and scale-up plan and secure long-term financing to assure achievement of this ambitious target.

4. PIF provides no information about the existing regulatory barriers for RE expansion in the country. The maturity of the regulatory frameworks is an important factor that has to be addressed and appropriate regulatory and fiscal support provided using project funds.

5. Battery storage is a key component of the system “ but what storage capacity has been calculated when assessing costs? There is a balance between the resource reliability, the demand profile and storage back-up. Since batteries remain costly (although now certainly cheaper per kWh stored than in recent years) was any analysis made of using existing diesel power systems as back-up on occasions to integrate into the system in order to keep battery storage size and hence investment costs down? How the project will assure that the replaced by PV diesel generators will be discontinued, particularly given the increasing energy demand? GHG calculations of project impacts should consider/estimate potential "leakage".

6. It is not clear how the PV capacity was calculated for each individual system. How was the power demand on each island assessed? Was any increased demand accounted for as more appliances are inevitably connected over time? Is future expansion of the planned systems an option being considered in the current designs? Will small businesses, schools, health centers and etc. be able to grow their demand to utilize the power available as well as domestic connections? Only domestic use and solar home systems are specifically mentioned.

7. Are the panels to be roof-mounted or fixed on land? Can they be designed to withstand extreme cyclones that appear to be growing in strength in the region? Laying flat would result in slightly less output but reduce the risk from storm damage. The price of panels has declined recently but much of the balance-of-system has not declined to the same degree (e.g., inverters, controls, steel framing, and etc.).

8. A "repair programme" is planned on Vava'u (see Project Description of the PAM) “ though elsewhere this is described as a lines upgrade ("rehabilitation of existing grid networks"). Are there any lessons to be learned from why this is necessary? For this project will the new lines infrastructure be designed to cope with increased future demand?

9. The Tongan government a few months ago, in association with the EU, was seeking inputs for a school energy project "PV powered computer suites in high schools" (but the web site seems to have been taken down <http://energy.gov.to/index.php/all-category/business/186-tongan-schools-pilot-on-grid-solar-photovoltaics-systems>). Is this project linked with this ADB project?

10. It would be beneficial to consider building local capacity and provide training for O&M on the islands as an additional source of income and socio-economic benefit of the project.

<i>STAP advisory response</i>	<i>Brief explanation of advisory response and action proposed</i>
1. Concur	In cases where STAP is satisfied with the scientific and technical quality of the proposal, a simple “Concur” response will be provided; the STAP may flag specific issues that should be pursued rigorously as the proposal is developed into a full project document. At any time during the development of the project, the proponent is invited to approach STAP to consult on the design prior to submission for CEO endorsement.
2. Minor issues to be considered during project design	STAP has identified specific scientific /technical suggestions or opportunities that should be discussed with the project proponent as early as possible during development of the project brief. The proponent may wish to: (i) Open a dialogue with STAP regarding the technical and/or scientific issues raised. (ii) Set a review point at an early stage during project development, and possibly agreeing to terms of reference for an independent expert to be appointed to conduct this review.

	<p>The proponent should provide a report of the action agreed and taken, at the time of submission of the full project brief for CEO endorsement.</p>
<p>3. Major issues to be considered during project design</p>	<p>STAP proposes significant improvements or has concerns on the grounds of specified major scientific/technical methodological issues, barriers, or omissions in the project concept. If STAP provides this advisory response, a full explanation would also be provided. The proponent is strongly encouraged to:</p> <p>(i) Open a dialogue with STAP regarding the technical and/or scientific issues raised; (ii) Set a review point at an early stage during project development including an independent expert as required.</p> <p>The GEF Secretariat may, based on this screening outcome, delay the proposal and refer the proposal back to the proponents with STAP's concerns.</p> <p>The proponent should provide a report of the action agreed and taken, at the time of submission of the full project brief for CEO endorsement.</p>