

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: May 04, 2012

Screeners: Lev Neretin

Panel member validation by: Ralph E. Sims
Consultant(s):

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

FULL SIZE PROJECT **GEF TRUST FUND**

GEF PROJECT ID: 4745

PROJECT DURATION : 5

COUNTRIES : Sudan

PROJECT TITLE: Promoting Utility-Scale Power Generation from Wind Energy

GEF AGENCIES: UNDP

OTHER EXECUTING PARTNERS: Ministry of Electricity and Dams

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): **Minor revision required**

III. Further guidance from STAP

The project supports GEF Strategic Objective CCM-3 and also will assist the Sudan government's objectives to improve electricity access, encourage renewable energy and reduce GHG emissions. However, the evidence is lacking to support wind power as a technology when the wind flows appear to be relatively low.

The following questions should be addressed during project preparation:

1. Rational for technology selection: The wind resource is to be assessed and a wind atlas developed, but if the wind resource is then deemed to be low, then there would be a risk that the project may not develop further. It is hard to believe that 7 wind farms are planned without careful assessment of the wind source potential having already been undertaken.

The PIF states Sudan has "considerable wind resources" and the Second National Communication has identified that wind has high potential, but the only data provided to support this statement give typical mean annual wind speeds of 4.5-5 m/s. Where wind has less than a mean annual wind speed of around 7m/s, then wind power may not be economically viable. Based on Table 1, a capacity factor of around 35% is evident which if correct. This is above the global average but does not relate to the low 4.5-5 m/s mean wind speeds quoted. So there appears to be some inconsistency and uncertainty in these calculations. What real data have actually been used for these calculations have to be further clarified in the project document. The quoted \$1.86M /MW installed capacity (with Dagonda at \$2056 /MW) is similar to mean costs cited for the USA in 2009 (ranging from \$1200 to 4400/MW; IPCC, 2011, Chapter 7). Project proponents may explain if these costs include road access, transmission line extensions, etc.

2. Grid reliability: Checking grid stability when operating the one pilot 100 MW wind farm at Dagonda will help provide useful experience for the system operators as to how to manage a variable generation system. However, the challenge to the operators will increase as shares of the total generation from wind power increase as replication progresses. It is not clear what share of power will be generated once the 6 wind farms are built but if all renewable electricity plants are adding around 551 MW by 2016 to the projected total capacity of 5180 MW as is stated (Medium Term Power System Development Plan), the proposed 300 MW of wind capacity is likely to remain a relatively small share and hence grid integration should not be a major issue at this stage.

3. Removal of barriers: One of the project aims is to demonstrate the technical potential of wind energy for Sudan stakeholders to be achieved with a smaller wind farm than the 100 MW. The technology is mature. Measuring the wind resource is the key to success. If as low as presented, the viability of wind power in Sudan seems questionable without significant government support policies (such as FITs as proposed).

Developing a grid code is one critical component to remove integration barriers. A lot of experience exists elsewhere when integrating variable wind power into an existing grid (see IPCC 2011 report on Renewable Energy, chapter 11) but each system differs, so this specific Sudan study is needed. The current mix of generation (unknown) may or may not give specific problems for wind power replications. If developed along with the "large hydro potential", a workable generation mix could result to better managed wind variability.

Learning from the experience of other wind farm operators that exist around the Red Sea is a commendable approach, but much of this information is usually commercially-confidential, so it is not clear who will provide this assistance or how much useful information might be obtained. It would be useful to provide some evidence that such information will be forthcoming.

4. Climate change abatement and risks: The chance of reduced hydro-power generation due to reduced precipitation is acknowledged. Possible future impacts on mean wind speeds and frequency of extreme gales are not mentioned.

Monitoring and evaluation: It is stated that GEF funding sought is mainly for supporting the "technical performance" of the baseline wind farms (page 9) but whether this will be done in association with the turbine manufacturers is unclear, as is who exactly will undertake the study, especially given the lack of capacity acknowledged in the proposal. Sudan UNDP has recruited an energy specialist who can oversee the project monitoring, assuming the agency is giving high priority to energy monitoring activities, but more clarity on this is requested.

<i>STAP advisory response</i>	<i>Brief explanation of advisory response and action proposed</i>
1. Consent	<p>STAP acknowledges that on scientific or technical grounds the concept has merit. However, STAP may state its views on the concept emphasizing any issues where the project could be improved.</p> <p>Follow up: The GEF Agency is invited to approach STAP for advice during the development of the project prior to submission of the final document for CEO endorsement.</p>
2. Minor revision required.	<p>STAP has identified specific scientific or technical challenges, omissions or opportunities that should be addressed by the project proponents during project development.</p> <p>Follow up: One or more options are open to STAP and the GEF Agency: (i) GEF Agency should discuss the issues with STAP to clarify them and possible solutions. (ii) In its request for CEO endorsement, the GEF Agency will report on actions taken in response to STAP's recommended actions.</p>
3. Major revision required	<p>STAP has identified significant scientific or technical challenges or omissions in the PIF and recommends significant improvements to project design.</p> <p>Follow-up: (i) The Agency should request that the project undergo a STAP review prior to CEO endorsement, at a point in time when the particular scientific or technical issue is sufficiently developed to be reviewed, or as agreed between the Agency and STAP. (ii) In its request for CEO endorsement, the Agency will report on actions taken in response to STAP concerns.</p>