

# CLIMATE INVESTMENT FUNDS

SREP/SC.11/Inf.2  
June 11, 2014

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Meeting of the SREP Sub-Committee  
Montego Bay, Jamaica  
June 27, 2014

Agenda Item 4

**COMMENTS ON ARMENIA'S SREP INVESTMENT PLAN  
SUBMITTED BY THE SUB-COMMITTEE MEMBERS**

May 6, 2014

## **Comments Received from the Netherlands--Endorsement of the Investment Plan for Armenia**

Dear Patricia,

Thank you for sharing the SREP investment plan of the Government of Armenia. We will be happy to congratulate the Government of Armenia with this interesting plan and its anticipated transformative impact.

At this stage, we have two specific questions/comments on the investment plan:

1. We have been interested to see that the analysis of renewable energy options prioritizes thermal application of geothermal energy ("direct use") as most suitable for SREP. Why does the investment plan not include an element of such direct use of geothermal energy, either as stand-alone SREP project or as specific component in the proposed Geothermal Power Exploration and Development project (could feasibility of direct use be anticipated as possible outcome of the resource assessment for the Karkar site)?
2. We have also been interested to see that the investment plan presents two options for use of the SREP funds (either a grant to government or a guarantee to private sector investors/developers). How will this decision be made? Our domestic experience has been that a guarantee-type mechanism has been very effective for private sector development of thermal applications of geothermal energy (with a medium temperature resource). If the government of Armenia would consider to include the option of direct use mentioned above, would that have implications for how to best apply the SREP funds?

Best regards,

**Frank van der Vleuten**



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April 28, 2014

**Comments Received from Switzerland--Endorsement of the Investment Plan for Armenia**

Dear Patricia,

Thank you for circulating the SREP Investment Plan for Armenia.

However, please note that we have materially not enough resources to appraise an investment plan within the short time you gave us to decide on its endorsement. We need an extension of at least 3 weeks.

Also, we feel that any investment plan should be discussed in a Subcommittee meeting or at least by VC.

Since the next Subcommittee meeting will take place in June, we suggest to put the investment plan of Armenia on the agenda of this meeting, along with the investment plans of the two Pacific Islands.

This will also give all subcommittee members enough time to appraise it.

Thank you and best regards  
Daniel

**Daniel Menebhi**  
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27 May 2014

### **SREP Investment Plan for Armenia**

We thank Armenia for a well prepared Investment Plan.

We understand and value the efforts that were made to produce a document that addresses the needs of the country and is consistent with the strategies already pursued.

Prior to the decision about the endorsement, we have the following questions (Q) and comments (C):

1. RE resource potential in Armenia
  - a. C: The identified capacity for small hydro power (100 MW) is lower than the target for 2020 (377 MW). This would indicate a much larger potential for small hydropower than indicated. Please explain.
  - b. Q: It is noted that utility-scale solar potential depends on the deployed PV technology. What is the potential in each of the three cases (fixed PV, single-axis tracking PV, concentrated PV)? Which technology is proposed for the investments to be supported with SREP contributions?
  - c. Q: What are the estimates of the energy potential (in an equivalent to power capacity) for geothermal heat pumps and solar thermal heating/hot water technologies?
  - d. Q/C: For geothermal potential, the stated figures assume flash technology is used. This requires a high temperature resource. What would be the estimated potential if the temperatures of the identified resource were not high enough for flash technology and binary plants would have to be deployed?  
Note: It shall be noticed that at 150 MW the overall geothermal potential of Armenia is in any case very small.
2. RE targets in the Government Strategy for RE
  - a. Q: What is the presently installed capacity for each of the listed RE technologies in table 3.5 (p.37)?
  - b. Q: How realistic do you see the targets of bringing the RE energy share in Armenia's energy mix (excluding large hydro power) up from 6% in 2012 to 21% in 2020 and 26% in 2025? What important power plants are expected to be put on the network until 2020?
  - c. Q: It is noted that the GoA targets to install 50MW of geothermal power until 2020. How consistent is this with the fact that in the SREP IP it is foreseen to set-up a plant of only 28 MW after the resource of the most promising site (Karkar) is proven, a PPP is structured with a private sector operator and the plant is built and connected to the grid? What other options of geothermal development, as advanced as the Karkar proposition using SREP grant (if approved) does the GoA have in the pipeline?
3. Ranking of RE technologies against selection criteria
  - a. Q: We noticed that the ranking of geothermal heat pumps, solar thermal heating and distributed solar PV has been adjusted (to worse) between the draft and the final versions of the IP. Please explain and substantiate these adjustments.

- b. C: We do have concerns that the criterion "market maturity/immaturity" has been overweighed and possibly even wrongly interpreted in the ranking. In the SREP design document, it is explicitly mentioned the SREP should support established RE technologies with large scale-up potential. Therefore the prioritization of the least established (i.e. non-incepted) technologies seems to be contradictory with the request of a large scaling-up potential and also of readiness. This is particularly problematic since the GoA justifies the selection of geothermal development against better ranking technologies (e.g. geothermal heat pumps) only by applying and overweighting this criterion.
- c. C: It is noticed that geothermal heat pumps rank highest by a large margin as RE technologies to be suited for a SREP contribution and that despite this high ranking it was not selected. The justification is that this sector, along with solar thermal, has already sufficient/substantial support from the MDBs and the private sector. On the other hand, it is also stated that so far only one commercial-scale geothermal heating facility has been realized in Armenia. This raises the question of how much support is sufficient and indicates that there could very well be a significant potential for scaling-up these highest ranking technologies. We would like to have an appreciation by the MDBs (WB-IFC, ADB and EBRD) as well as the GoA of this aspect.
- d. Q: What stakeholders have been consulted regarding the substance and the sufficiency of funding for the geothermal heat pump and solar thermal sectors? Is there a summary of the statements of the different groups of stakeholders in this respect? What is/was the position of the independent observers?
- e. C: it is stated that the deployment of utility-scale solar PV in Armenia has the potential to create an entire industry in terms of job creation. We doubt that the construction of a limited number of large plants will have this effect. An "entire industry" will be created most likely with technologies that offer large replication potential and easy access to small and medium sized private enterprises in its deployment. This is the case for geothermal heat pumps, solar thermal and distributed solar PV systems, as correctly assessed in the ranking.

#### 4. Geothermal power development

- a. Q: Please substantiate the expectations that the private sector will make the capital investment (power plant) if the resource potential is confirmed (at 28 MW) and that the MDBs (IBRD, ADB, EBRD) or their commercial arms will be ready to support the project with loans. Are there any statements of intent by private sector investors in this direction? What are the positions of the cited MDBs?
- b. Q: With regards to your (GoA) answers to the issues raised by the independent expert, do you have any indications about the probabilities whether the Karkar resource is high temperature or low/medium temperature?
- c. C: Please provide a copy of the ISOR (Iceland) assessment on which you base your statement about the justification for exploratory drilling.
- d. C: Given the low potential, the still unproven nature of the Karkar geothermal resource (temperature), the SREP investment in the proposed geothermal power development component seems extremely risky and likely to end up in a single 28 MW pilot plant in the best case. Even in this best case, there would be no transformational impact. Therefore, we strongly support the recommendation of the independent expert regarding the reduction of the geothermal power development component in the IP.

## 5. Utility-scale solar PV

- a. C: It is doubtful that the construction of 40-50 MW of utility-sized solar PV plant will have a sufficient impact on the long-term supply costs of solar PV products sufficient to make the technology commercially viable.
- b. C: Utility-scale solar PV will contribute to job creation but a scale-up in this respect will happen only in conjunction with distributed solar PV. It is therefore recommended to identify and favor synergies with the (existing) distributed solar PV sector in the implementation of the utility-scale solar PV program.

## 6. Other technologies

- a. C: Having noticed that geothermal heat pumps and solar thermal heating technologies ranked highest in the appraisal of potential RE technologies, we do not understand why none of these technologies appear in the IP.
- b. C: We see in these technologies a particularly large potential for scaling-up, precisely because they have already been successfully implemented in Armenia.
- c. C: We see in these technologies a larger potential for the private sector and job creation than in any of the proposed technologies in the IP.
- d. C: We therefore recommend to integrate the geothermal heat pump technology into the IP, instead of the geothermal power development and to propose an incentivization program to induce the private sector to deploy this technology in Armenia.
- e. C: As the independent expert also indicated, small hydro power could be another sector where a scaling-up, supported by SREP, could yield promising results. We feel that this potential was underestimated in the IP.

## 7. Improvement of enabling environment for RE

- a. Q: What specific measures are planned by the GoA to improve the enabling environment for RE, both for utility-scale plants and for distributed power generation?
- b. Q: What about targeted incentives, such as duty and VAT exemptions for renewable energy investment goods?

## 8. Financial Plan

- a. Q: Why are no private sector investments and commercial loans foreseen in the utility-scale solar PV project share of the WB, contrary to the program managed by the ADB?
  - b. C: Given the lack of any details, we consider that the USD 106 million foreseen for the geothermal power development is/would be essentially a funding gap with high uncertainty regarding its materialization. This amount should thus not be included as a leverage investment in the IP.
  - c. Q: What is the share of grant and capital requested by the GoA and what components are foreseen to benefit of grants/capital?
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May 6, 2014

## **Comments Received from the United Kingdom --Endorsement of the Investment Plan for Armenia**

Dear Patricia,

Thank you for sending the SREP Armenia Investment Plan for our review. Our comments at this stage are as follows:

- We appreciate the process that the Government of Armenia and World Bank have gone through to identify which technologies and sectors should be chosen. However, we have some concerns particularly regarding the substantial objections noted by the independent reviewer regarding the focus on geothermal power. This does not appear to be satisfactorily resolved, and would like to see additional evidence and/or review before the sub-committee is asked to endorse the plan.
- Further to the above, in a context where 100% of the population is grid-connected – not typical for SREP countries - we also wonder whether there might be some important energy efficiency opportunities, noting also that Armenia is in the EBRD's E5P programme.
- We also noted that the geothermal heating scored well in the analysis, but was not prioritised and we would appreciate any further information on this given the large potential for scale, which presumably exceeds available support through existing programmes?
- We believe that the IP could be strengthened with a stronger monitoring and evaluation plan that would help to learn lessons that could increase the chances that SREP finance will be catalytic to more renewable energy investment, seizing the capacity gap opportunity (particularly for PV, with technical potential estimated to be 6,500MW).
- In general, given the strategic questions pending after the independent review, it is our view that the decision on the Investment Plan should be taken at the next Sub-Committee meeting in June for endorsement, rather than by mail in the interim.

Best wishes,  
Steven

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## **Comments from the United States-- Endorsement of the Investment Plan for Armenia**

### United States Comments on SREP Investment Plan for Armenia

We appreciate the efforts of the Government of Armenia and the World Bank to put together an Investment Plan that fits with the goals of SREP and addresses some of the interesting challenges that the country faces in developing its clean energy sector. We think that scaling up renewable energy in Armenia would be very helpful for climate change mitigation reasons as well as energy security reasons, given Armenia's strong dependence on imported natural gas. There are a number of positive aspects to the plan and it is moving in the right direction, but we also think there are some outstanding issues that need to be better addressed before we can vote to approve the plan. These issues are:

- The problems with the geothermal project expressed by the independent reviewer raise some serious concerns and they are not sufficiently addressed by the responses in Annex G. We would like to see a more detailed response to the issues raised by the independent reviewer.
- Why was geothermal power included in the IP, despite having a low scale-up score in the ranking criteria (Table 4.1), while geothermal heat pumps and solar thermal heating were not included even though they scored higher in the options ranking? What programs will diffuse these higher ranking technologies? Are the other funding mechanisms for the two latter options similar in size and scale to SREP?
- We are concerned about the lack of strong commitment to policy reform tied directly to SREP support, and a strategic framework for implementing it. The document identifies major barriers to investment in renewables, but the mitigation options are not clearly identified enough to provide confidence that the SREP program will help overcome them, nor does there seem to be any clear commitment from the GoA to implement reforms that could increase the likelihood of success stemming from SREP funding. How will the SREP program facilitate energy sector reforms? Additionally, please explain how structural problems—like the poor coordination between government authorities (PSRC and MoNP) on obtaining necessary permits for RE technologies—will be improved in order to catalyze further renewable sector development.
- We would appreciate more detail about how the proposed projects will help catalyze private investment and growth in the geothermal or utility-scale solar PV sectors. The geothermal project depends largely on a funding source that is not identified in the investment plan. While we appreciate that a private sector partner has not yet been identified, the IP could provide some examples of potential partners or at least some estimate of expected co-financing levels from the GoA, IBRD, or ADB.
- We echo the UK's comment about energy efficiency opportunities, especially given the aging energy infrastructure in Armenia. Are there substantial opportunities for energy efficiency and how might they fit in the SREP program?

Our preference would be to not wait until June sub-committee meeting to address these issues, but rather to set up a video conference in the next few weeks.