CTCN Technical Assistance

Request Submission Form

Requesting country:	*Algeria*

Request title:	*Technical assistance for the study and construction of a ground-based solar photovoltaic (PV) power plant with a nominal capacity of 1MWp*

Contact information:

	National Designated Entity	**Request Applicant**
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Technology Needs Assessment (TNA):

☐ *The requesting country has conducted a TNA*

☐ *The requesting country is currently conducting a TNA*

☒ *The requesting country has never conducted a TNA*

Algeria adopted a renewable energies development and energy efficiency programme (PEREE) in 2011. This was updated in 2015. Its aims include the establishment of solar PV-powered electricity generation plants with a total capacity of 13,575 MW.

Geographical focus:

☐ *Community-based*

☐ *Subnational*

☒ *National level*

☐ *Multi-country*

The plan is to establish the facilities in question primarily in the high plateaux and in the south of Algeria. These two regions have vast spaces endowed with some of the best solar potential in the world, and are thus major assets in the deployment of large-scale solar PV power plants. The facility in question will be constructed near the new town of Boughezoul, in the central high plateaux, 170 km to the south of Algiers.

Theme:

☐ *Adaptation to climate change*

☒ *Mitigation to climate change*

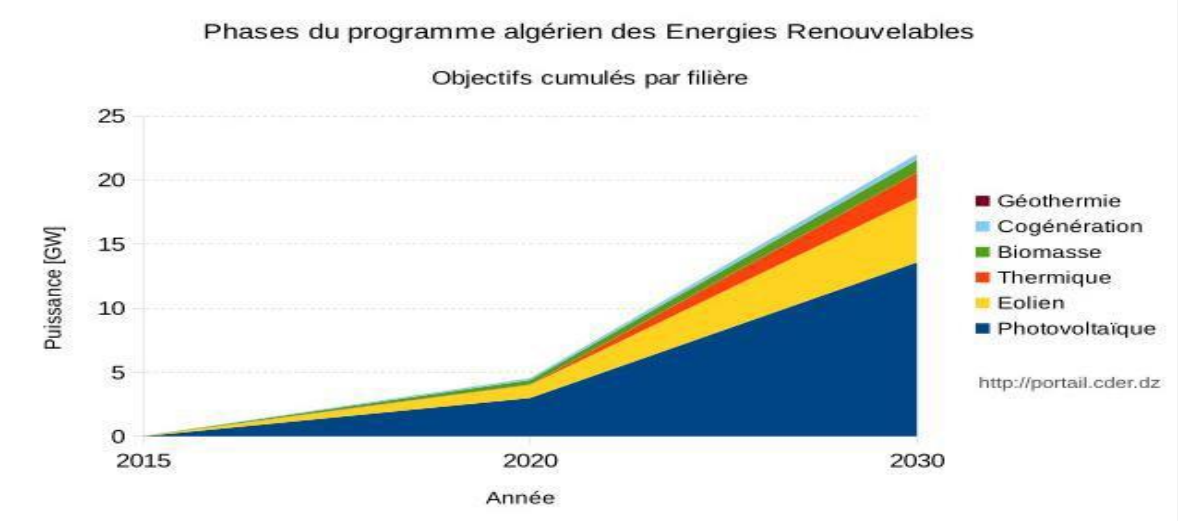
☐ *Combination of adaptation and mitigation to climate change*

Sectors:

This request is aimed at improving the skills available within the country to establish medium- and high-capacity solar PV power plants by encouraging the emergence of industrial sectors able to provide most of the industry's requirements. Combined experience in this area could, in fact, provide a platform for a wider dynamic covering several sectors, such as: Energy, Environment, Industry, Research and development (R&D), Land-use policy and Vocational training.

Problem statement *(up to one page)***:**

Algeria adopted a wide-ranging renewable energies and energy efficiency programme (PEREE) in 2011. Updated in 2015, this programme has a target production of 22,000 MW of electricity from renewable sources by 2030, of which more than 60 per cent (13,575 MW) will be of solar PV origin (Figure 1).



Given its size, this programme could also be considered a structuring project, as it encompasses actions essential for the country's sustainable development. It has the potential to act as a catalyst for establishing an important industrial base that will generate wealth while effectively contributing a large proportion of human resources to various areas of employment, including R&D. In fact, the technologies involved in the solar PV energy sector remain relatively open to being mastered by developing countries. Jobs can thus be created in a wide range of professions.

This overall perspective encompasses the mission of the Centre for the Development of Renewable Energies (CDER), as the responsibilities of this public institution include implementing

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Algeria's renewable energies programme, particularly in terms of its technological, technical and training choices.

For this reason, and to encourage the emergence of an authentic industrial base able to integrate local potential on a mass scale, the CDER has launched a federative project aimed at building a 1 MWp ground-based solar PV power plant connected to the national electricity grid.

A national partnership has therefore been established with the main public and private economic actors in this sector, and the CDER is taking the lead as both project owner and works contractor. It is primarily in this latter area that the CTCN's support is most needed in order to help the CDER team launch the project professionally, in terms of both its industrialization and technical management.

Past and ongoing efforts (*up to half a page*)**:**

The CDER was established in 1988 and, in line with the mission and responsibilities set out in its founding decree, it has always strived to develop and master the scientific and technical knowledge related to renewable energy concepts. Through its solar PV energy division, it has contributed in particular to endowing a number of remote sites in the south of Algeria with their own autonomous means of producing local electricity from solar energy, which can be used in multiple applications (domestic, water pumping, runway lights, etc.). In terms of PV facilities connected to the grid, the related studies and designs only really took off following the acquisition of a 10 kWp experimental microplant in 2004. Following this, modelling of PV modules also began for small national producers in this field. However, it was only with the first national debates that preceded the launch of the PEREE in 2011 that an absolute priority was given to the associated research issues. In fact, the CDER is one of the national institutions with explicit responsibility for supporting programme implementation, while the National Gas and Electricity Company (Sonelgaz) is the designated project owner. Sonelgaz has already taken receipt of two turnkey solar PV power plants in southern Algeria, with capacities of 1 MWp (Ghardaia) and 3 MWp (Djanet). Twenty-two other solar PV power stations with a total capacity of 343 MWp are also currently being built in the high plateaux and deep south. These should be ready to hand over towards the end of 2015. It should be noted that the initial version of the PEREE (2011) relied heavily on solar thermal for the production of 60 per cent (7.2 GW) of its total capacity of 12 GW of renewable electricity intended for the domestic market by 2030. With the subsequent impressive advances in the solar PV sector, particularly in terms of its lowered costs, it became necessary to revise the 2011 programme four years later. The new version, approved by the Council of Ministers in February 2015, revised the total capacity to be installed with own funding upward (22 GW), and now states a clear preference for solar PV energy, the contribution of which has thus increased to 13.575 GW (~ 60 per cent).

Assistance requested (*up to one page*):

This is a request for technical assistance to support the implementation of studies to design and construct an industrial project for which only the final objective is currently clearly defined.

It relates to building a 1 MWp solar PV power plant on an already-identified site on the outskirts of the new town of Boughezoul, in the centre of the high plateaux region (170 km to the south of Algiers).

The formulation, launch and monitoring of all works, as well as contributing to their concrete implementation on the ground, represents a significant challenge for the team appointed to take forward this large-scale project for the CDER. The Algerian researchers are fairly confident in their scientific knowledge of the subject, but are lacking mainly in the concepts required to implement this in the rigorous context of a working operation. Given the numerous constraints to be resolved in terms of feasibility, protection and other technical issues, this new area of intervention is still far from sufficiently mastered. We also need to know how to correctly plan the implementation of the recommended technological solutions and their integration into the different stages of the process, and to understand the nature of validation protocols for gradual testing.

We are convinced that these skills can only be gained from extensive experience in the field. We therefore need to achieve a level of mastery that will help Algeria incorporate more of its own human and material resources into this work.

Contact between the CDER team members in charge of the project and experts who can support them in specific areas related to the technical conduct of the project would thus be greatly appreciated. In any case, if we are to have the best chance of obtaining knowledge that is in line with actual needs, we feel it important to explain the content of this request in more detail. Without claiming to be aware of all the needs, especially those relating to implementing industrial aspects in line with the required standards, we can nonetheless identify some issues in which our skills are lacking and which could be covered by this request:

1- *Constraints regarding the implementation of the main technical solutions relating to a grid-connected PV conversion chain, in line with industrial standards.*
2- *The technical study for the generator and evaluation of the feasibility of connecting it to the existing grid.*
3- *Optimal choice of the final architecture for the conversion chain depending on the operational features required under normal operating conditions.*
4- *Compliance upgrade of operating or reconfiguration protocols if particular faults related to the connected grid appear.*
5- *Calibration and optimal integration of the dynamic and static protection devices necessary for the entire installation.*
6- *Sequencing of construction works for the whole electrical facility on site (cabling, assembly of equipment, preliminary tests, etc.) and other specific works (earthing,*

lightning protection, etc.).

7- Network connection tests and plant evaluation tests before its final handover.

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It should be noted that priority, for the moment, is placed only on assistance related to the project's technical implementation. It goes without saying that the other areas of expertise necessary for the proper implementation of this type of project (global dimensioning, civil engineering, environmental impact, cost optimization, etc.) are all just as important and will be addressed later.

Expected benefits *(up to half a page):*

Given our clear lack of experience in the engineering, procurement and construction of projects of this scale in Algeria, the requested technical assistance would represent a significant step forward in the steady industrial development of our country. Moreover, support for such a strategic area as a mastery of renewable energy-related techniques would also open up the opportunity to effectively involve local potential in the sustainable development process that is under way. If national industry made a significant contribution to the sector, implementation of the PEREE-recommended plan of action would be doubly beneficial for the country.
In any case, the CDER's mission is now in line with this overall perspective, and this request is an authentic illustration of this ambition.

Provision of the outlined technical support would help build a solid and much-needed bridge between the industrial and applied research sectors, which has thus far been lacking. From this viewpoint alone, the dynamic created would be likely, in the medium to long term, to open up promising avenues for all actors able to contribute to the emergence of healthy economic activity in Algeria.

On another level, and in the short term, it would motivate the CDER researchers to further mobilize their resources by refocusing them on activities with clear added value and that are fully in line with their core mission as defined. In this way, this cumulative knowledge could transform the CDER, in the medium term, into a credible provider of technical assistance for the implementation of similar projects. It could also provide specialist training courses aimed at supplying the labour market with qualified staff for this sector, which is recognized as having significant job creation potential.

Post-technical assistance plans (*up to half a page***):**

Mastering an industrial approach to implementing grid-connected solar PV power stations (the purpose of the technical assistance in question) would open up real possibilities for the diversification of future actions in the area. Implementation of the PEREE is only in its infancy, and the CDER would be able to be even more actively involved in this through expanding its interventions.

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In addition, the legislative texts setting the guaranteed purchase prices for solar PV electricity have been enacted. Other alternatives requiring private investment may therefore also be of interest to the CDER's commercial division (ER2).

Finally, once the skills gained in this regard have been fully developed, the CDER may well consider giving a new focus to its R&D activities, in order to respond to new concerns related to the ensuing industrial environment.

Key stakeholders:	
Stakeholder	**Role to support the implementation of the assistance**
Centre de développement des énergies renouvelables (Centre for Development of Renewable Energies – *CDER) (CTCN's main partner)*	*The study, implementation, commissioning and running of the plant as a full-scale experimental platform*
Condor Electronics private industrial group	*Provision of the PV modules necessary for the generator (1 MWp) and other components and accessories necessary for construction of the plant*
Public company of an industrial and commercial nature (EPIC Boughezoul)	*Production of a legal framework for the property tax base of the project and contribution to preliminary site improvements as well as subsequent civil engineering works*

Alignment with national priorities (*up to half a page*):

Although it is a hydrocarbon producer (150 Mtoe), two-thirds of which is exported to provide 97 per cent of the country's foreign income, Algeria has begun an energy transition aimed initially at covering at least one-third of its electricity needs through renewable resources by 2030. The programme produced in this regard, approved in 2011 and then updated in February 2015, is already largely under way. This has particularly been the case since the launch of the turnkey construction of some 20 solar PV power plants with a total installed capacity of 343 MWp, which should be commissioned towards the end of this year.

This programme also set other objectives, however, in terms of relying on local capacities for design and construction support, aiming for Algerian companies to make up 60 per cent of those involved. This technical assistance request thus falls clearly within the global framework of the energy transition initiated in Algeria and can rightly be considered strategic. It is a matter of diversifying the country's energy resources by exploiting its very favourable solar energy potential, while at the same time encouraging national economic actors to become involved, by endowing them with the necessary industrial capacity.

Development of the request *(up to half a page)*:

This request has been made following a noted and recurrent deficit in capacity to lead a project to

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construct a solar PV power station, above all in terms of progressing from the study stage to that of its actual industrial construction. This restricts the CDER's ambition (and that of the department to which it reports – the General Department for Scientific Research and Technological Development) to establish a useful bridge between the realm of research and that of industry.

Expected time frame:

Depending on the technical assistance that is finally agreed upon, the intervention could last for a period of six to 18 months. The entire works, up to handover and commissioning of the facility, are estimated to require 24 months.

Background documents:

All documents noted below relate generally to the different legal texts produced for the development and promotion of renewable energies in Algeria. They are thus linked in one way or another to the request made, insofar as this relates to technical assistance for an industrial project that is representative of the national programme for renewable energy development.

- *Mission of the CDER and its partners: http://www.cder.dz*
- *Renewable Energies and Energy Efficiency Programme(PEREE)* http://www.mem-algeria.org/francais/uploads/enr/Programme_ENR_et_efficacite_energetique_fr.pdf http://www.creg.gov.dz/images/stories/PDF/creg15mars.pdf
- *Law No 11-11 of 18 July 2011 on the additional finance law for 2011 increased the level of petroleum royalties that are paid primarily into the National Fund for Renewable Energies and Cogeneration (FNER) from 0.5 per cent to 1 per cent and extended its field of application to cogeneration facilities; [enc]*
- *Executive Decree No 11-423 of 8 December 2011 established the functioning of special allocation account no 302-131: the "National Fund for Renewable Energies and Cogeneration". [enc]*
- *Executive Decree No 13-218 of 18 June 2013 established the conditions for granting premiums for the cost of diversifying electricity production. [enc]*
- *Executive Decree No 13-424 of 18 December 2013 amended and completed Executive Decree No 05-495 of 26 December 2005 on energy audits for high-energy consumption facilities. [enc].*
- *Ministerial Order of 2 February 2014 set the guaranteed purchase tariffs for electricity produced in solar PV-powered facilities and the conditions for their application. [enc].*
- *Ministerial Order of 2 February 2014 set the guaranteed purchase tariffs for electricity produced in wind-powered facilities and the conditions for their application. [enc].*

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Monitoring and impact of the assistance:

☐ *By signing this request, I affirm that processes are in place in the country to monitor and evaluate the assistance provided by the CTCN. I understand that these processes will be explicitly identified in the Response Plan in collaboration with the CTC, and that they will be used in the country to monitor the implementation of CTCN assistance.*

☐ *I understand that, after the completion of the requested assistance, I shall support CTCN efforts to measure the success and effects of the support provided, including its short, medium and long-term in the applicant country.*

Signature de l'Entité Nationale Désignée (END):

Nom: *Noureddine YASSAA*

Organization: *CDER*

Date:

Signature

Directeur du Centre de Développement des Energies Renouvelables

Prof. YASSAA Noureddine