



PROJECT REGISTRATION FORM

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| Project Number: RDG-09-39 | Task Force: Renewable Energy and Distributed Generation |
| Title of Project: CO-OPERATION RESEARCH FOR LONG TERM RELIABILITY OF PV MODULES IN INDIA AND JAPAN | |
| Lead Partner Country: JAPAN | |
| Participating Partner Countries and Organizations: Solar Energy Centre(SEC), Ministry of New and Renewable Energy (MNRE), INDIA & National Physical Laboratories (NPL),CSIR, INDIA | |
| Project Manager Information Name: Dr. Michio Kondo Director, RCPV, AIST Organization: NATIONAL INSTITUTE OF ADVANCED INDUSTRIALSCIENCE AND TECHNOLOGY (ASIT), Address: RCPV, AIST, TSUKUBA, IBARAKI - 305-8568, JAPAN | Phone: + 81-29-861-5792 Fax: + 81-29-861-5829 Email: michio.kondo@aist.go.jp |
| Project Start Date: JULY 2009 | Proposed Project End Date: FEBRUARY, 2010 |
| <p>Description of Project: <i>Please include project context (i.e. opportunity or need for the project) appropriateness under the APP, and expected project outcomes.</i></p> <p>AIST, SEC and NPL propose the project entitled “Researches of long-term reliability of photovoltaic modules in India and Japan” which relates to the long-term outdoor PV module exposure test, performance and degradation analysis, the precise meteorological data acquisition in India, and the fabrication of anti-degradation PV devices suitable for hot and humid conditions like India will be conducted. The outcome of this project will encourage the developments of Indian PV industries to produce more suitable PV modules for hot and humid conditions and more reliable PV modules in such severe conditions.</p> <p>In this project, the precise measurements of meteorological data not only the global irradiance, ambient temperature, humidity, etc. but also the wide range spectrum (350-1700nm) will be conducted in India. Nowadays, there are many kind of photovoltaic devices, and some new devices have the wider band spectral absorption characteristics compared to the traditional Si devices which are commonly used around the world. So, it is needed to collect the precision meteorological data to evaluate the new device performance.</p> | |



Those precise meteorological data will help the PV device design suitable for Indian condition. Moreover, to evaluate the long-term reliabilities of PV modules, those modules must be operated as the same condition as they are used, that is, those modules should be exposed under the maximum power point tracking control (MPPT control). To conduct the exposure test under MPPT control, the switcher unit that switches the MPPT operation to I-V measurement operation by certain intervals not the seasonal but the hourly should be developed. Here, the devices under test are not the module but the array or string under MPPT operation. This interval I-V measurements result in not only the long-term durability test but also the PV energy rating test under the Indian climate. To evaluate those I-V performance results, those measurement equipments including MPPT/IV switcher and the PV arrays are installed both in India and in Japan as like twins. To clarify the degradation mode of PV modules, the accelerated exposure test, the degradation analysis, and the fabrication on the anti-degradation modules will be conducted at Indian institutes.

Project Objectives: *Please provide a clear statement of the purpose or aim of the Project (one sentence).*

The project is intended for development of anti-degradable PV module (life more than 35 years) to perform under the harsh environmental conditions of India and Japan.

Project Deliverables: *Please list outputs to be delivered by this project.*

- (1) A detailed report on the process of field degradation,
- (2) Method and process of fabricating a anti-degradable PV module
- (3) A detailed report containing the data of environmental parameters of India and Japan

Project Milestones: *Please list major milestones (including steps in project methodology) with timing (month/year) and performance indicators.*

Task 1 – Installation of comprehensive meteorological station completed.

Task 2. Meteorological data collected for four months and still continuing.

Task 3. Exchange of information on PV module testing between AIST and SEC completed.

Task 4. PV arrays and MPPT / IV switcher to be installed at SEC.

Task 5. Analysis of the degradation data of PV modules in the light of the weather parameters data to identify the reasons and remedies for the degradation.

Task 6. Fabricate an anti-degradable device (PV module) and carryout the degradation studies in the field as well as in Lab.

Task 7. Submit a report of the findings along with methodology of fabrication of anti-degradable module.

RESOURCES

JPY 69,720,440 NEDO , JAPAN (Approved)

**Other Information:**

National Institute of Advanced Industrial Science and Technology (AIST), Japan

AIST is one of the four qualified laboratories of WPVS (World Photovoltaic Scale), which is an international inter-comparison of primary reference solar cells calibration, and has the experiences of indoor and outdoor measurements and performance analysis. Also, AIST participates in the discussion to formulate the codes and standards at IEC on the power rating and energy rating of photovoltaic modules.

Solar Energy Centre, Ministry of New and Renewable Energy (SEC), India

SEC has already had operational outdoor PV test beds established during the year 2000. SEC has the great experiences of PV module characterization and qualification testing. SEC established all the required facilities for the performance and environmental testing of PV modules.

National Physical Laboratory (NPL), India

NPL has high capabilities to analyze the solar spectrum and to fabricate the novel PV devices. NPL is also keen about the PV calibrations. NPL is involved in solar cell R&D for the last three decades.