

MOU Number: MOU-12-283

Renewable Energy and Energy Efficiency

MEMORANDUM OF UNDERSTANDING

Among

The National Renewable Energy Laboratory
managed and operated by the Alliance for Sustainable Energy, LLC
NREL

and

Fraunhofer-Gesellschaft zur Förderung der Angewandten Forschung e.V.,
as legal entity for its Fraunhofer Institute for Solar Energy Systems
Fraunhofer ISE

And

National Institute of Advanced Industrial Science and Technology
acting through
Research Center for Photovoltaic Technologies
AIST/RCPVT

SUBJECT: Global Alliance of Solar Energy Research Institutes

INTRODUCTION

NREL, Fraunhofer ISE, and AIST/RCPVT are world leading institutes for renewable energy research and development with similar research goals and programs. Through collaborative activities on fundamental, pre-competitive research, the three organizations can leverage resources and expertise in accelerating progress toward shared research goals. The institutions intend to establish a **Global Alliance of Solar Energy Research Institutes**, starting with collaborative activities across the three organizations on solar photovoltaic research with the intent to expand the global alliance to other institutions over time. The three organizations will plan to serve as charter members of this global alliance and intend to develop criteria and procedures for new members and to decide when the global alliance should be expanded to cover other renewable energy research topics.

The National Renewable Energy Laboratory (NREL) is a national laboratory managed and operated by the Alliance for Sustainable Energy, LLC for the United States Department of Energy. Integral to its mission for the U.S. Department of Energy, NREL conducts research and development in renewable energy and energy efficiency technologies and practices, advances related science and engineering, and transfers knowledge and innovation to address the United States' energy and environmental goals. NREL is supported by funding from the U.S. Department of Energy (DOE) Office of Energy Efficiency and Renewable Energy (EERE). Within the PV programs, researchers support the development of new designs and manufacturing processes for solar materials, components, and systems with an emphasis on improved performance, reliability and service life. Long-term research and development is an essential element for cost reduction, improved reliability, and improved performance of technologies currently supported by the Solar

Energy Technologies Program at DOE. NREL's long-term R&D activities include the development of advanced materials and designs for new generation solar PV devices. Collaborative activities among the world's foremost players in the field of solar energy research from Germany, Japan, and the US will lead to a significant acceleration of progress in these fields.

The Fraunhofer Institute for Solar Energy Systems (Fraunhofer ISE) is a part of the Fraunhofer-Gesellschaft, the leading organization for applied research in Europe with more than 20 000 employees in 80 research units, with headquarters in Munich, Germany. With a total staff of more than 1100, including students, Fraunhofer ISE is the largest solar energy research institute in Europe. Fraunhofer ISE is member of and plays a leading role within the Fraunhofer Energy Alliance which brings together the expertise in energy research of several Fraunhofer institutes; furthermore it is closely connected with the Fraunhofer Center for Sustainable Energy Systems (CSE) of Fraunhofer's subsidiary, Fraunhofer USA Inc., located in Cambridge, Massachusetts, USA. Fraunhofer ISE conducts research on the technology needed to supply energy efficiently and on an environmentally sound basis in industrialized, threshold and developing countries. To this purpose, the Institute develops systems, components, materials and processes in the areas of the thermal use of solar energy, solar building, solar cells, electrical power supplies, chemical energy conversion, energy storage and the rational use of energy. The Institute's work ranges from fundamental scientific research relating to solar energy technologies and applications, through the development of production technology and prototypes, to the construction of demonstration systems. The Institute plans, advises and provides know-how and technical facilities as services. More than 90 % of the operating funds of Fraunhofer ISE of about Euro 60 M are based on competitive contracts provided by industry, governmental bodies and the European Commission, about 40% come from industrial contracts alone.

The Research Center for Photovoltaic Technologies (RCPVT) is a research unit of the National Institute of Advanced Industrial Science and Technology (AIST) (hereafter AIST/RCPVT) is focused on the dynamic development of photovoltaic technologies to realize national energy security, a low carbon society, and sustainable economic growth and job creation through a comprehensive and systematic approach. To this end, AIST/RCPVT conducts research on a variety of photovoltaic materials and devices, such as Si, compound semiconductors, organic materials and novel concept materials and develops calibration, measurement and system technologies together with industries, universities, research institutes and certification bodies. AIST/RCPVT consists of about 200 researchers including permanent staff, temporary staff and visiting staff from industry and academia.

NREL, Fraunhofer ISE, and AIST/RCPVT are referred to singly as "Participant" and together are jointly referred to as "Participants."

Desiring synergy among their independently programmed activities in order to advance their mutual interest in promoting advances in solar energy development, the Participants are planning to establish close collaborative activities under a Global Alliance of Solar Energy Research Institutes to bring together the capabilities of the world's leading researchers in the field of solar energy research from Germany, Japan, and the USA: the Fraunhofer ISE, AIST/RCPVT, and NREL, respectively.

This Memorandum of Understanding (MOU) among NREL, Fraunhofer ISE, and AIST/RCPVT memorializes the intent to participate in collaborative activities to maximize the benefit of their respective interests.

Section 1: Organization and Mission

Organization

- a. NREL is a Federally Funded Research and Development Center (FFRDC) managed and operated by the Alliance for Sustainable Energy, LLC for the United States Department of Energy under Contract No. DE-AC36-08GO28308. NREL's participation in the collaborative activities under this MOU is in accordance with the terms of the DOE contract and the DOE FFRDC sponsoring agreement.
- b. Fraunhofer ISE is part of the non-profit Fraunhofer-Gesellschaft which is partly funded by the German Government devoted to applied research. Fraunhofer ISE is located in Freiburg, Germany and operates laboratories in Gelsenkirchen, Halle (CSP, together with Fraunhofer IWM) and Freiberg (THM, together with Fraunhofer IISB).
- c. RCPVT is a research unit operated under the National Institute of Advanced Industrial Science and Technology (AIST) (hereafter AIST/RCPVT). The AIST is a public research institution established as an independent administrative institution and is funded by the Japanese government to a large extent. AIST's competent ministry is the Ministry of Economy, Trade and Industry. AIST/RCPVT's participation in the collaborative activities under this MOU is in accordance with the Act on the National Institute of Advanced Industrial Science and Technology, Independent Administrative Agency (Act No. 203 of December 22, 1999).

Mission

- a. NREL's mission is to enhance energy efficiency and the production of renewable energy to bring clean, reliable and affordable energy technologies to the marketplace. NREL has active programs in solar energy, wind energy, ocean energy, biomass, geothermal energy, utility integration, transportation systems, energy efficiency, and energy analysis and applications. A major stronghold of the National Renewable Energy Laboratory (NREL) lies in the field of solar energy. NREL intends to meet the US' rapidly growing and changing needs for clean energy, blending their considerable expertise and passion for the mission with state-of-the-art equipment housed in leading facilities.
- b. Fraunhofer ISE's objective is to conduct research and technology development which are able to supply energy efficiently and in an environmentally sound basis for everybody – worldwide. The work at the Institute ranges from the investigation of scientific and technological fundamentals for solar energy applications, through the development of production technology and prototypes, to the construction of demonstration systems. The Institute plans, advises and provides know-how and technical facilities and services. The Fraunhofer ISE is integrated into a network of national and international co-operation.
- c. AIST/RCPVT is dedicated to the development of photovoltaic technologies. As one of the global centers for photovoltaic technologies, RCPVT's activities cover research and development of photovoltaic materials, devices and systems, as well as their design, characterization and standardization. To this end, AIST/RCPVT (1) develops device and system technologies under the intimate collaboration with private sectors, (2) performs primary reference cell calibration and neutral characterization of devices and systems, (3) conducts fundamental research for next-generation devices, (4) supports international standardization for healthy growth of PV industry and market in the global scale, and (5) introduces regional innovations, particularly clean energy initiatives for mitigation of the disastrous consequences of the Great East Japan Earthquake in the Fukushima region.

Section 2: Planned Collaborative Activities

- a. The objectives of the collaborative activities planned under this MOU are to accelerate progress toward sharing research and development goals and ensuring the more sustainable use of solar energy. These objectives seek to exploit complementarities among the researchers and capabilities of the Participants.
- b. The primary form of collaborative activities is to be a researcher exchange program where each Participant is to send one to two researchers to each of the other two Participants' facilities for collaborative activities for six months to two years. The visiting researchers are to be core staff members of their respective institution who are conducting leading research and who will build sustained institutional ties.

Section 3: Funding

- a. Unless otherwise determined by writing, each Participant is responsible for the costs it incurs in participating in the collaborative activities contemplated by this MOU, including all administrative costs, overhead expenses, labor costs, insurance costs, travel expenses and similar costs.
- b. This MOU is neither a fiscal nor a funds obligation document. Nothing in this MOU authorizes or is intended to obligate the Participants to expend, exchange, or reimburse funds, services, or supplies or transfer or receive anything of value.
- c. This MOU: (1) is not a contract; (2) is not to be used to obligate or commit funds; and (3) is not to be used as a basis for the transfer of funds.

Section 4: Researcher Exchanges

- a. Each Participant is to be responsible for its own personnel in relation to Researcher Exchanges to carry out collaborative activities under this MOU.
- b. Each Participant's personnel are to adhere to the standard regulations, policies, and procedures of the host institution concerning the regulation of mutual rights and obligations in carrying out collaborative activities under this MOU, including protection of business proprietary information, and other intellectual property, conditions of cooperation and decorum, conditions of security and safety, and all other terms under which personnel are authorized to participate in Researcher Exchanges at the host institution.
- c. Each Participant has sole responsibility for its own personnel in relation to Researcher Exchanges to carry out collaborative activities under this MOU at the host institution, including but not limited to: visa and travel formalities, appropriate insurance (medical insurance and medical evacuation and repatriation insurance), travel expenses, and suitable living accommodation and expenses.
- d. To the extent possible, the host institution is to assist in facilitating travel arrangements of the visiting Participant's personnel in relation to Researcher Exchanges in accordance with the existing procedures governing foreign national access to the host institution. Host institutions should also provide logistical and administrative support for visiting researchers.

Section 5: Dissemination of Information

- a. Each Participant intends to participate in the collaborative activities in a manner that facilitates exchanges of publicly available, non-proprietary business information. Subject to applicable laws and regulations, the Participants intend that information, data, and reports of collaborative activities carried out under this MOU may be released by another Participant with the written concurrence of the other Participants.
- b. Collaborative activities that may involve sharing of business proprietary information and transfer of rights in intellectual property are excluded from the purview of this MOU. In the event it becomes necessary to share business proprietary information, the Participants intend to execute separate non-disclosure agreements.

Section 6: Use of Information

Information transmitted by one Participant to the others under this MOU should be accurate to the best knowledge and belief of the transmitting Participant. No Participant makes any warranty, express or implied, nor assumes any responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe upon privately owned rights.

Section 7: Intellectual Property

The Participants do not intend, or expect, to create intellectual property under this MOU. If it appears that collaborative activities under this MOU may result in the creation of intellectual property, the Participants should enter into a separate written agreement or restructure the collaborative activities to avoid the creation of intellectual property.

Section 8: Future Cooperation

Specific future cooperation derived from the collaborative activities under this MOU, including as appropriate details concerning financial arrangements and the allocation and protection of intellectual property rights, are to be implemented through a separate written agreement between Participants. Such separate written agreement should set forth as appropriate a work plan, staffing requirements, cost estimates, funding sources, a plan for the adequate and effective protection of intellectual property rights and other arrangements or conditions that are not within the purview of this MOU.

Section 9: Review of Collaborative Activities

The Participants intend to review collaborative activities undertaken under this MOU as a means to ascertain their effectiveness, document achievements and lessons learned, recognize technical personnel, and identify and plan areas for future cooperation. This review should take the form of periodic meetings of key technical contacts and management from each Participant to discuss ongoing collaborative activities and future cooperation. Specific commitments developed as future cooperation pursuant to this MOU should be reflected in separate written agreements.

Section 10: Contacts

The Participants' points of contact for all notices, communications and coordination shall be the following individuals, their successors and/or designees:

- a) For the National Renewable Energy Laboratory:
Dr. Dan Arvizu, President and NREL Laboratory Director
Alliance for Sustainable Energy, LLC
15013 Denver West Pkwy
Golden CO 80401
Tel: 303-384-3016
Fax: 303-384-3097
Email: dan.arvizu@nrel.gov
- b) For Fraunhofer ISE
Prof. Ficke R. Weber
Director, Fraunhofer-Institut für Solare Energiesysteme ISE
Chair, Fraunhofer Energy Alliance
Heidenhofstr. 2, 79110 Freiburg, Germany
Phone: +49 (0) 761 45 88-51 20
- c) For AIST/RCPVT:
Dr. Michio Kondo
Director, Research Center for Photovoltaic Technologies, AIST
AIST Tsukuba Central 2, 1-1-1 Umezono,
Tsukuba, Ibaraki 305-8568 Japan
Email: michio.kondo@aist.go.jp

Section 11: Commencement, Revision and Discontinuation

- a. Collaborative activities under this MOU may commence upon the later date of the Participants' signatures, may continue for an initial period of three years, and may be extended for additional periods by the Participants' joint determination in writing.
- b. The Participants may revise this MOU at any time by mutual consent in writing.
- c. The Participants may discontinue this MOU at any time by mutual consent in writing. A Participant that desires to discontinue its participation in this MOU should endeavor to provide the other Participants at least 90 days advance written notice.

Section 12: General Conditions

- a. This MOU is not intended to create any legally binding obligations among the Participants.
- b. This MOU in no way restricts any of the Participants from participating in any activity with any other public or private organization.
- c. This MOU is strictly for internal management purposes for each of the Participants. It is not legally enforceable and shall not be construed to create any legal obligation on the part of any Participant. This MOU shall not be construed to provide a private right or cause of action for or by any person or entity.

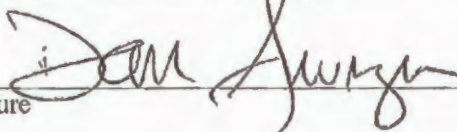
[Signatures on following page.]

Signatures

The Parties hereby acknowledge this MEMORANDUM OF UNDERSTANDING by the following signatures.

For National Renewable Energy Laboratory
managed and operated by the Alliance for Sustainable Energy, LLC for the
United States Department of Energy

Signature



Dan Arvizu

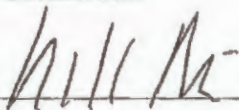
Director, NREL
President, Alliance for Sustainable Energy, LLC

Date

July 10, 2012

For Fraunhofer-Gesellschaft

Signature



Hans-Jörg Bullinger

President of Fraunhofer-Gesellschaft

Date

06.07.2012

Signature



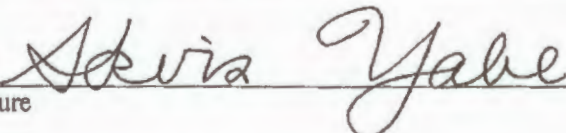
Eicke Weber

Director, Fraunhofer ISE
Chair, Fraunhofer Energy Alliance

Date

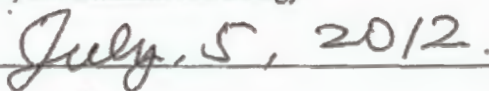
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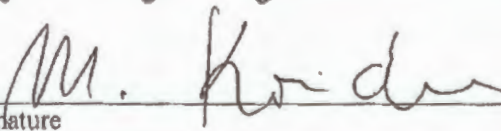
For National Institute of Advanced Industrial Science and Technology
acting through the Research Center for Photovoltaic Technologies


Signature

Akira Yabe


Vice-President
Director-General, Environment and Energy


Date


Signature

Michio Kondo

Director, Research Center for Photovoltaic Technologies


Date