

MEMORANDUM OF UNDERSTANDING

Between

The National Renewable Energy Laboratory, herein referred to as ("NREL") is a national laboratory managed and operated by the Alliance for Sustainable Energy, LLC for the United States Department of Energy (DOE) under Contract No. DE-AC-08GO28308

And

Tamil Nadu Generation and Distribution Corporation Limited (herein after referred as to "TANGEDCO") a wholly owned Government of Tamil Nadu company incorporated under the companies Act, 1956 and having its registered office at 144, Anna Salai, Chennai-60002, Tamilnadu, India (which expression shall unless repugnant to the context or meaning thereof include its successors and assigns).

NREL or TANGEDCO is each referred to as a "Participant." Both NREL and TANGEDCO are collectively referred to as "Participants."

FOR COORDINATION ON ENVISIONING THE TRANSFORMATION OF TAMIL NADU ELECTRICITY GRID

The purpose of this MOU is to encourage coordination in areas of mutual interest and benefit to the Participants. Based on the principles of equality and reciprocity, this MOU is intended to serve as a general framework for planned coordination between the two Participants and is intended to facilitate discussions for the development of a more specific planned program of research and development (R&D) collaboration. Any specific program of R&D collaboration or sharing of confidential information is to be implemented through an appropriate written contract between the Participants.

WHEREAS integral to its mission for DOE, NREL conducts research and development 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 energy, geothermal energy, utility integration, transportation systems, energy efficiency, and energy analysis and applications. DOE achieves its program objectives through federally-funded research and development at NREL in each of the above-listed areas.

WHEREAS TANGEDCO is a wholly owned Government of Tamil Nadu Company incorporated under the Indian Companies Act, 1956, having its registered office at 'NPKRR Maligai' 144, Anna Salai, Chennai - 600002, India, TANGEDCO is responsible for power generation, transmission and distribution throughout the State of Tamil Nadu.

WHEREAS desiring synergy between their independently programmed and funded missions in order to advance their mutual interest, the Participants have reached the following understanding:

Section 1: Areas and Forms of Coordination

1. The shared objectives and outcomes for the independently programmed and funded coordination contemplated under this Memorandum of Understanding (MOU) are focused

on coordination to maximize the benefit to their respective institutional interests. Planned areas of coordination may include:

- Increased understanding of long-term power system planning;
- Increased understanding of technical solutions for electricity distribution companies (DISCOMs) to reliably manage distributed energy resources;
- Increased understanding of distribution network planning and commercial impacts of distributed energy resources;
- Increased understanding of identification of least-cost transmission and generation expansion under a variety of scenarios that reflect business-as-usual and dramatic changes in distributed energy resources, technology costs, and demand;
- Increased understanding of development of a planning and real-time operation platform that seamlessly interconnects and integrates high penetrations of advanced solar PV generation in the existing grid in a safe, cost-effective, secure, and reliable manner, while helping to reduce interconnection approval time; and
- Increased understanding of distribution feeder modeling and design and analysis of next-generation tariffs for distributed energy resources.

2. Planned coordination under this MOU may include:

1. Exchange of published scientific and technical information, publications, and reports;
2. Meetings organized to discuss specific topics identified in Section 1(1) above, including conferences, seminars, and workshops; and
3. Exchange of scientists, engineers, and other specialists for participation in workshops, conferences, seminars, working sessions, and model-development activities. Each Participant should abide by the health, safety, and environmental requirements of the host Participant when on an exchange assignment at the host Participant's facility.

Section 2: Funding

1. The scope of coordination activities under this MOU should be mutually determined in light of time, resources and/or funds available at both institutions for the types of coordination undertaken and by such other financial assistance as may be obtained by either Participant from external sources.
2. Unless otherwise determined by separate writing, each Participant is to be responsible for the costs it incurs in participating in the coordination contemplated by this MOU, including all administrative costs, overhead expenses, labor costs, insurance costs, travel expenses and similar costs.

Section 3: Researcher Exchanges

1. Each Participant is to be responsible for its own personnel in relation to researcher exchanges to carry out coordination under this MOU.
2. Each Participant's personnel are to adhere to the regulations, policies, and procedures of the host institution in carrying out coordination under this MOU, including protection of business proprietary information, protection of intellectual property, compliance with export control laws and regulations, conditions of cooperation and decorum, health, safety and security requirements, and all other terms under which personnel are authorized to participate in researcher exchanges at the host institution.
3. Each Participant is to be solely responsible for its own personnel in relation to matters such as visa and travel formalities, appropriate insurance (medical insurance and medical evacuation and repatriation insurance), travel expenses, and suitable living accommodation and expenses.
4. To the extent possible, the host institution is expected to assist in facilitating travel arrangements of the other Participant's personnel in relation to researcher exchanges in accordance with the applicable procedures governing foreign national access to the host institution.

Section 4: Dissemination of Information

1. Each Participant intends to participate in the coordination in a manner that facilitates exchanges of publicly available, non-proprietary information. Subject to applicable laws and regulations of its country, each Participant may disseminate information, data, and reports of coordination carried out under this MOU.
2. If the Participants decide that a particular activity may lead to the exchange of additional business proprietary information, prior to sharing such additional information, they should consult with each other and make written arrangements for the appropriate handling of such additional information. Such sharing or disclosure of proprietary information should be governed by a separate written Non-Disclosure Agreement.

Section 5: Use of Information

Any information transmitted by one Participant to the other under this MOU should be accurate to the best knowledge and belief of the transmitting Participant.

Section 6: Intellectual Property

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

Section 7: Future Collaboration

Any specific future collaboration that may involve the conduct of collaborative research and development, including the exchange of intellectual property of confidential information, or

the transfer of funds is to be implemented through an appropriate written contract between the Participants. Any such contract should include a work plan, staffing requirements, cost estimates, funding sources, the adequate and effective protection and allocation of intellectual property rights, and other arrangements or conditions; and must be authorized under NREL's Management and Operating Contract.

Section 8: Review of Coordination

The Participants intend to review the coordination 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 potential future collaboration. This review should take the form of periodic meetings of representatives of each Participant to discuss ongoing coordination and to identify and plan potential future collaboration.

Section 9: Contacts

1. All notices, communications and coordination should involve, at a minimum, the following individuals, their successors and/or designees as follows:

- (a) For NREL:

David Palchak, Engineer
15013 Denver West Parkway
Golden, CO 80401
Telephone: 1 303 384-7456
e-mail: David.palchak@nrel.gov

- (b) For TANGEDCO:

The Chief Engineer/Grid Operation
Load Despatch Centre Building,
No.144, Anna Salai,
Chennai – 600002, India
Phone nos: CE/Grid Operation : 044-28521509
SE/System Studies : 044-28520820
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The Chief Engineer/Commercial
2nd floor, Western wing,
NPKRR Maaligai,
No.144, Anna Salai,
Chennai – 600002, India
Phone no.: CE/Commercial : 044-28520496
e-mail: cecoml@tnebn.net
secoml@tnebn.net

Section 10: General Considerations

1. This MOU is not intended to create any legally binding obligations between the Participants.
2. Each Participant should conduct the coordination contemplated by this MOU in accordance with applicable laws and regulations (including export control laws) to which it is subject and international agreements to which its Government is party.

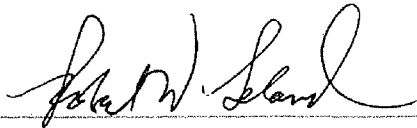
Section 11: Commencement, Modification and Discontinuation

1. Coordination under this MOU may commence upon signature and may continue for an initial period of two (2) years unless discontinued in accordance with Section 11(3) below.
2. The Participants may modify or extend this MOU at any time by mutual consent in writing.
3. The Participants may discontinue coordination under this MOU at any time by mutual consent in writing. Alternatively, a Participant that desires to discontinue its participation in this MOU should endeavor to provide the other Participant at least 90 days advance written notice.

Signed in duplicate.

For
National Renewable Energy Laboratory:

For
TANGEDCO:



Robert Leland
Associate Laboratory Director



(Er. B. KANCHANA)

SUPERINTENDING ENGINEER/PLANNING (i/c)
TANGEDCO
N.P.K.R.R. MAALIGAI, 6th FLOOR,
144, ANNA SALAI, CHENNAI - 600 002.

Date 1/21/2020
Place National Renewable Energy Lab
Golden, CO

Date 07/02/2020
Place CHENNAI

For
National Renewable Energy Laboratory:

BY Amy Rose

Title _____

Date 2 Feb 2020

Place Chennai