

MOU Number: MOU-18-502

MEMORANDUM OF UNDERSTANDING

Between

The National Renewable Energy Laboratory, 15013 Denver W Pkwy, Golden, CO 80401, USA

And

Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V., Hansastr. 27c, 80686 München, Germany as legal entity for its

Fraunhofer Institute for Energy Economics and Energy System Technology IEE

Kassel, Germany

For coordination on Research of Renewable Energy Resources with a focus on Wind Energy

INTRODUCTION

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 (DOE) under Contract No. DE-AC36-08GO28308.

The Fraunhofer Institute for Energy Economics and Energy System Technology (Fraunhofer IEE) is a research institute of the Fraunhofer-Gesellschaft, which is the leading organization for applied research in Europe. Research activities are conducted by 72 institutes and research units at locations throughout Germany. Fraunhofer IEE has established itself in the fields of energy economics and energy system technology.

As part of its mission for DOE, NREL conducts research and development on 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, and energy efficiency. NREL has conducted wind plant performance and operation and maintenance research in recent years. NREL has also focused on turbine reliability assessment from both physics and data domains, and analysis of gearbox component loads and stresses using multibody simulation software.

As part of its mission, the Fraunhofer IEE has focused on wind plant performance and reliability research since as early as 1989. The main focus has been with respect to reliability data collection, analysis, and plant operation and maintenance and has become a credible hub in these areas globally.

NREL or Fraunhofer IEE is each individually referred to as "Participant" and collectively as "Participants."

The Fraunhofer IEE and NREL have conducted renewable energy research with a focus on wind energy for many years. They have cooperated informally by exchanging professionals and



invitations to hosted events of mutual interest. In the past, the research goals of the Participants overlapped in areas such as wind turbine reliability and wind plant operation & maintenance, grid stability, economic and technical analysis. Continued research into all these areas is of mutual interest to the Participants.

The purpose of this MOU is to encourage coordination in areas of mutual interest and benefit 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.

Section 1: Areas of Coordination and Collaboration

1. The coordination activities planned under this MOU, and the programs of collaboration contemplated in furtherance of, are focused on cooperation to maximize the benefit of each Participant's respective institutional interests, which may include an increased understanding of following selected topics:
 - Reliability data collection and analysis
 - Wind plant operations & maintenance
 - Energy meteorology and resource assessment
 - Electrical grids
 - Energy economics and system design

Section 2: Forms of Coordination

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, including conferences, seminars, and workshops;
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 3: 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 the Participants otherwise determine in a separate written agreement, 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 4: Researcher Exchanges

1. Each Participant retains responsibility for its own personnel in relation to researcher exchanges to carry out coordination under this MOU.
2. Each Participant's personnel should abide by the regulations, policies, and procedures of the host Participant in carrying out activities under this MOU, including protection of business proprietary information, protection of intellectual property, compliance with export control laws and regulations, conditions of coordination and decorum, health, safety, and security requirements, and all other terms under which personnel are authorized to participate in researcher exchanges at the host Participant's facility. Such activities may require entry into separate written agreements.
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 Participant should assist in facilitating travel arrangements of the other Participant's personnel in relation to researcher exchanges in accordance with its applicable procedures governing foreign national access to the host Participant's facility.

Section 5: Dissemination and Use of Information

Each Participant intends to participate in the coordination in a manner that facilitates exchanges of publicly available, non-proprietary business information. Subject to applicable laws and regulations of its country, each Participant may disseminate information, data, and reports of the coordination carried out under this MOU.

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

Section 6: Intellectual Property

The Participants do not anticipate the transfer of rights in intellectual property or the sharing of confidential information to occur under any planned coordination activity under this MOU.

Section 7: Future Collaborations

Any specific future research and development collaboration or the transfer or commitment 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. Furthermore, such contract must be authorized under NREL's Management and Operating Contract and comply with Fraunhofer's policies.

Section 8: Review of Coordination

The Participants intend to review the coordination undertaken under this MOU as a means to ascertain its effectiveness, document achievements and lessons learned, recognize technical personnel, and identify and plan areas for potential future collaboration that involves the conduct of research and development. This review should take the form of periodic meetings

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of representatives of each Participant to discuss ongoing coordination and to identify and plan future collaboration that involves the conduct of research and development activities.

Section 9: Contacts

One or more designated representatives from each Participant should oversee, manage and facilitate implementation of this MOU in cooperation with each other on behalf of their respective institutions. All notices, communications and coordination should involve, at a minimum, the following individuals, their successors and/or designees as follows:

(a) For the National Renewable Energy Laboratory:

Shawn Sheng
National Wind Technology Center
15013 Denver West Parkway
Golden, CO 80401
Tel: 1 303 384-7106
Shuangwen.sheng@nrel.gov

b) For Fraunhofer IEE:

Prof. Dr. Kurt Rohrig, Deputy Director
Königstor 59
Kassel, D-34119
Germany
Tel: +49 561 7294-330
eMail: kurt.rohrig@iee.fraunhofer.de

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 to which it is subject and international agreements to which its government is party.

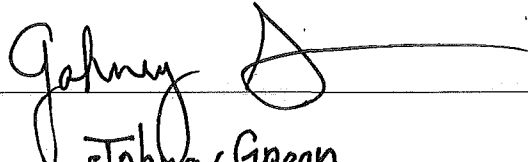
Section 11: Commencement, Modification and Discontinuation

1. Coordination under this MOU may commence upon signature, and may continue for a period of two (2) years, unless discontinued in accordance with paragraph 3 of this section.
2. The Participants may modify 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.

[signatures on the following page.]

Signed in duplicate.

For
The National Renewable Energy Laboratory


John Green

(Printed name of signatory)

Associate Laboratory Director
Mechanical and Thermal Engineering Sciences

Title

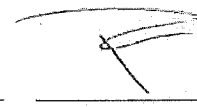
June 29, 2018

Date

Golden, CO, USA

Place

For
Fraunhofer-Gesellschaft e.V.


Thomas Fischer

(Printed name of signatory)

Head of Department Legal Counsel
R&D Contracts

Title

June 28, 2018

Date

München

Place



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