Standards Support & International Engagement

2019 Wind Program Peer Review

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April 30 – May 2, 2019
International Engagement

• Standards
• Collaborative Research and Development
Why standards?

• Internationally recognized standards are needed to:
  – assure minimum levels of safety,
  – remove market barriers,
  – provide high quality reproducible test results.

• Where needed: supplemented with domestic standards to address US specific needs.

• Benefits of standards:
  – Objective design criteria based on industry experience
  – Open markets (global design requirements)
  – Assist with removal of deployment barriers (e.g. noise)
  – Standard products – volume manufacturing
  – Feedback from field performance to design requirements

Lower Risk

Lower LCOE
Standards Organizations

• International Electrotechnical Commission (IEC)
  – Technical Committee (TC) 88 – wind energy generation systems
    • TC-88 Chair, Jeroen Van Dam, NREL
    • US Technical Advisory Group (TAG)
      – Conformity Assessment Board (CAB) – issues certificates

• American National Standards Institute (ANSI)
  – American Wind Energy Association (AWEA)
Standards revision cycle and terminology

- NP or NWIP: New Work Item Proposal
- CD: Committee Draft
- CDV: Committee Draft for Voting
- FDIS: Final Draft International Standard
- MT: Maintenance Team

Typical Standards revision cycle 3-5 years.
Wind Standards - Technical Approach

• Actively participate in international and domestic standards development.
• Leverage knowledge developed in other parts of the program.
• Understand issues industry is struggling with and what the boundaries of our knowledge are to help define R&D needs.
IEC & TC88

IEC is the main focus of the activities

- International Electrotechnical Commission (www.iec.ch)
- Most widely accepted international wind turbine standards
- TC88 responsible for wind turbine specific standards: 61400 series
- TC88 has 22 participating countries and 13 observer countries
- US TAG (Tech Advisory Group) manages US contributions through ANSI.

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International Energy Agency
Wind Technology Collaboration Program
Mission of IEA Wind

“...to stimulate co-operation on wind energy research and development and to provide high quality information and analysis to member governments and commercial sector leaders by addressing technology development and deployment and its benefits, markets, and policy instruments.”

– IEA Wind Strategic Plan
IEA Wind has broad membership

OECD Participating Countries:

Europe:
- Austria, Denmark, Finland, Germany, Greece, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom, and the European Commission

North America:
- Canada, Mexico, and the United States

Asia and Pacific:
- Australia, Chinese Wind Energy Association, Japan, and South Korea

International Organizations (sponsors):
- Chinese Wind Energy Association and the European Wind Energy Association
Membership Represents 85% of Global Capacity

- Austria
- Belgium (2015)
- Canada
- Chinese Wind Energy Assoc.
- Denmark

- European Commission
- Finland
- France (2015)
- Germany
- Greece
- Ireland

- Italy
- Japan
- Korea
- Mexico
- Netherlands
- Norway
- Portugal
- Spain
- Sweden
- Switzerland
- United Kingdom
- United States
- WindEurope
Active Research Tasks of IEA Wind

- Life Extension (Task 42)
- Enabling Distributed Wind (Task 41)
- Downwind Turbine Technology (Task 40)
- Quiet Wind Turbine Technology (Task 39)
- Systems Engineering (Task 37)
- Forecasting (Task 36)
- Environmental Assessment and Monitoring for Wind Energy Systems (Task 34)
- Lidar: Wind lidar systems for wind energy deployment (Task 32)
- WAKEBENCH: Benchmarking wind farm flow models (Task 31)
- Dynamic Codes and Models for Offshore Wind Energy (Task 30)
- Aerodynamic Data Analysis of the EU MEXICO Project (Task 29)
- Social Acceptance of Wind Energy Projects (Task 28)
- Cost of Wind Energy (Task 26)
- Power Systems with Large Amounts of Wind Power (Task 25)
- Wind Energy in Cold Climates (Task 19)
- Base Technology Information Exchange (Task 11)
16 Active Tasks – 2014-2019 Priority Areas

1) WIND CHARACTERISTICS
- 2010: Task 31 - WAKEBENCH
- 2011: Task 32 - Lidar for Wind Energy
- 2016: Task 36 - Forecasting

2) WIND POWER TECHNOLOGY
- 1987: Task 11 - Base Technology Information Exchange
- 2001: Task 19 - Wind Energy in Cold Climates
- 2008: Task 27 - Small Wind Turbines in Turbulent Sites
- 2008: Task 29 - Mexnext Aerodynamics
- 2010: Task 30 - Computer Codes and Models for Offshore Wind Energy (OC5)
- 2013: Task 35 - Full Size Ground Testing
- 2018: Task 39 - Quiet Wind Turbine Technology
- 2018: Task 40 - Downwind Turbine Technologies

3) WIND INTEGRATION
- 2005: Task 25 - Power Systems with Large Amounts of Wind Power
- 2015: Task 37 - Systems Engineering

4) SOCIAL, EDUCATIONAL and ENVIRONMENTAL ISSUES
- 2008: Task 26 - Cost of Wind Energy
- 2013: Task 34 - Environmental (WREN)
- 2019: Task 34 - Environmental (WREN)

5) COMMUNICATIONS
- 2011: Communication Strategy

Completed Term
Current Term
Recommended Practices: Basis for Standards

- Recommended practices serve as guidelines in advance of formal standards
- 16 recommended practices have been issued
DOE International Partnership Agreements (NREL example)

- NREL has 50+ active agreements with international partners
- $55.8M of total international contract value
  - $10.9M of international funds to NREL
  - $12.9M of DOE shared resources
  - $32.0M of international partner shared resources

International partnerships are critical for advancing R&D and commercializing innovation because wind is a global industry dominated by large international corporations.
DOE International Researcher Exchanges

- International researcher exchanges are essential to staying at the forefront of innovation and working with the best and brightest
- Exchanges are done through CRADAs, MOUs, and other agreements
- Typical researchers are graduate level Masters or PhD students, PostDocs, or Professionals (Professors, researchers at Research Centers)

Latha Sethuraman
- University of Edinburgh, UK
- NREL PostDoc
- Now NREL Staff Member

Javier Sanz Rodrigo
- National Renewable Energy Centre (CENER), Spain
- NREL Visiting Professional

Dries Allaerts
- KU Leuven, Belgium
- NREL PostDoc

David Schlipf
- University of Stuttgart, Germany
- NREL Visiting Professional

Liz McMaster
- University of Florida, USA
- NREL Post Undergraduate
- Accepted to European Wind Energy Master Program - Technical University Denmark

Pietro Bortolotti
- Technical University of Munich, Germany
- NREL PostDoc
- Now NREL Staff Member