

## Accelerating the Integration of Variable Generation into Utility Power Systems



The appeal and economics of wind and solar power have never been stronger, but these unique forms of generation require special engineering and operating strategies. These sophisticated plants require specialized technical knowledge.

Your organization's success depends on its understanding of the technical needs and changing dynamics of the wind and solar industries.

**UWIG** is the leading resource for technical know-how about integration of variable generation. **UWIG** is the only organization exclusively focused on delivering technical knowledge and information about interconnection and operation of these plants on electric power systems.

**"You get a good introduction into the wind energy markets, who the players are, and what the issues are. The networking about what goes on with specific pieces of equipment is excellent."**

— Henry Durrwachter, Luminant

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## Annual Membership Dues

(based on gross revenue)

### Regular (Utility/ISO) Members

- \$ 5,000 (greater than \$300 million)
- \$ 2,000 (\$30 million to \$300 million)
- \$ 1,000 (less than \$30 million)

Regular members have voting privileges, are represented on the **UWIG** Board of Directors, and can participate in all **UWIG** technical meetings, business meetings, and workshops.

### Associate (Corporate) Members

- \$2,000 (greater than \$1 million)
- \$ 1,000 (less than \$1 million)
- \$ 500 (Academic/Government Members/  
Individual Consultants)

Associate members receive all of the **UWIG** benefits other than voting privileges and representation on the **UWIG** Board of Directors.

**For membership applications and information, visit [www.UWIG.org](http://www.UWIG.org).**

### Ways to Contact **UWIG**

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Reston, VA 20195  
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In cooperation with the U.S. Department of Energy

## Connect to Variable Generation With Confidence



*Have Questions About Wind or Solar Power?  
**UWIG** Has the Answers*



## Gain New Knowledge From Industry Experts

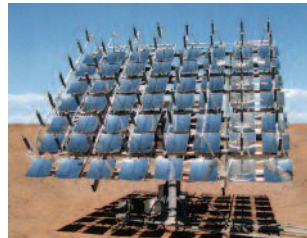
Formed in 1989 by a group of utilities, **UWIG** provides excellent peer-to-peer networking for its members. It annually hosts technical meetings, workshops and a short course; publishes technical papers and reports; conducts specialized research and development and offers a variety of resources on its Web site, [www.UWIG.org](http://www.UWIG.org).

**“UWIG is the premiere technical resource on variable generation, their work on forecasting being the most recent example.”**

— Dale Osborn,  
Midwest ISO

**UWIG** can benefit your organization by helping you:

- Move up the learning curve. Head off problems, and quickly resolve issues that do come up.
- Learn about forecasting output from these variable generation resources.
- Understand how evolving grid codes impact variable generation plant behavior.
- Better predict how these plants will interact with conventional generating units.
- Take advantage of tools for modeling wind turbines in load flow and stability analyses.
- Understand voltage regulation and flicker issues from variable generation plants on distribution systems.
- Understand the pros and cons of different wind turbine and PV plant sizes and locations on distribution systems.



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**UWIG** has expanded its technical outreach, offering members six user groups including a new Solar Integration user group.

- Wind Plant Modeling and Interconnection
- Operating Impacts and Integration Studies
- Distributed Wind Applications
- Market Operation and Transmission Policy
- Wind Turbine Operations and Maintenance
- Solar Integration

An organization would have to spend tens of thousands of dollars every year to try to duplicate the research results and knowledge base available through membership in **UWIG**. Membership also provides valuable access to colleagues who have direct experience in variable generation. All industry participants — utilities, ISO/RTOs, project developers, turbine and panel vendors and consultants — receive value from their membership in **UWIG**.

Get the engineering know-how you need to be effective. Put **UWIG's** experience and technical depth to work in your organization! Fill out a membership application, available at [www.UWIG.org](http://www.UWIG.org), and join today.

**“There is no other place in the country where wind turbine owners can meet with their counterparts and have a detailed and candid discussion on O&M experiences.”**

— Billy Joe Cutsor,  
Municipal Energy Agency of Nebraska



Basin Electric Power Cooperative

## How UWIG Research Is Helping Utilities Today

### Understand the System Impact of Variable Generation

Utilities need a good understanding of the full impact of operating variable generation on their system. **UWIG** sponsored the first-ever comprehensive study of the cost of ancillary services associated with wind plant operation. This ongoing activity addresses time scales ranging from system regulation (seconds to minutes), up to and including unit commitment (hourly scheduling up to one week in advance).

### Assessing Distribution System Impacts

Many utilities must understand the system impacts of single variable generation installations and clusters of generators on distribution feeders. **UWIG's** Distributed Generation Impacts Project has brought clarity to key issues such as voltage regulation, flicker, coordination of overcurrent protection devices, economics and is expanding its treatment of solar applications.

**“UWIG represents the utility's perspective. It's a competent technical group that can assess the cost impacts of variable generation on a utility system.”**

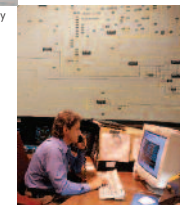
— Brad Reeve,  
Kotzebue Electric  
Association



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Masterfile



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