



# Wind Turbine Risk Assessment

**EQECAT Serves the Global Property and Casualty Insurance, Reinsurance and Financial Markets**

EQECAT, Inc. provides state-of-the-art products and services to the global property and casualty insurance, reinsurance and financial markets. EQECAT is the technical leader and innovator of catastrophe risk management models that quantify exposure to a range of natural and man-made catastrophic risks.

Through its modeling software platform, **WORLDCATenterprise™**, EQECAT enables clients to quantify and manage the potential financial impact of natural hazards. **WORLDCATenterprise** includes 181 natural hazard software models for 95 countries spanning six continents. These models are based upon innovative applications of the latest science, engineering expertise, claims and exposure data and advanced mathematics.

EQECAT, a subsidiary of ABSG Consulting Inc., was founded in 1994 and is headquartered in Oakland, California. Contact EQECAT, Inc. for additional information.

## **EQECAT, Inc.**

Americas/Bermuda: 201-287-8320  
UK/Europe/Asia: +44 207 265 2030

information@eqecat.com ■ www.eqecat.com

## **ABS Consulting**

AN ABS GROUP COMPANY

ABS Consulting is a global safety, risk and integrity management company with broad experience completing challenging projects worldwide in the oil and gas, chemical process, nuclear, renewable energy, government, maritime and mining industries. ABS Consulting has offices in 28 countries and over 1,300 employees worldwide.

### **Corporate Headquarters**

16855 Northchase Drive  
Houston, TX 77060  
Tel: (281) 673-2800  
Fax: (281) 673-2950

info@absconsulting.com ■ www.absconsulting.com

**Comprehensive  
Risk Assessment  
Worldwide**

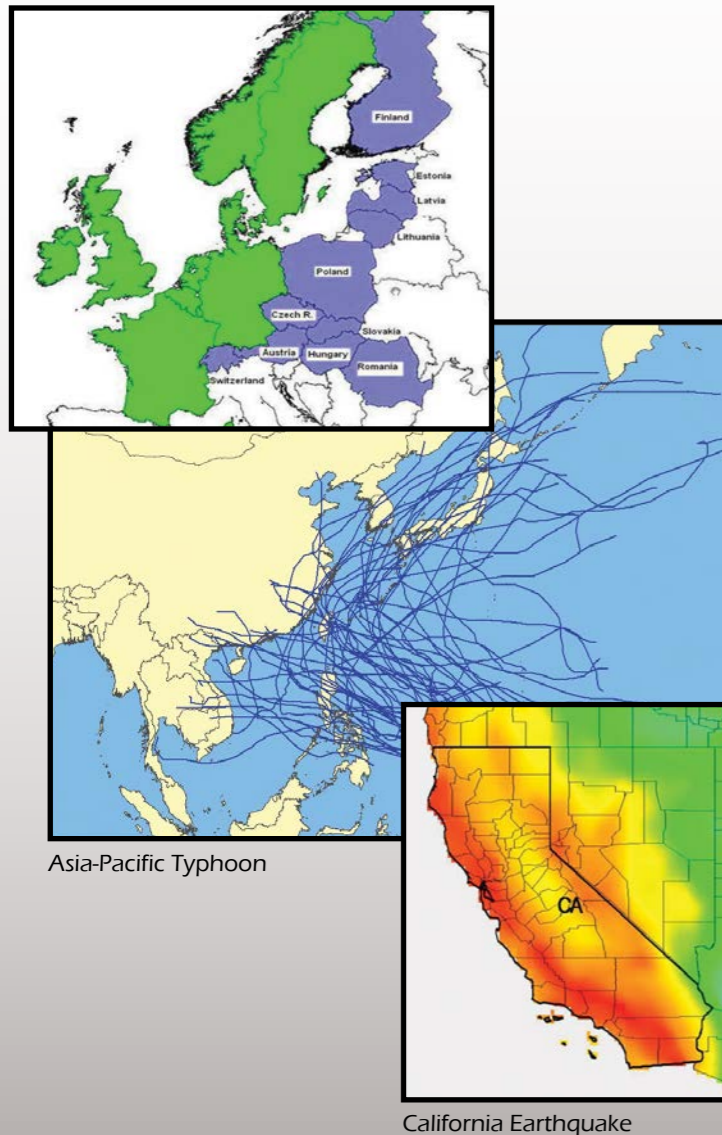


# Worldwide Wind Turbine Risk Assessment

EOECAT, in conjunction with ABS Consulting, offers a unique combination of high-end engineering, project certification, technical due diligence, risk assessment, insurance and risk transfer services to the wind power market.

We provide probabilistic loss assessment for all components of wind turbines for extreme wind, storm surge and wave action, and earthquake risk. Outputs include expected loss, uncertainty and return period loss estimates.

North-Sea Windstorm and Surge



North Palm Spring, CA Earthquake 1986 - damaged wind turbine (EOECAT, 1986)

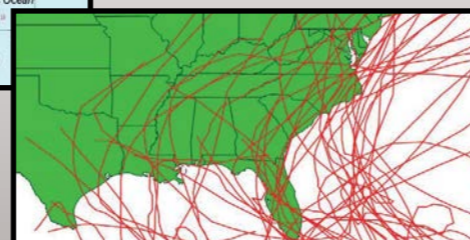
## Vulnerability Model Developed by Engineering Studies

In collaboration with ABS Consulting, EOECAT uses a "ground-up" engineering approach in the development of wind turbine vulnerabilities, incorporating;

- Failure modes of turbines, blades, nacelles, tower supports and foundations
- Manufacturing processes, and control system effects
- Historical performance incorporated into vulnerabilities
- Extreme natural hazard performance measures



Japan Earthquake



Gulf Atlantic U.S. Hurricane

EOECAT draws upon ABS Consulting's expertise in:

- Project Certification and Verification (CVA)
- Turbine component certification/certificates of compliance
- Wind resource assessment
- Wind plant layout optimization
- Third-party independent engineering and inspection
- Turbine maintenance optimization
- Equipment reliability assessment



Typhoon Maemi, Japan 2003 - damaged wind turbines (Ishihara et al., 2005)

## Applications

- Insurance and risk transfer
- Project finance
- Capital markets

## Risk Modeling Process

### Asset Attributes

- Locations, lat-lons
- Values
- Design bases
- Site conditions

### Hazards

- Wind
- Storm surge and wave action
- Earthquake

### Vulnerability

- Blades
- Nacelle
- Towers
- Foundations

### Risk of Loss

- Loss exceedance curve
- Expected annual loss