

Breakout Session

Customized Severe Convective Storm Risk Modeling

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AEGIS

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AEGIS

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Director of Risk Management

Southern Company

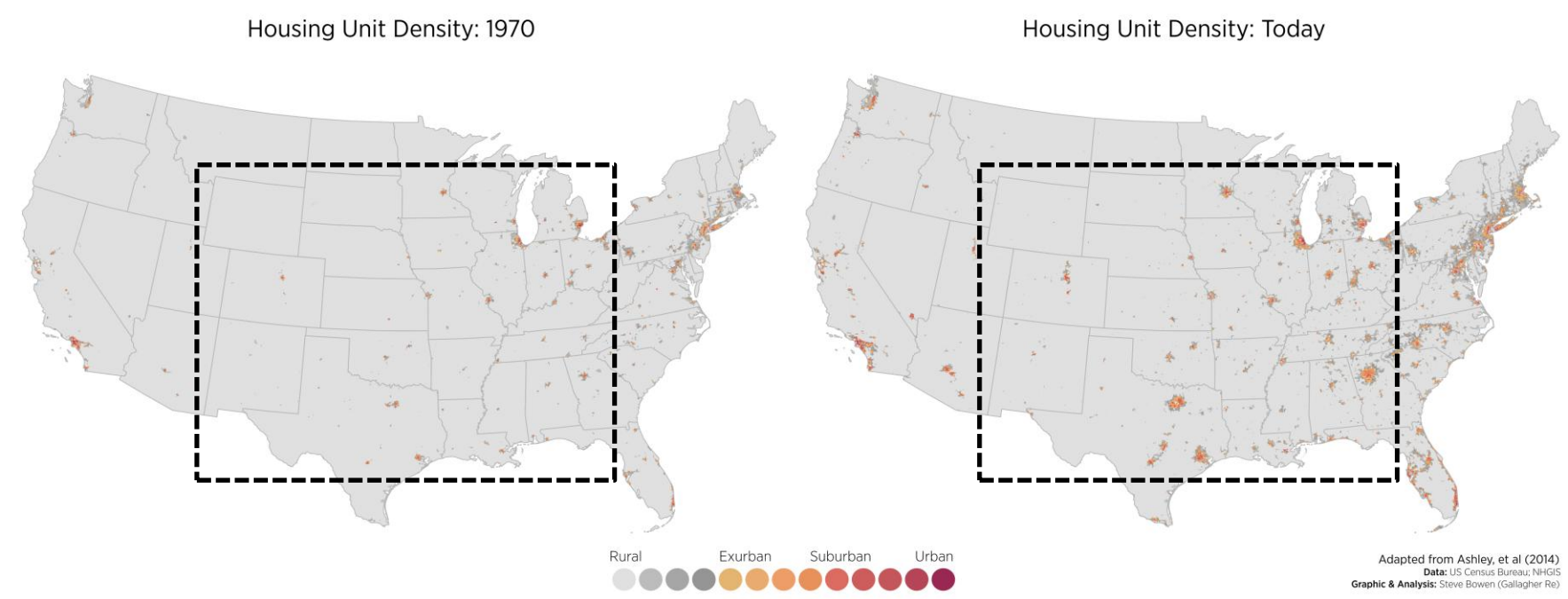
Arjun Jayaprakash

Principal Engineer

Karen Clark & Company

Multi-billion dollar events are increasing in frequency

SCS has accounted for 42% (>USD500 billion) of all U.S. insured losses since 2010;
Tropical Cyclone “just” 29%” – Gallagher Re



KCC: Innovation Leader in Weather, Climate, and Catastrophe Risk Modeling



Multidisciplinary team of PhD scientists and engineers spanning the fields of:

Atmospheric Science
Geophysics/Seismology
Hydrology
Wind engineering

Structural engineering
Earthquake engineering
Statistics/data science



KCC delivers scientifically advanced, high-resolution, and accurate models for:

Tropical cyclones
Extratropical cyclones
Earthquakes
Severe convective storms

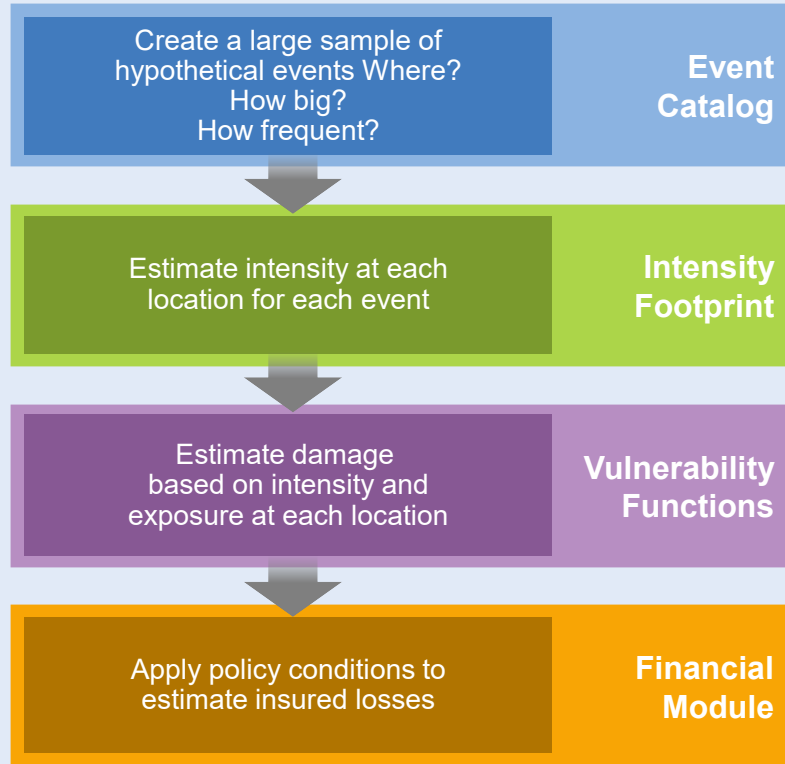
Winter storms
Wildfires
Floods



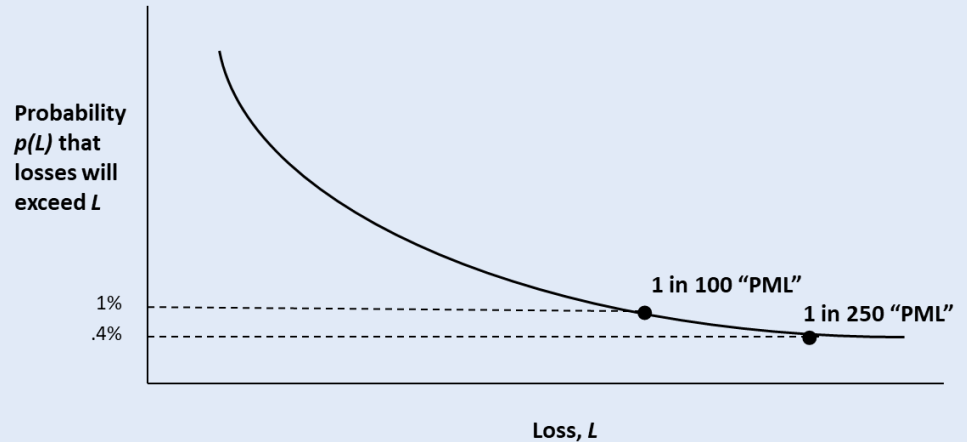
KCC models and software applications are used by the world's leading financial institutions

Top 10 P&C insurers
Regional and super-regional insurance companies
Reinsurers, banks, and ILS investors

KCC Models Provide Critical Insurance Loss Metrics

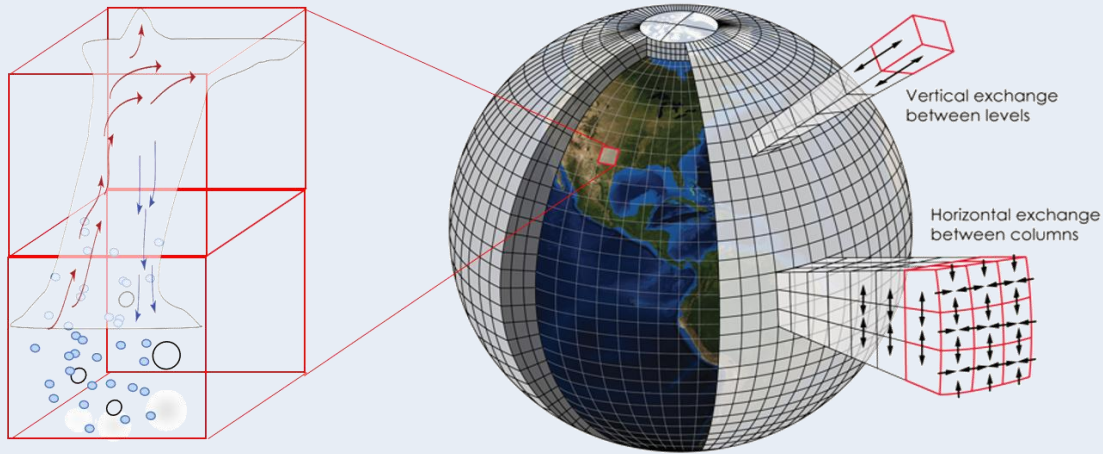


Exceedance Probability (EP) Curve

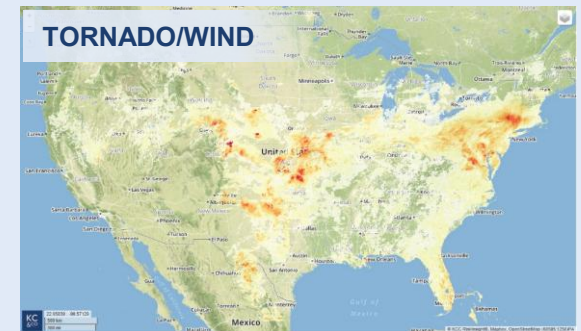


How KCC Scientists Built an Accurate SCS Model: Start with Advanced and Innovative Scientific Techniques

KCC scientists developed a **physics-based** modeling methodology (NWP), that captures all impacts of severe weather across the entire affected area

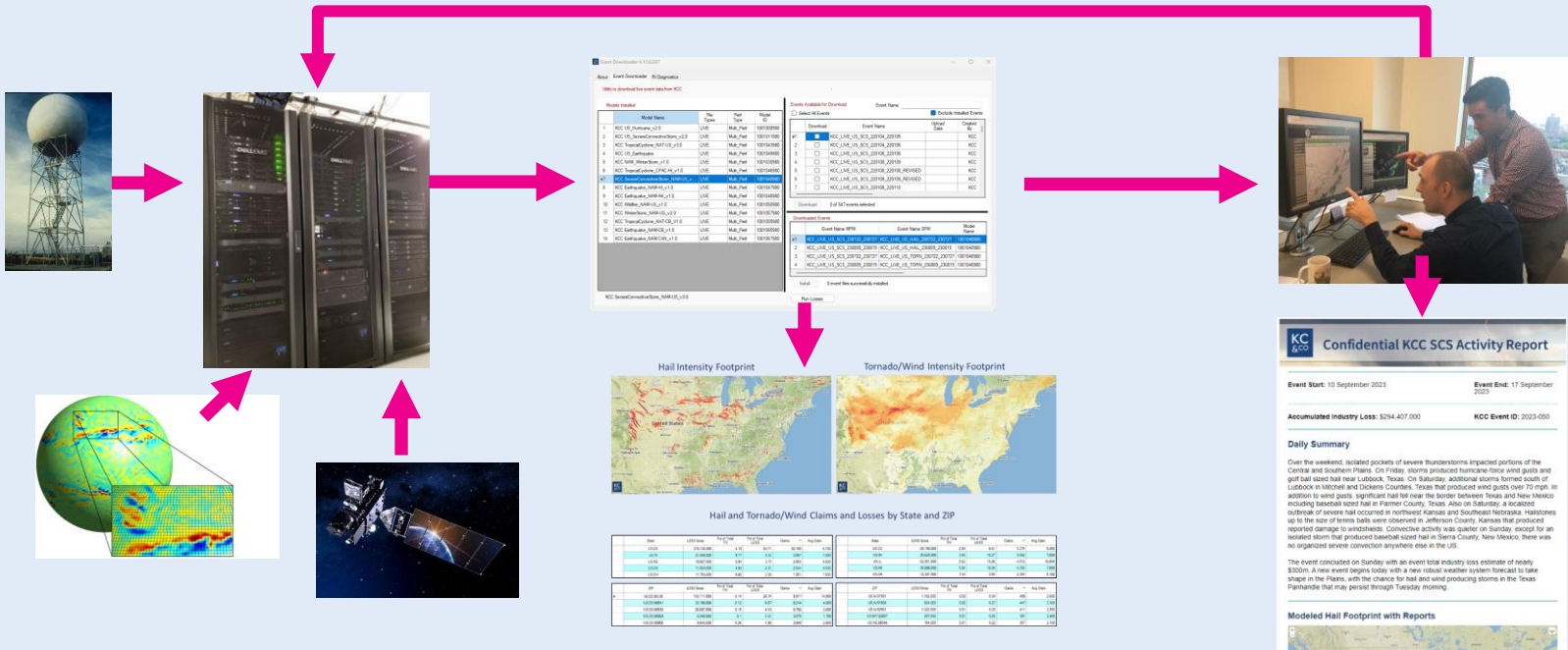


High-resolution footprints capture all claims

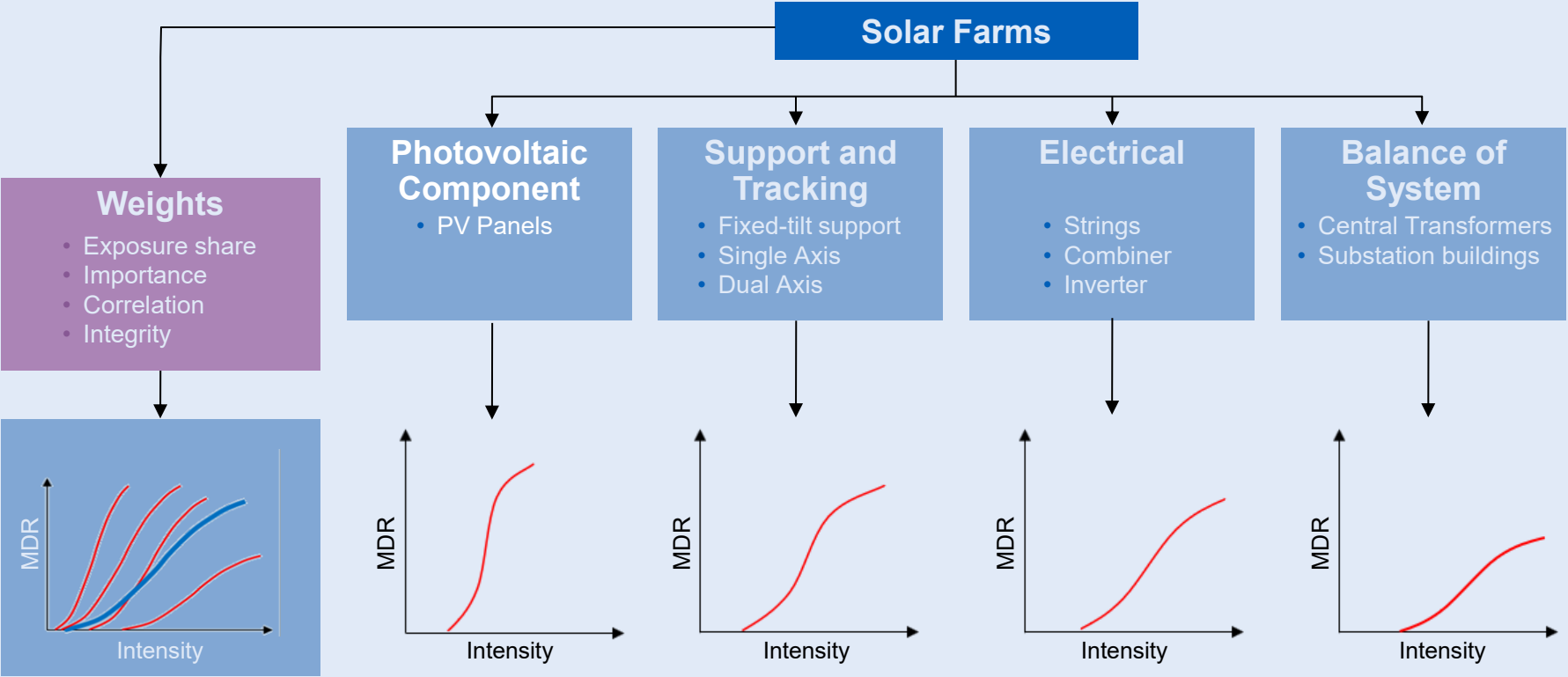


Advanced Science Combined with Continuous Model Verification: KCC LiveEvents

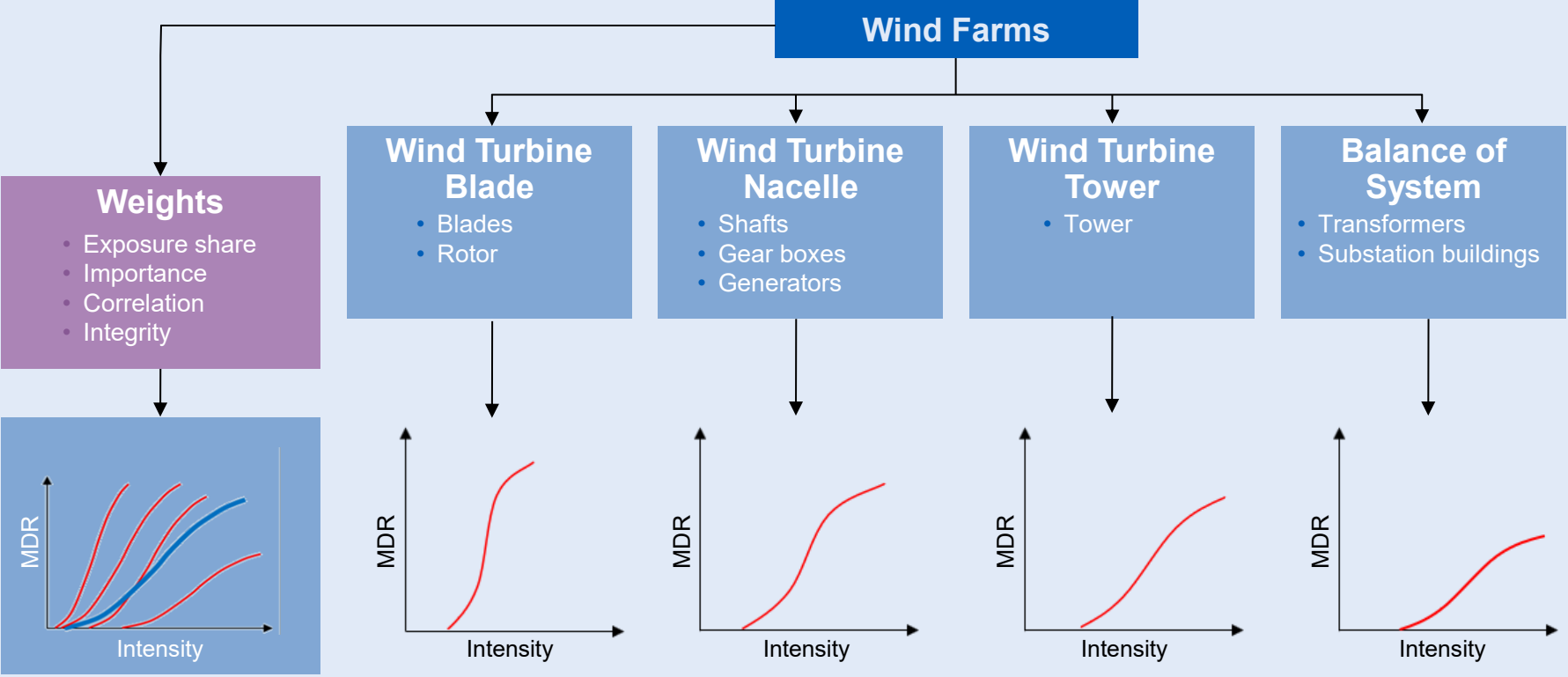
KCC automatically downloads and archives ~30 GB of data per day to support SCS LiveEvents



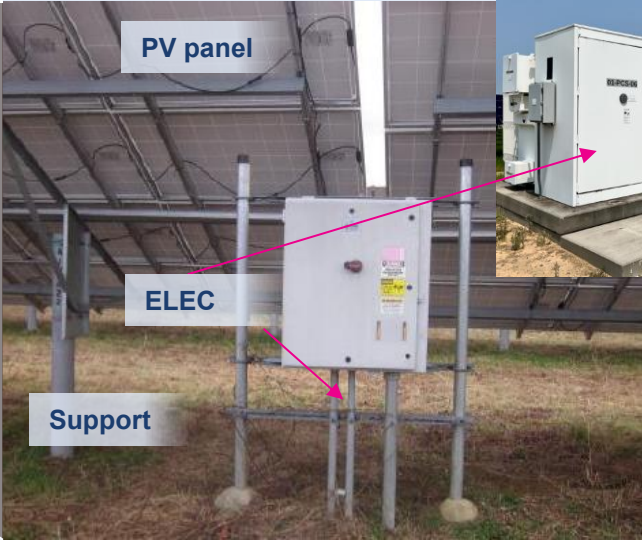
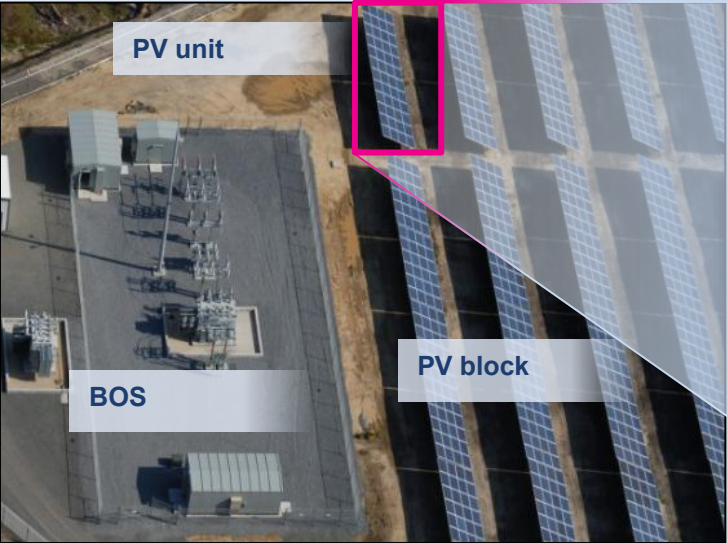
Component-Based Vulnerability Method for Solar Farms



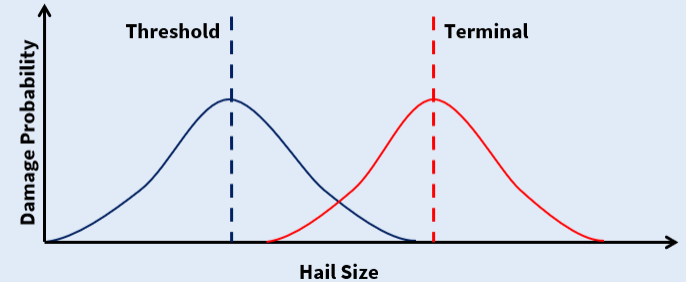
Component-Based Vulnerability Method for Wind Farms



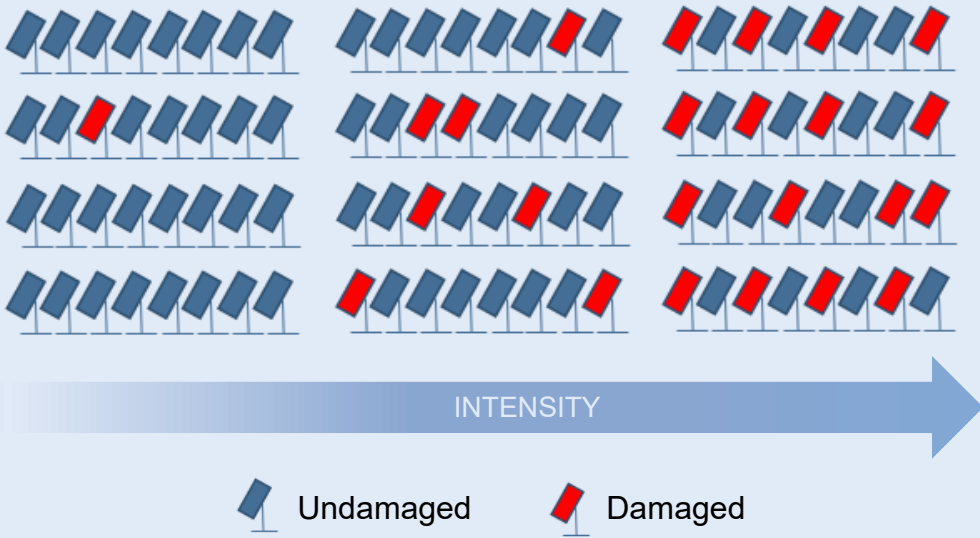
Major Components of Solar Farms



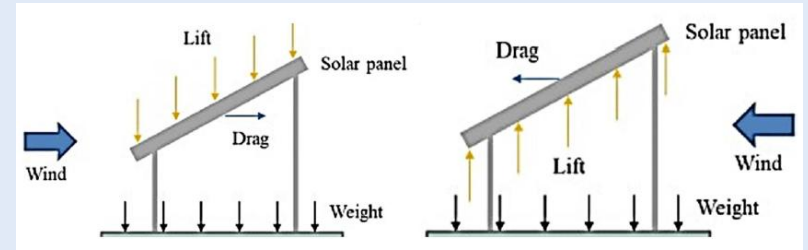
Hail Damages the PV Panels But Not Mounting Frame or Electrical Components



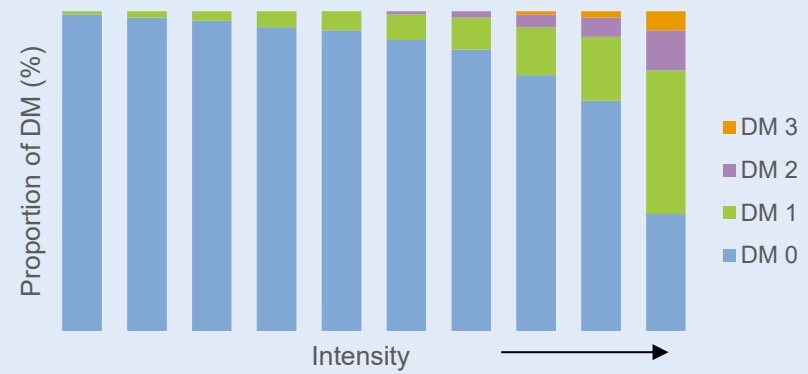
Upscaling Mean Damage Ratio from PV Unit Level to Solar Farm Level



Wind Impact Can Result in Different Damage Modes



Khan et al. (2023)

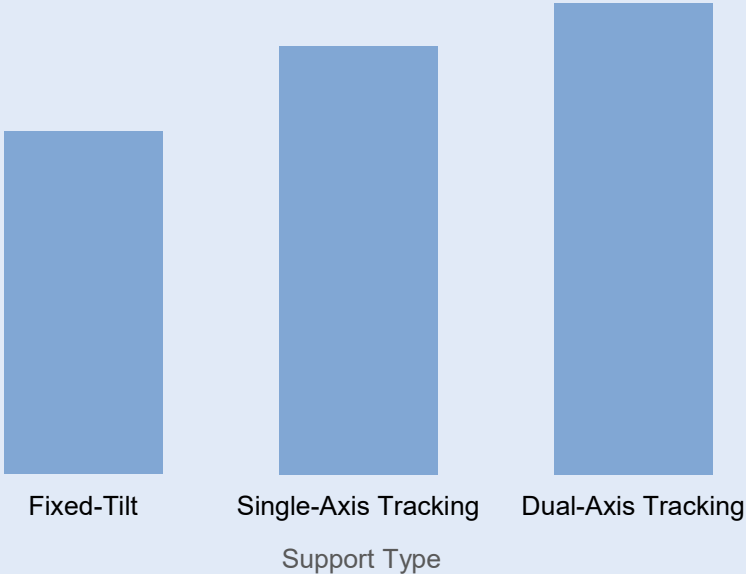


Relative Vulnerability of Solar Panel Support Types



Increasing Wind Vulnerability

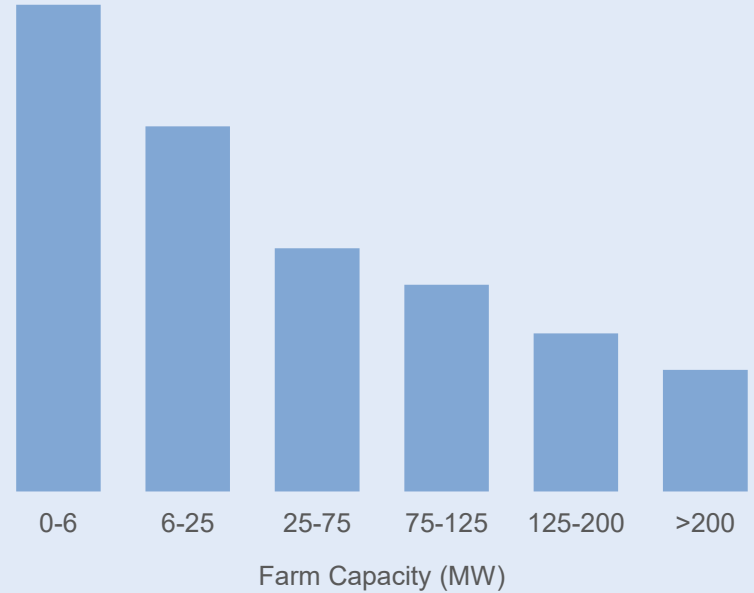
Relative Vulnerability



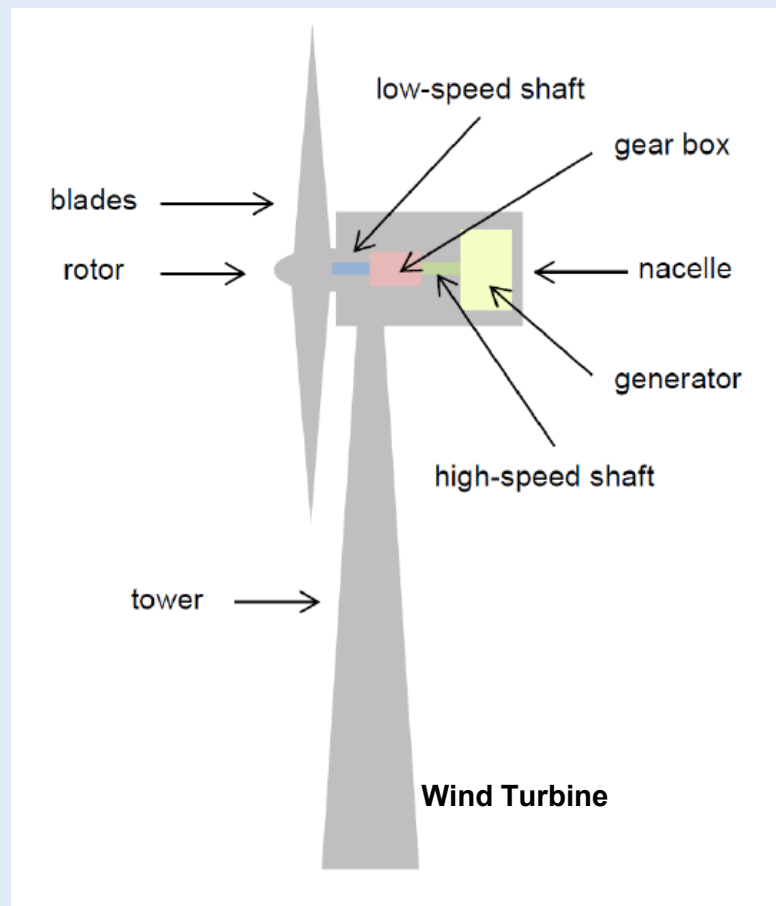
Solar Farm Size Must Be Accounted For When Modeled Using A Single Point Exposure



Relative Vulnerability



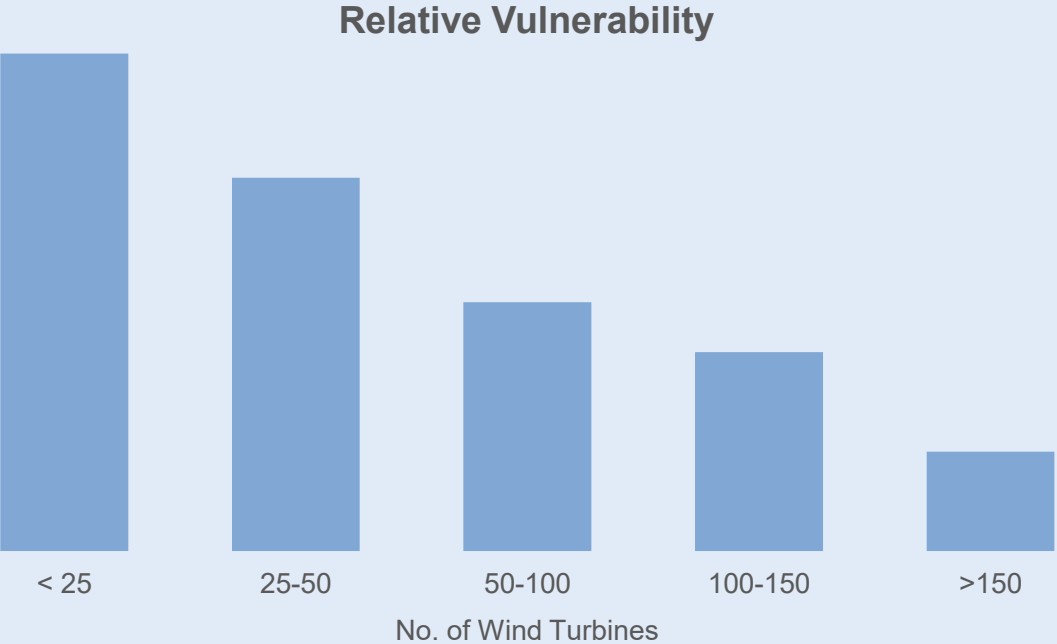
Major Components of Wind Turbines



Identification of Wind Turbine Damage Modes



Farm Size Becomes Even More Important For Wind Farms



KCC<>AEGIS NatCat Site Visits Help Confirm Engineering Assumptions



Typical Length and Cross-Sectional Measurements Are Inputs to Structural Analysis



Transformer Foundation



1.8-mm Z-shaped Channel Section on Fixed-tilt PV Frame

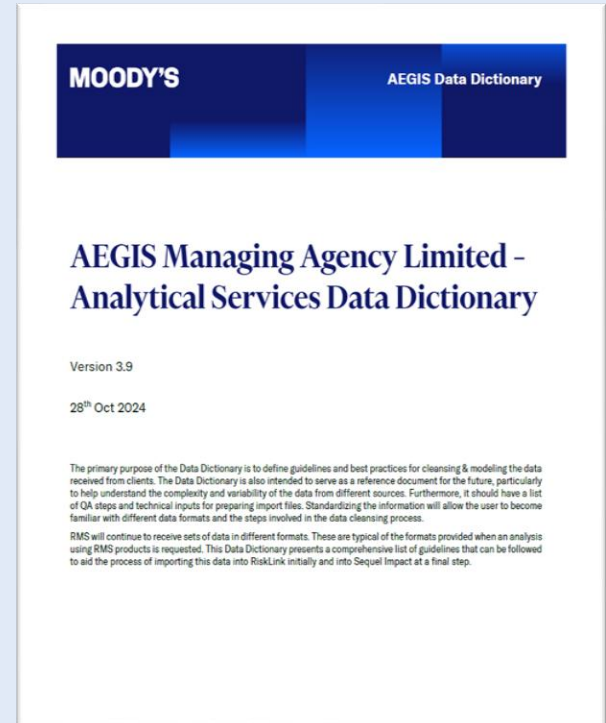


Angle Bracing on Fixed-tilt PV Frame

AEGIS Account Modeling

Hundreds of policies annually modeled to generate detailed risk profiles across all accounts

- Statement of Values (SOV) is cleansed for modeling
 - 15 years of established, comprehensive best practices
- Multi-peril, physics-based modeling
- Analytics supplied to underwriters to support pre-pricing procedures



Customized view of risk and commitment to reducing model overestimations

- Custom vulnerability curves based on loss experience and engineering expertise
- Site-specific attributes captured to modify losses



On-site assessments used to improve modelling assumptions



