



# PHOTOVOLTAIC POWER PLANT AN INSURER'S PERSPECTIVE



**Hartford Steam Boiler**

2015 IECRE: PV System Certification Workshop

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# PV Exposures Property Risk



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- Equipment Breakdown
- Fire – Internal and External
- Wind – Panels can act like sails
- Lightning – protection should be integrated
- Snow Loading – Typical design for about 5.5 ft of snow
- Hail – typical design is to withstand 1 inch hailstone
- Flooding – Depth of flooding determines damage
- Earthquake – 100% PD

# Exposures Business Interruption

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- Additional cost to purchase power
- Utility Penalty?
- Is there a “Power Purchase Agreement”?
- Renewable Energy Certificates
- Who owns the equipment?

# Key Elements of an Engineering Review



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## NLE

Normal Loss Expected  
What **Often** Happens

## PML

Probable Maximum Loss  
What is **LIKELY** to happen.

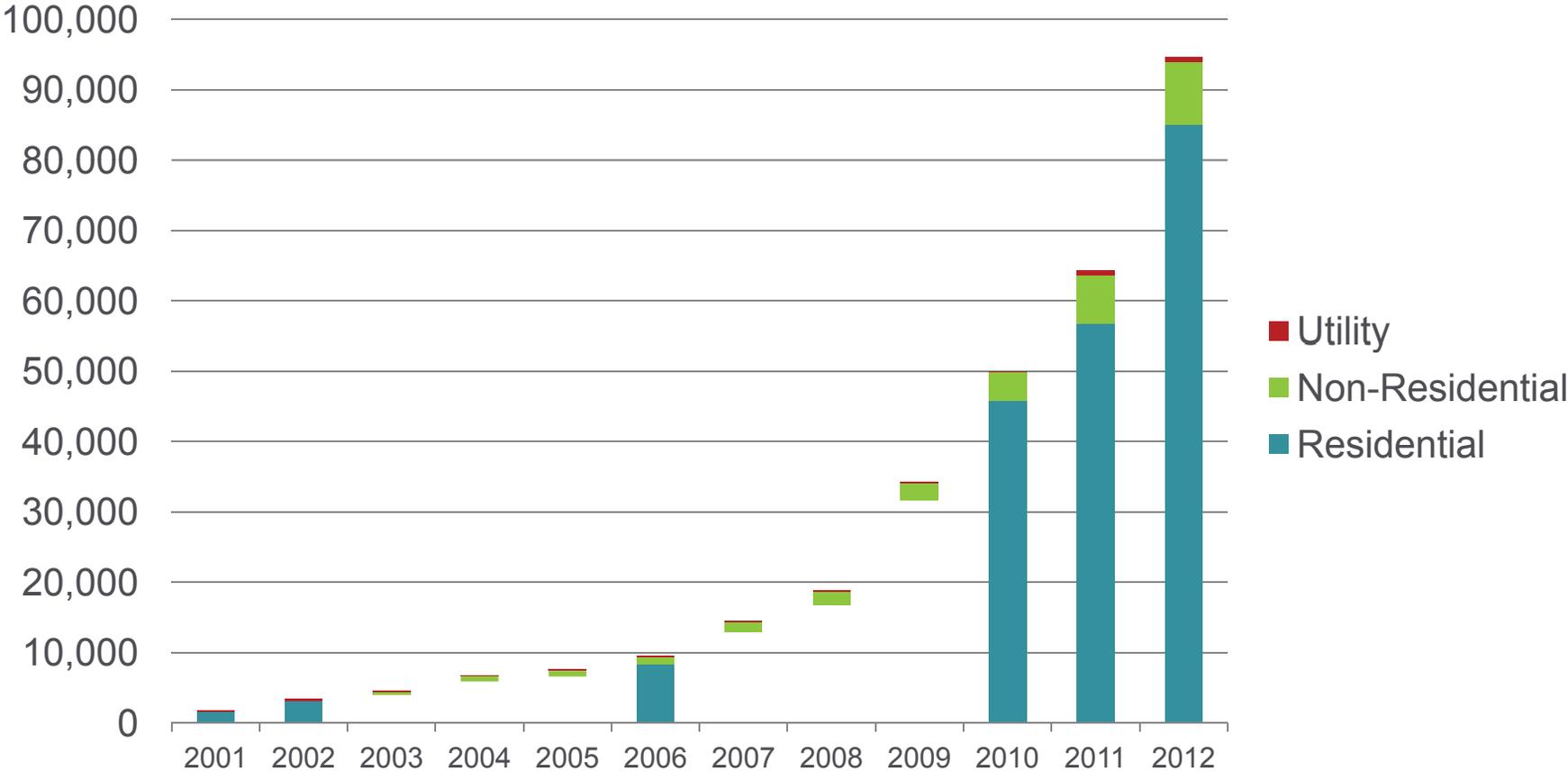
## MFL

Maximum Foreseeable Loss  
What **COULD** happen

# Solar Photovoltaic is an Emerging Exposure



## Number of Installations

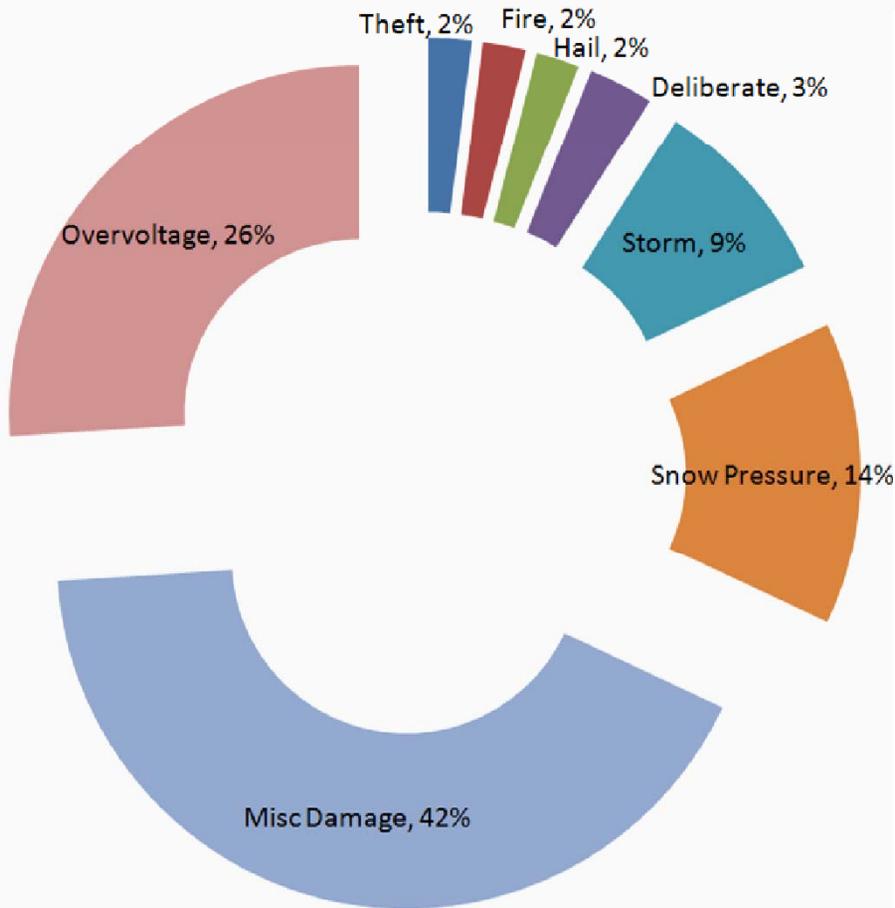




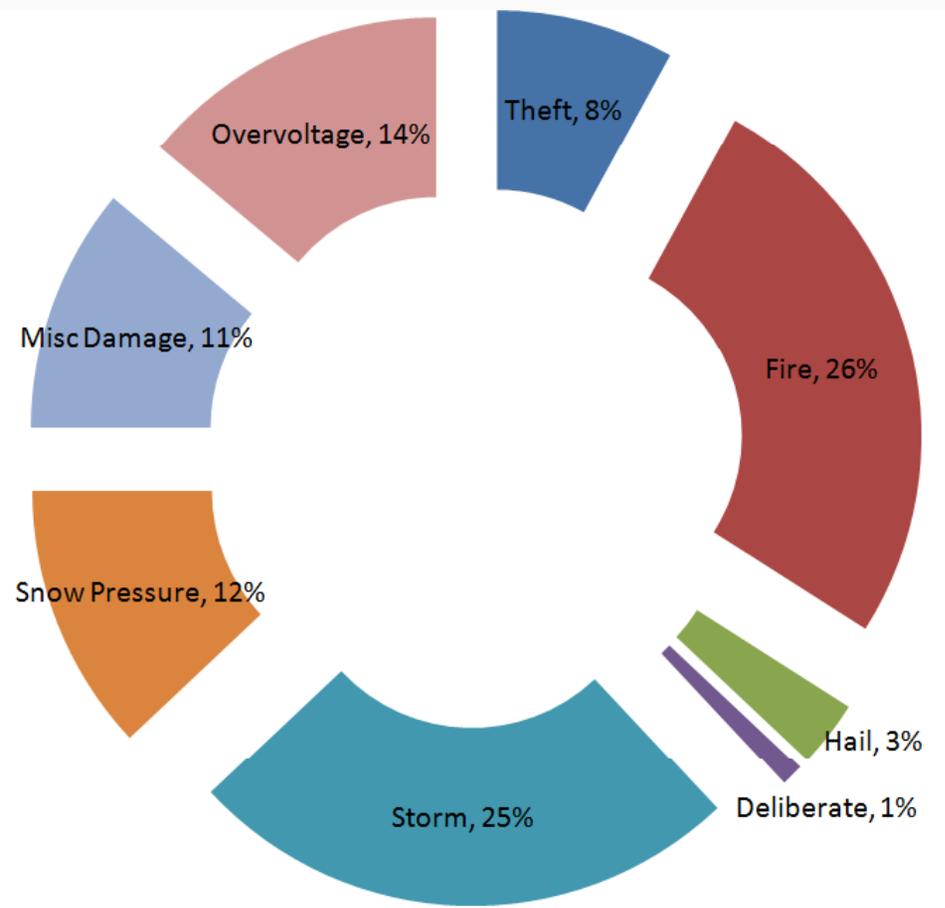
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# PV Loss Data Property Damage Exposures - Frequency



Frequency, #



Severity, \$

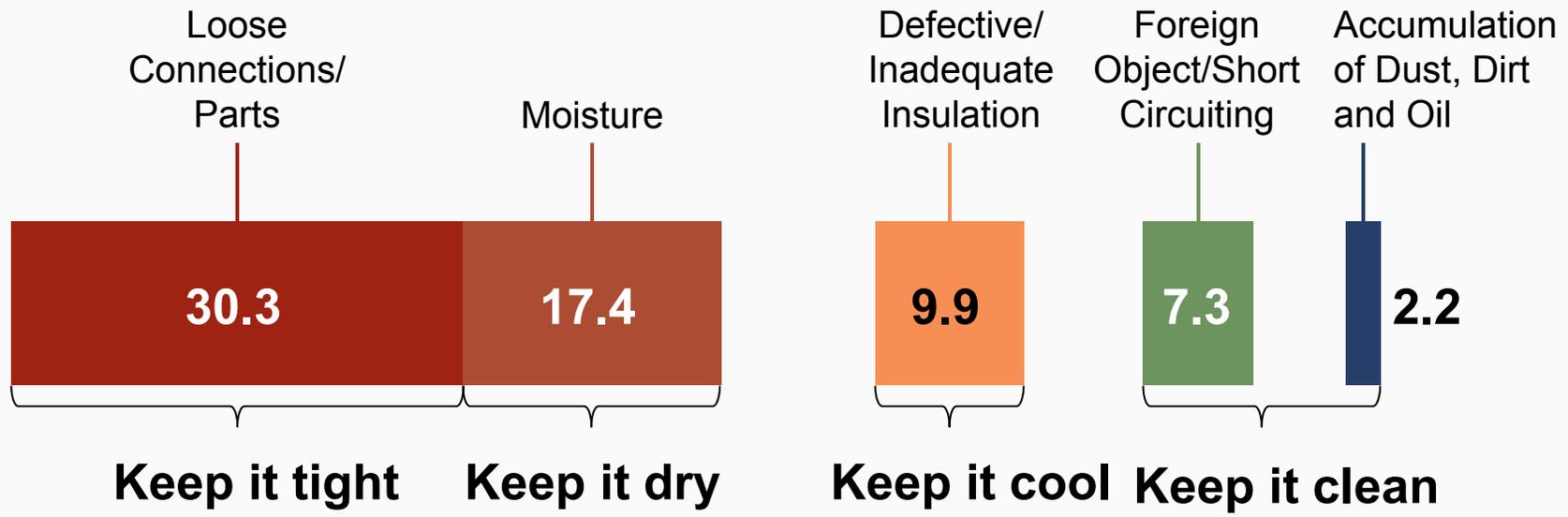
Chart Source: Renewable Energies, Survey, German Insurance Association

# Primary Causes of Electrical Failures



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## Percent



# PV Exposures Property Risk - Fire



## System Layout

- Try and obtain diagrams showing layouts
- Groups of inverters and transformers are exposed to a fire starting in one of the units
- In this example; 2 inverters and 1 transformer here are exposed to same fire event.

# PV Exposures Property Risk - Fire



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## Rooftop fires

- Fire departments hesitant to access roof
- Possible electrical hazards

# Causes of Loss Snow Pressure



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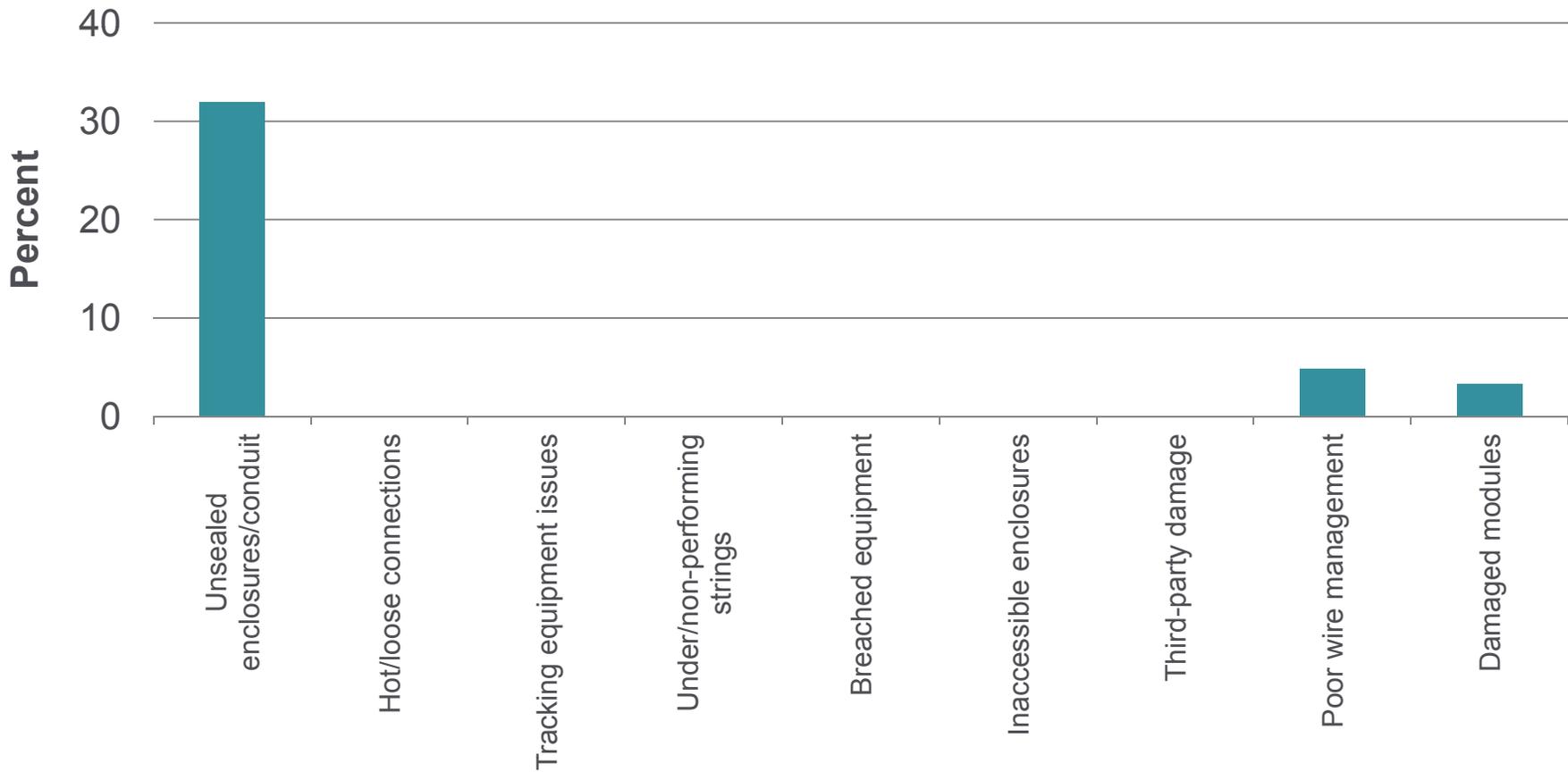


Source: Munich Re

# Causes of Failures



## Analysis of O&M Findings



Courtesy of Advanced Energy Inc.

# Keys to Reducing Exposure



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- Experienced installers
- Established manufacturers
- No experimental, prototype
- New equipment under Warranty
- Some sort of Service Agreement, regular inspection
- Equipment is visible and accessible
- Properly designed for climate (temperature, lightning, wind)



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# QUESTIONS

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