INSURANCE INFORMATION INSTITUTE

The Age of Extreme Weather

Casualty Actuarial Society Spring Meeting
May 21, 2019
New Orleans, Louisiana

James Lynch, FCAS MAAA, Chief Actuary

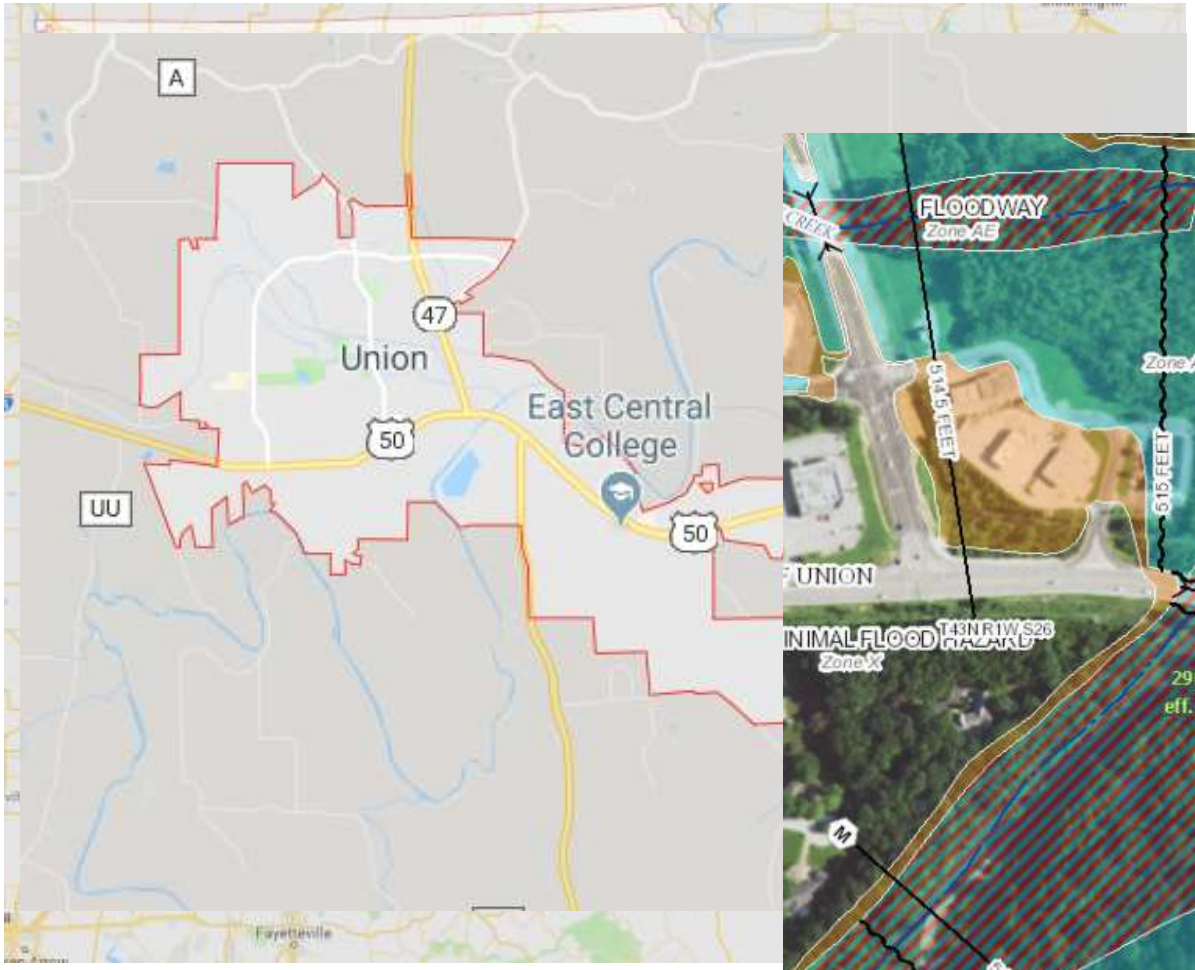
Insurance Information Institute ◆ 110 William Street ◆ New York, NY 10038
Tel: 212.346.5533 ◆ jamesl@iii.org ◆ www.iii.org

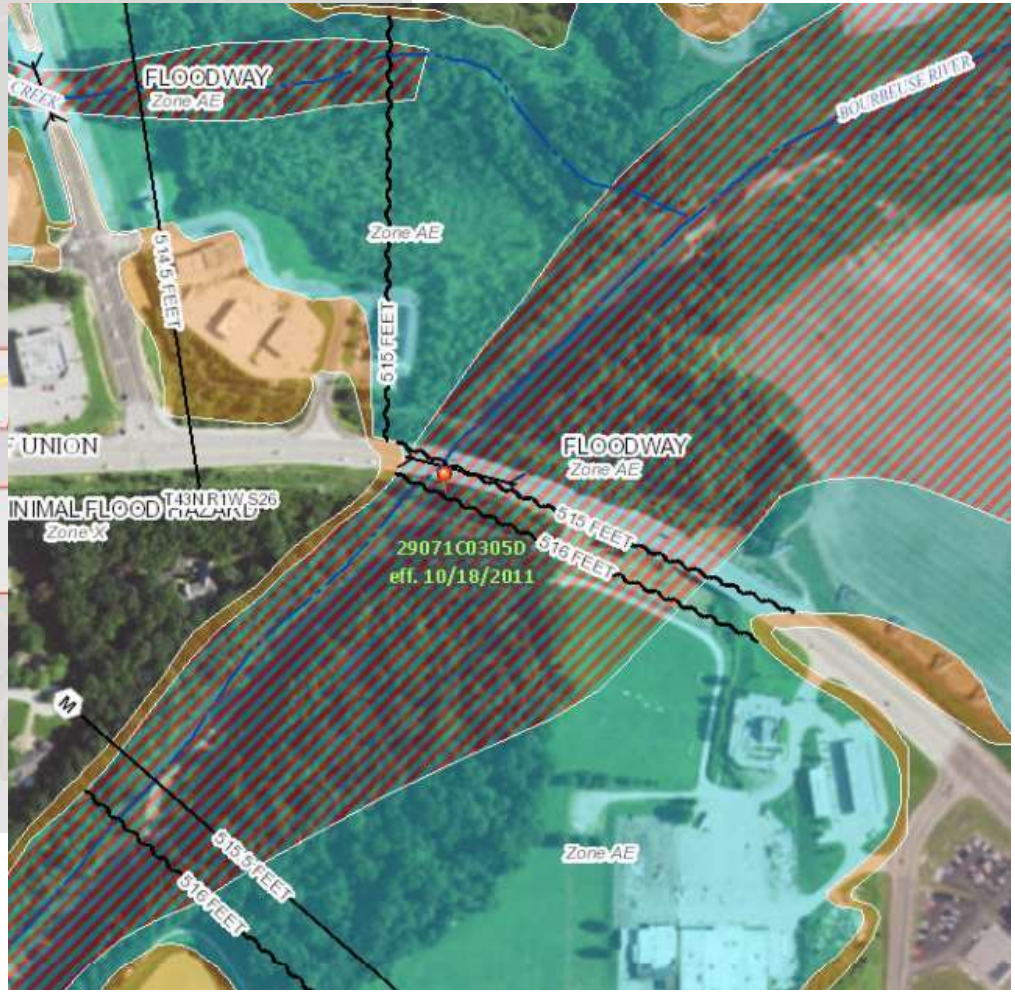
I.I.I. Mission Statement

Catastrophes

Extreme Weather Threatens Union

A Small Town in Missouri





1982 Union, Missouri, Flood

A Storm for the Ages

Bourbeuse River
Record Crest
33.8 feet
12/5/1982

Source: Fox2News.com, @BoxxRadio.

2015 Union, Missouri, Flood

A Storm for the Ages

Bourbeuse River
Record Crest
34.3 feet
12/29/2015

Sources: CBSnews.com; fox2news.com

2017 Union, Missouri, Flood

"Unfortunately, it's a river and Mother Nature. And we can't control her."

Bourbeuse River
Crest
29.4 feet
May 2-3, 2017

	Crest (feet)	Year
1	0.40	1936
2	0.40	1948
3	0.40	1948
4	0.50	1976
5	0.55	**2014**
6	0.64	**2012**
7	0.68	**2000**
8	0.78	**2001**
9	0.80	1996
10	1.14	**2007**

Source: eMissourian.com, National Weather Service.

Extreme Events: A Troubling Trend

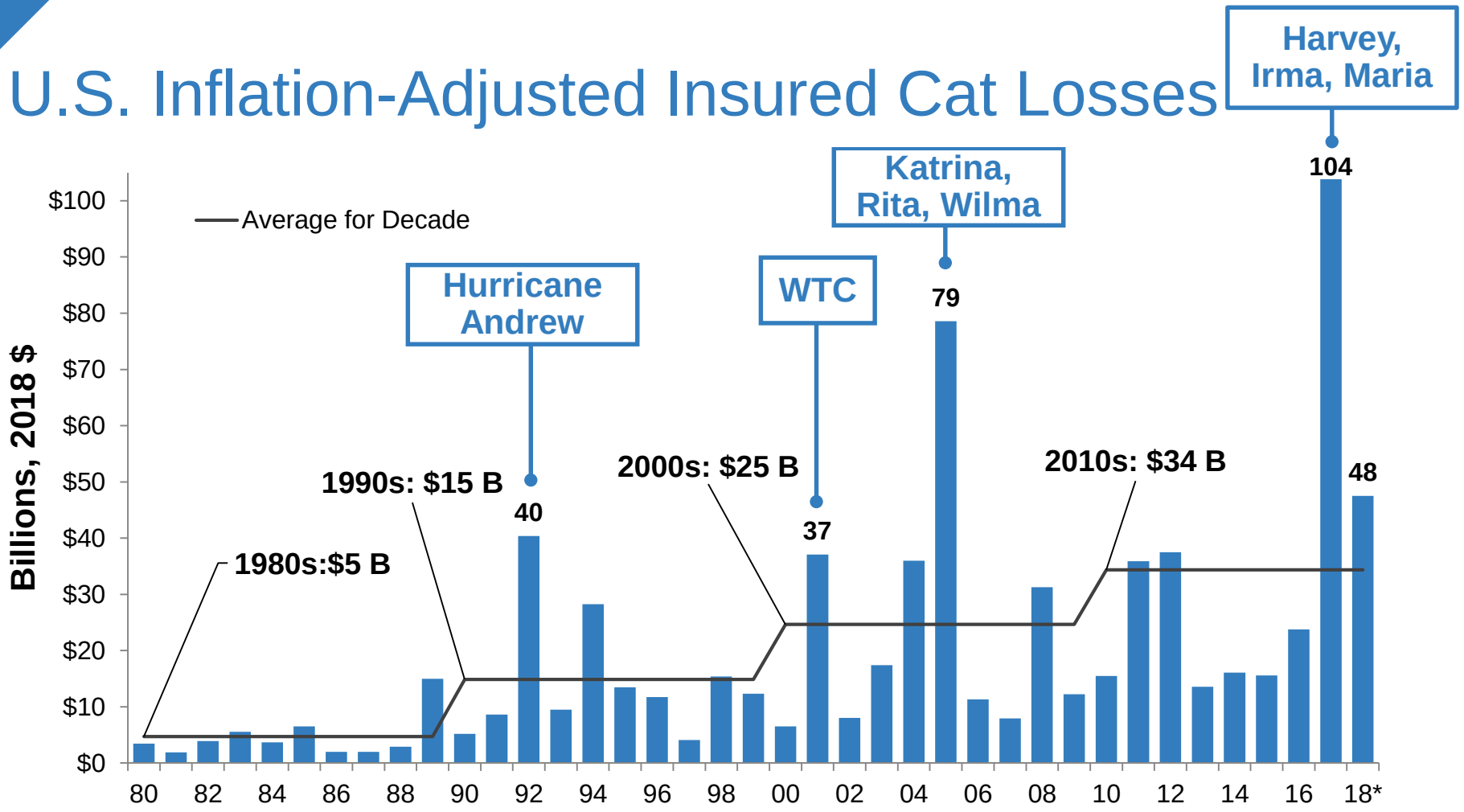
Rank	Date	Event	Cause	Insured Loss (1) ($ millions)
1	Aug. 2005	Hurricane Katrina	Hurricane	$41,100
2	***Sep. 2017***	***Hurricane Maria (2)***	***Hurricane***	***25,000-30,000***
3	***Sep. 2017***	***Hurricane Irma (2)***	***Hurricane***	***20,000-25,000***
4	Sep. 2001	September 11 Events	Terrorism	18,779
5	Oct. 2012	Hurricane Sandy	Hurricane	18,750
6	***Aug. 2017***	***Hurricane Harvey (2)***	***Hurricane***	***16,000-19,000***
7	Aug. 1992	Hurricane Andrew	Hurricane	15,500
8	Jan. 1994	Northridge, CA earthquake	Earthquake	12,500
9	Sep. 2008	Hurricane Ike	Hurricane	12,500
10	Oct. 2005	Hurricane Wilma	Hurricane	10,300

(1) Dollars when occurred.

(2) Insurance Information Institute estimate based on data from catastrophe risk modelers, the Property Claims Services unit of Verisk Analytics, et al.

Source: Insurance Information Institute, catastrophe risk modelers, The Property Claim Services® (PCS®) unit of ISO®, a Verisk Analytics® company, et al.

U.S. Inflation-Adjusted Insured Cat Losses



2018 – Third worst year for U.S. Insured Catastrophe Losses. Average Insured Loss per Year for 1980-2018 is $19.3 B.

*2018: Inflation-adjusted estimate, subject to change. 2010s is average of 2010 to 2018. All losses are Direct.
Sources: Property Claims Service, a Verisk Analytics business; Insurance Information Institute.

How Insurance Drives Economic Growth

Safety/ Security

1. Insurers are financial first responders

2. Insurers are risk mitigators

Economic/ Financial Stability

3. Insurers are capital protectors

4. Insurance is a partner in social policy

5. Insurance sustains the supply chain

6. Insurers are capital infusers

Development

7. Insurers are community builders

8. Insurance enables infrastructure improvements

9. Insurers are innovation catalysts

10. Insurers are credit facilitators

Insurance Leading Throughout History

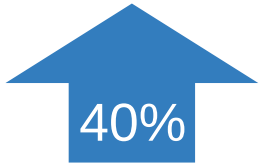
- ???
- 1969
- 1870
- 1784
- 1648

Cyber-Physical Systems

Underwriting Solutions

(Re)insurance Products

Private Industry	Case Studies
FEMA Reinsurance	Through a $150 million purchase of private reinsurance products, FEMA was able to recover approximately $1 billion, or an eighth of its total 2017 loses.
NFIP NatCat Bonds	By issuing new natural catastrophe bonds geared towards institutional investors, the NFIP can bring an estimated $500 million of additional reinsurance coverage.
Private Market Flood Products	During 2017, the private flood insurance market added 50 new carriers. Direct private flood insurance premiums written reached $630 million, an increase of $217 million over 2016.



2018 FEMA Reinsurance

NATIONAL FLOOD INSURANCE PROGRAM

Swiss Re

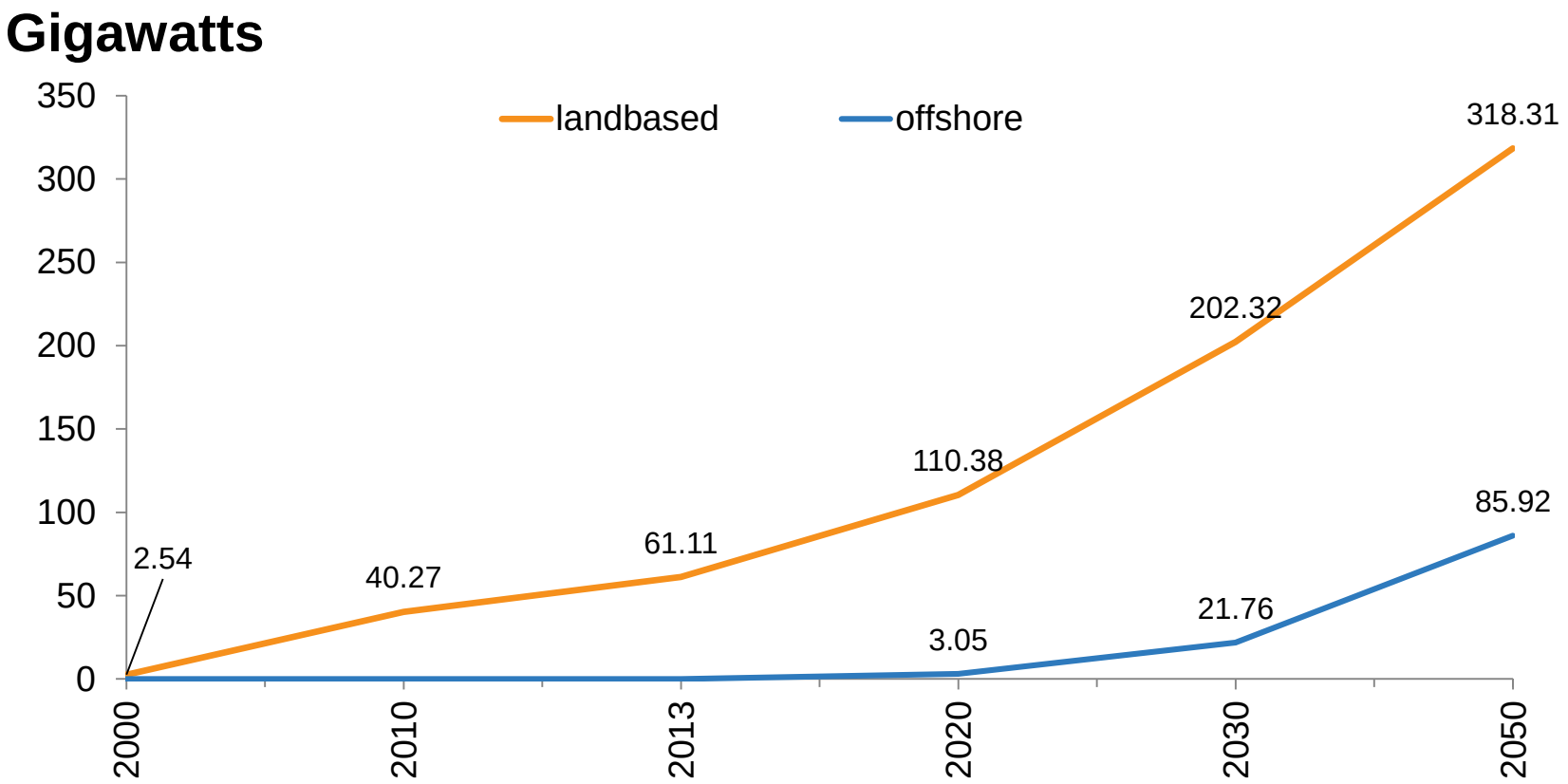
LLOYD'S

AIG

Source: Insurance Journal; *Houston Chronicle*; Insurance Journal.

Case Study: Offshore Wind Power

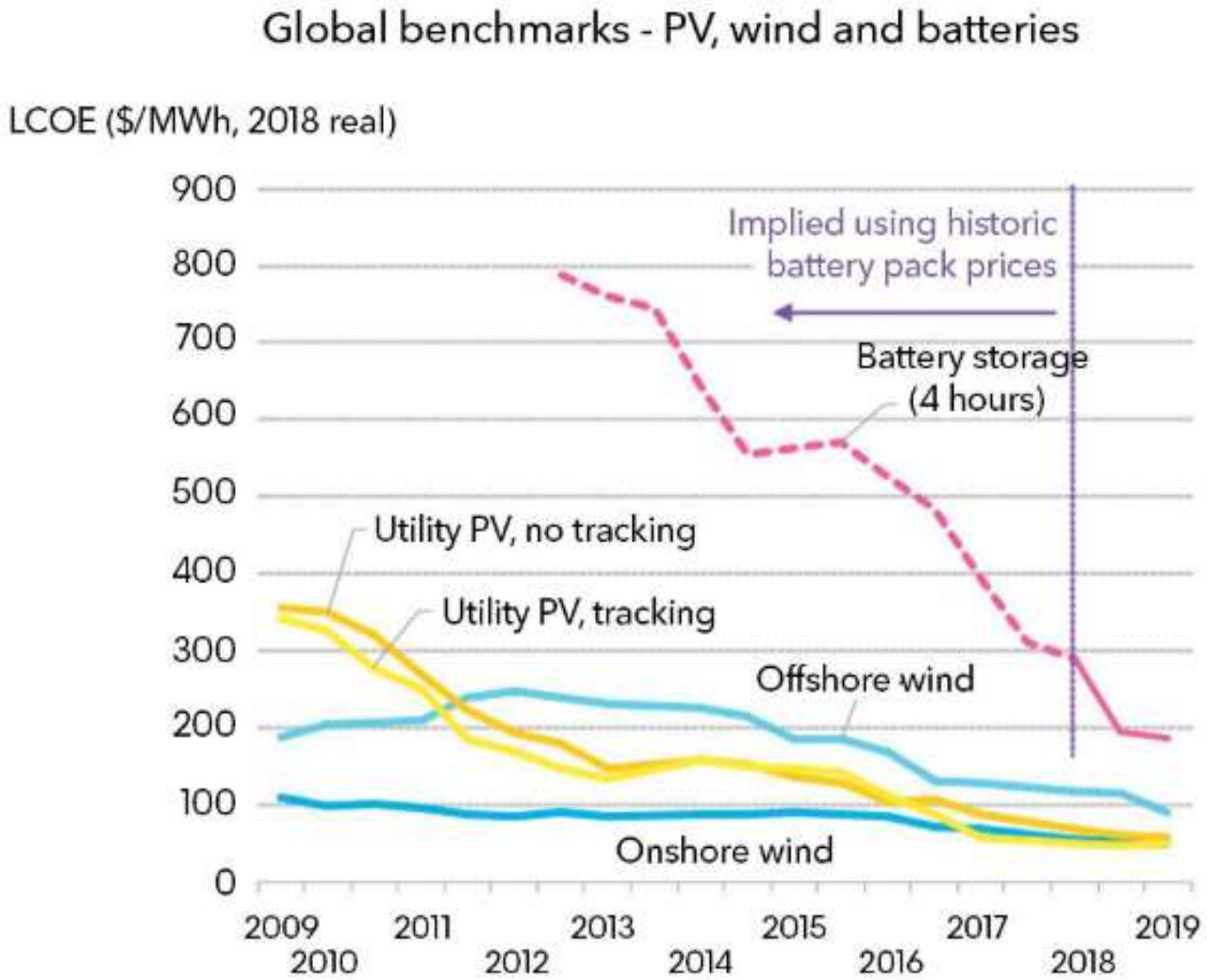
Growth of Wind Power Capacity in the U.S.



By 2050 total wind power capacity across 48 states will be 404.25 gigawatts, an increase of 180.15 gigawatts from 2030

Source: Energy.gov

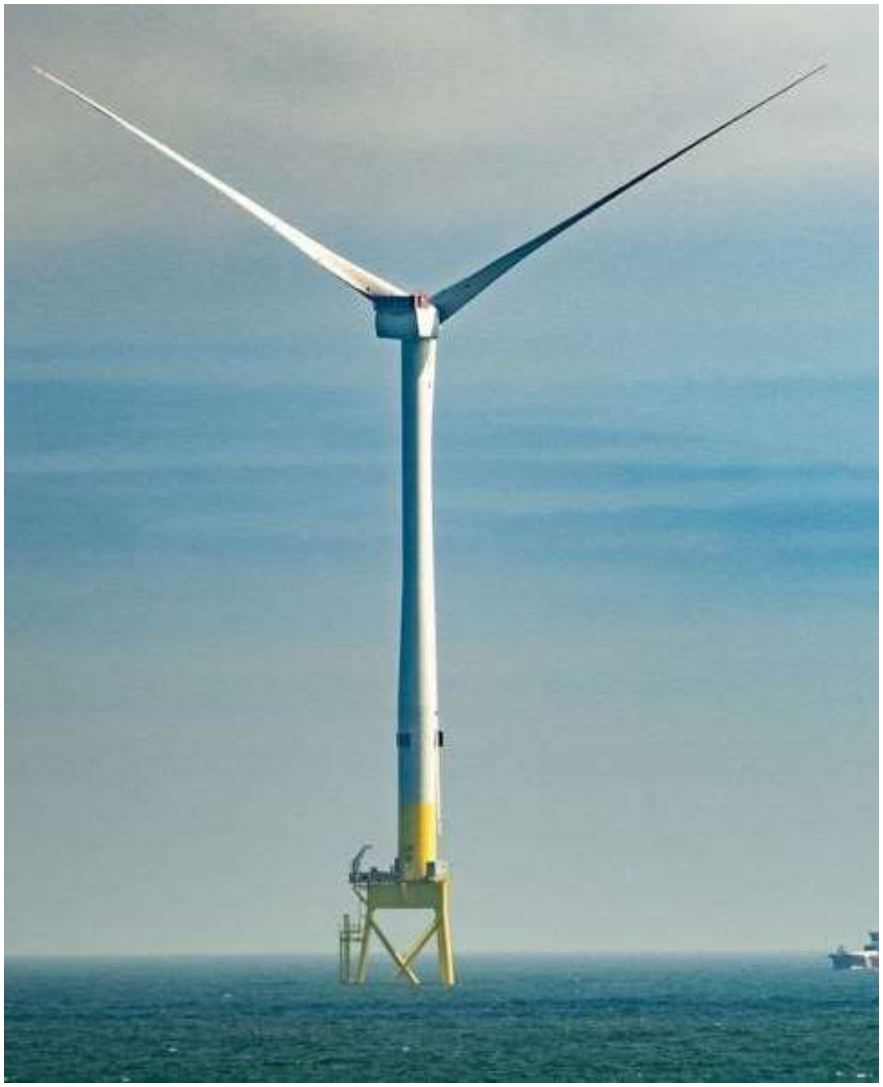
Cost of Alternative Energies is Falling



LOCO: Levelized cost of energy – cost of producing MWh of electricity, accounting for cost of development, construction and equipment, financing, feedstock, operation and maintenatnce

Source: BloombergNEF.

Offshore wind farms pros and cons



Pros

- Offshore wind speeds are faster and steadier than on land
- Meet energy needs of high-density coastal areas
- Renewable energy with no pollution
- Domestic energy source
- Jobs

Cons

- Expensive and difficult to build and maintain
- Effects on marine animals and birds are not fully understood
- May be unpopular with residents

Source American Geosciences Institute

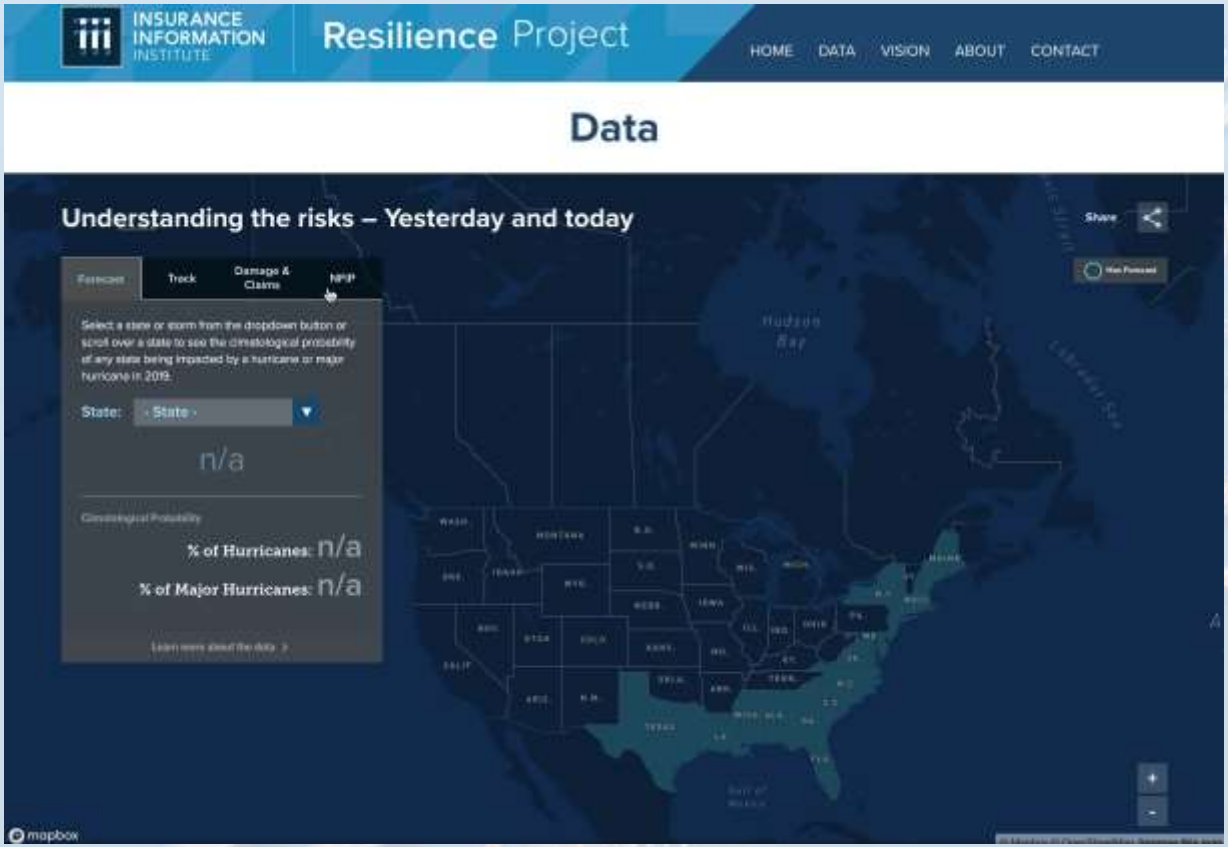
Key risks faced by wind farms

Risk	Insurance
Cargo in transit	Marine
Construction problems	Construction delay cover
Mechanical, cable issues	Property damage cover
Lightning strike	Business interruption
Terrorism	Political risk
‘Wind drought’	Weather hedge

Source: Willis Towers Watson, WindPower, JLT Group.

Education Solutions

I.I.I. Resilience Project



Data transformed to show the power of resilience.

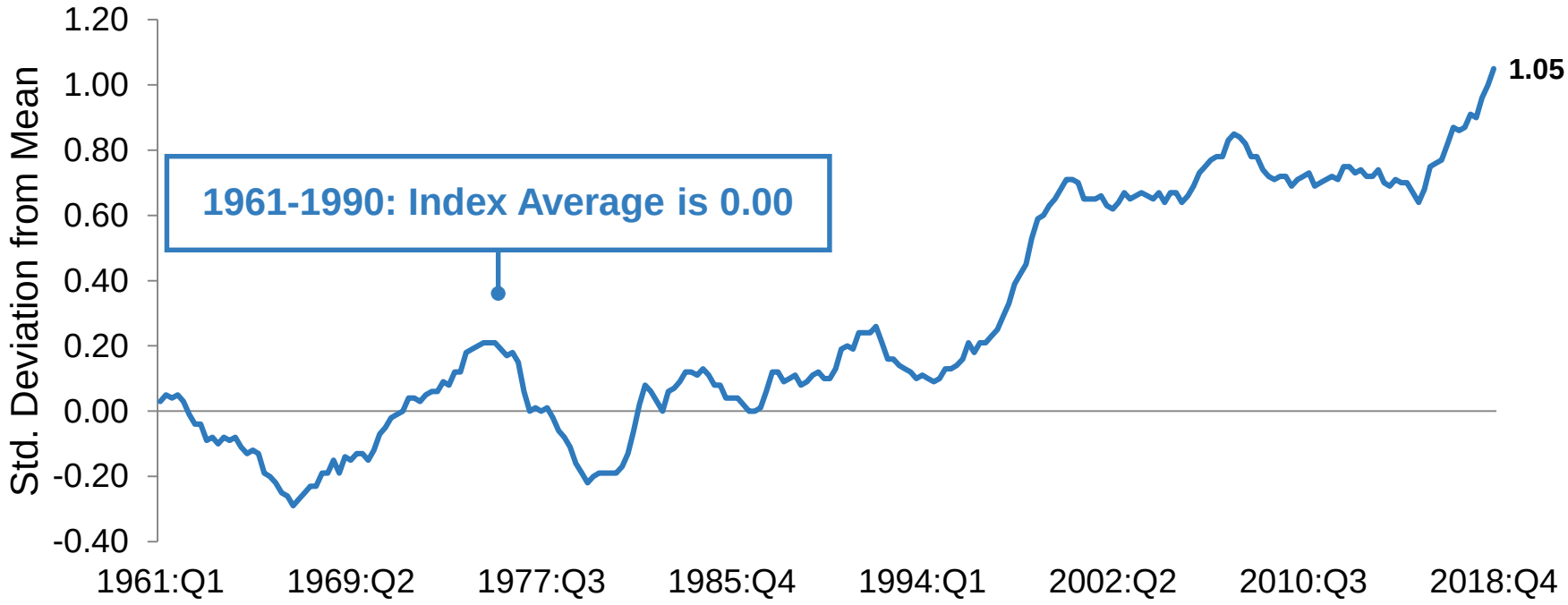
Powered by:

AON
Empower Results®

Education & Analysis

Actuaries Climate Index – Measuring Weather Extremes

Seasonal Five-Year Moving Average, United States



Index Measures Frequency of Extreme Events (Heat, Cold, Drought, Wind, Rain, Sea Level) Vs. 1961-1990 Average

Source: Actuaries Climate Index, http://actuariesclimateindex.org/home/

Summary

- Extreme Weather is a Growing Problem Worldwide
- Insurance Traditionally Manages Emerging Risks
- Insurers Are Taking an Educational Role

INSURANCE
INFORMATION
INSTITUTE

Thank you for your time and your attention!