An Introduction to Weather Risk Management

eWeatherRisk®
Managing Weather Risk is Smart Business

eWeatherRisk®

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What's In it For Me?

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- We can't control the weather, but we will be able to control financial outcomes
  - A new risk management product
  - Supported by weather data tools and analytics
  - All roads lead to better financial results
- NOT a substitute for your operational expertise

What We Know About Weather

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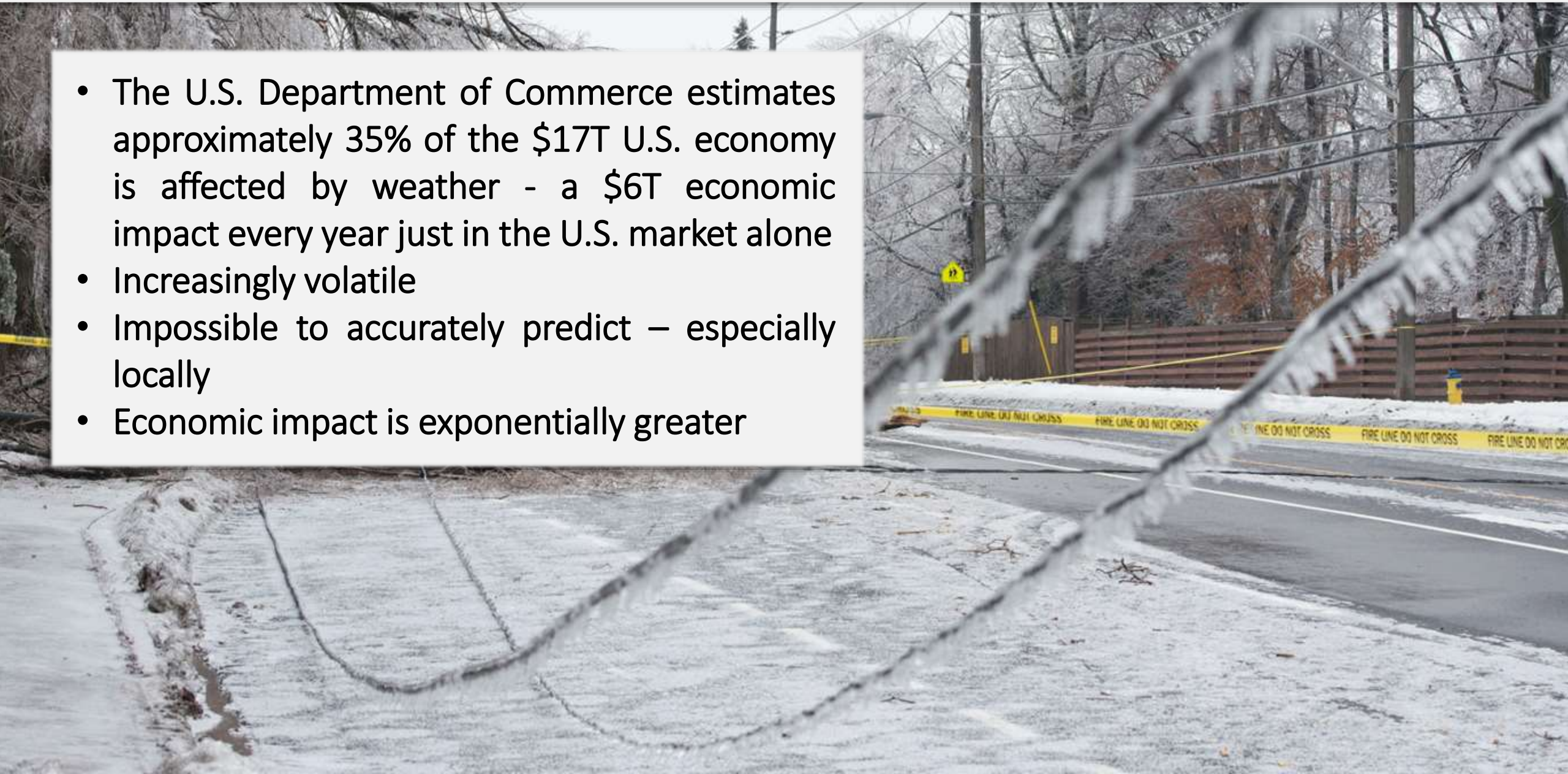

- The U.S. Department of Commerce estimates approximately 35% of the $17T U.S. economy is affected by weather - a $6T economic impact every year just in the U.S. market alone
- Increasingly volatile
- Impossible to accurately predict – especially locally
- Economic impact is exponentially greater

Current Evidence

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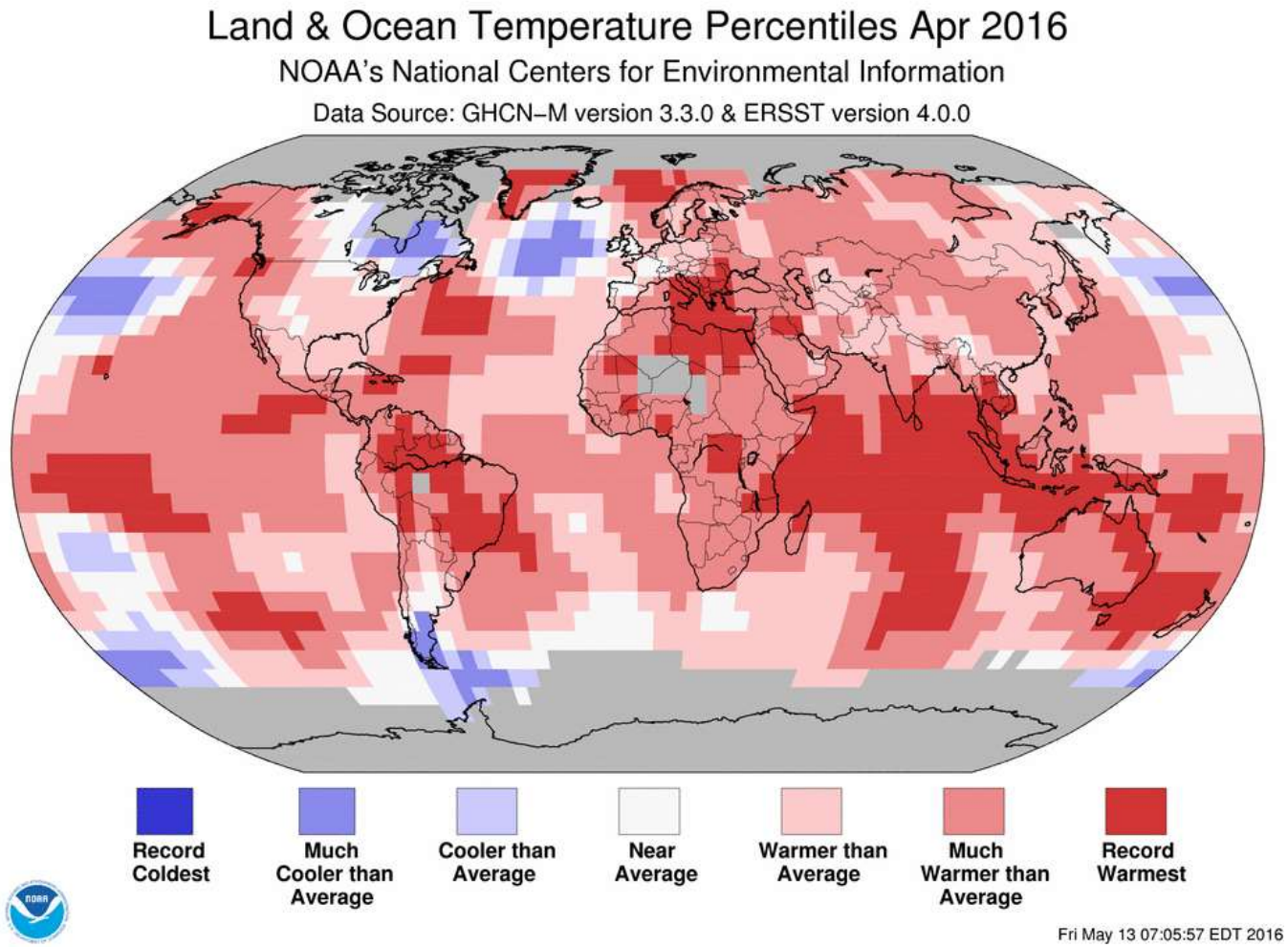
RANK: 1880–2016	MONTH + YEAR	ANOMALY °C	ANOMALY °F
1	March 2016	1.23	2.21
2	February 2016	1.19	2.15
3	December 2015	1.12	2.02
4	April 2016	1.10	1.99
5	January 2016	1.03	1.86
6	October 2015	0.99	1.78
7	November 2015	0.97	1.74
8	September 2015	0.92	1.66
9	March 2015	0.90	1.61
10 (tie)	June 2015	0.88	1.58
10 (tie)	February 2015	0.88	1.58
10 (tie)	January 2007	0.88	1.58
13	August 2015	0.87	1.57
14	February 1998	0.86	1.55
15	May 2015	0.85	1.54



Weather Risk Management Value Proposition

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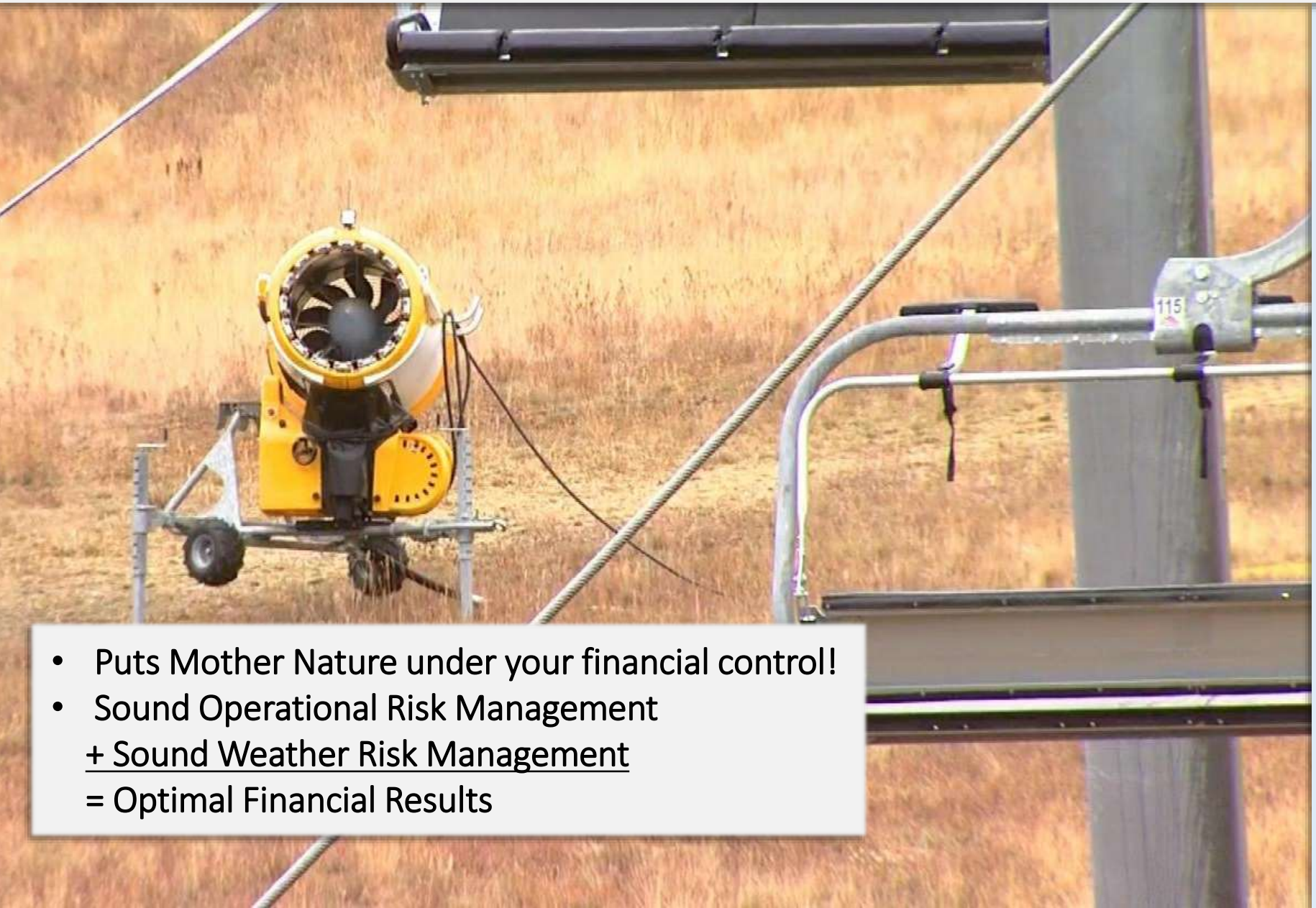

- Puts Mother Nature under your financial control!
- Sound Operational Risk Management
  + Sound Weather Risk Management
  = Optimal Financial Results

Utility
Guarantee minimum number of Heating Degree Days, Cooling Degree Days

Wind Farm
Ensure adequate wind speeds

Farmer
Protect adequate rainfall inches or events

Construction Company
Enough 'working days' or too many 'idle days'

Snow Removal Company
Minimum number of snow removal events or inches of snowfall

Theme Park
Sufficient 'warm days' and or 'dry days'

Solar Farm
Guarantee adequate insolation (sunlight) hours and intensity

Who Manages Weather Risk?

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Every facet of the global economy hedges weather.

- Agribusinesses hedge weather risk to protect against crop yield losses and increases in input costs
- Power companies protect against cool summers and warm winters
- Retail companies manage weather risk to guard against lower foot traffic and reduced sales.

What is a Weather Risk Management Product?

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- A financial product
- Mitigates risk of adverse weather
- Simple, transparent and objective
- Parametric weather trigger - no adjuster, pays when weather event happens
- Can be used for virtually any weather-related risk

A Data-Driven Solution

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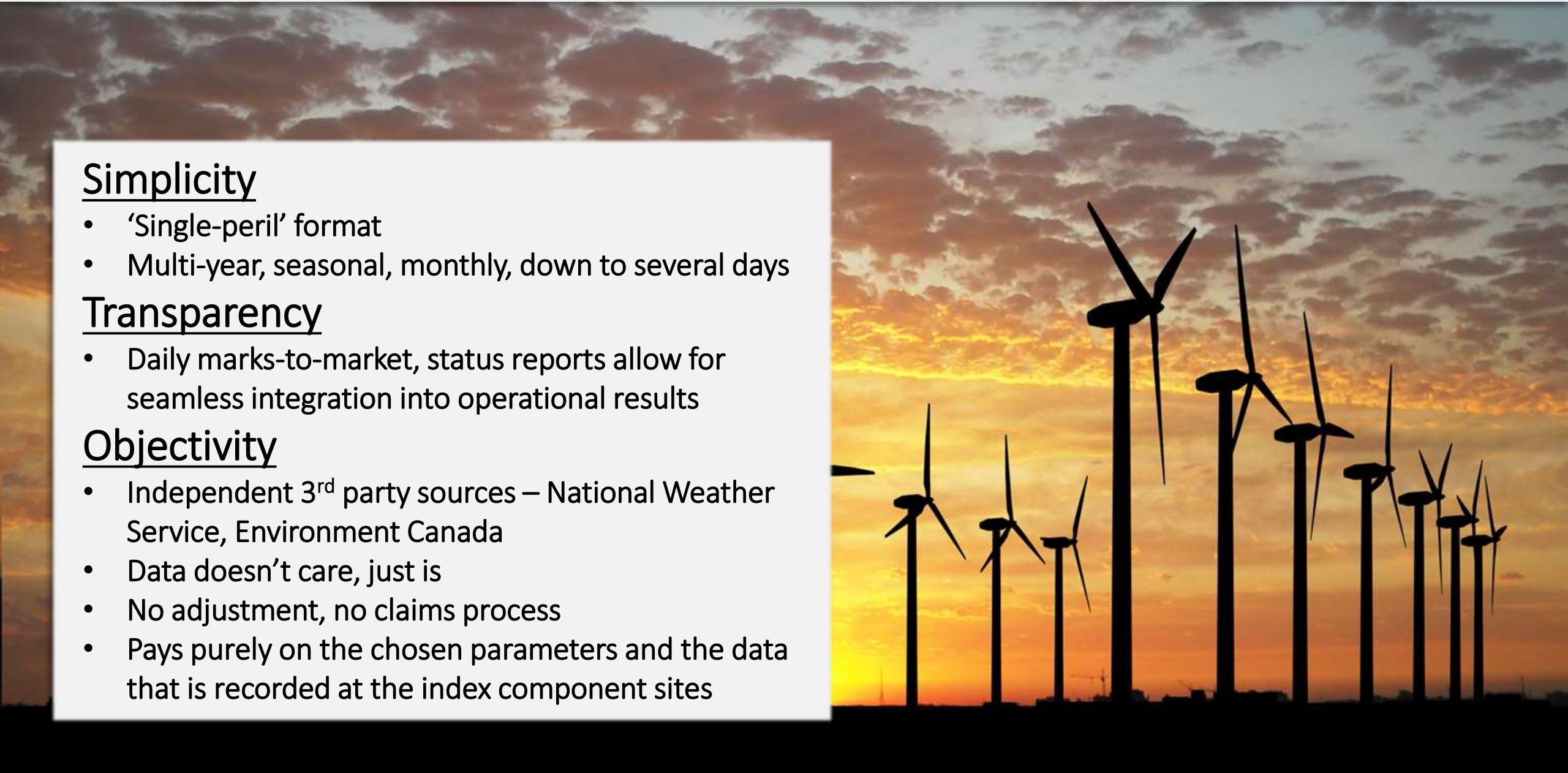

Simplicity

- 'Single-peril' format
- Multi-year, seasonal, monthly, down to several days

Transparency

- Daily marks-to-market, status reports allow for seamless integration into operational results

Objectivity

- Independent 3rd party sources – National Weather Service, Environment Canada
- Data doesn't care, just is
- No adjustment, no claims process
- Pays purely on the chosen parameters and the data that is recorded at the index component sites

History of the Weather Markets

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1997 — First Market Transaction

3 transactions involving Willis, Koch Industries and Enron marked the beginning of a new way of managing weather risk

Source: WRMA

1999 — CME Launches Weather Derivatives Exchange

Chicago Mercantile Exchange launches temperature-based product slate to include 10 cities trading monthly HDD and CDD futures and options

Source: CME Group

2003 — CME Expands Cities, Products, goes Global

- 5 additional cities
- Seasonal strips
- Cumulative Average Temperature
- 6 European locations

Source: CME Group

2005 — First Snowfall Contract

- CME launches first snowfall contract
- 6 Canadian HDD, CDD, CAT locations

Source: CME Group

2008 — Australia

Temperature-based contracts join

Source: CME Group

2011 — Rainfall

CME contracts for rainfall now traded in a number of US cities

Source: CME Group

2016 — Uh-oh!

CME shrinks temperature cities to 8 in the U.S., 2 in Europe, and snowfall and rainfall contracts disappear

Source: CME Group

?

OTC Migration – The Customization Advantage

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Flexibility is Key

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Temperature
- Excess Heat or Cold
- Insufficient Heat or Cold
- Number of Temperature Events

Precipitation
- Drought
- Excess Rainfall
- Highest Periodic Rainfall
- Number of Precipitation Events

Proprietary
- Dual-Trigger
- Heat Index, Wind Chill
- Snow
- Ice
- Wind
- River Height
- Streamflow
- Hurricane
- Weather-Contingent Gas
- Weather-Contingent Power

Virtually ANY weather risk!

Case Study

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- Participant identifies weather concerns
- Defines coverage period
- Determines contract size
- Builds weather indices using land-based, radar weather data points
- Data is accumulated throughout the pre-specified coverage period
- If recorded data for index components meets event criteria, contract pays regardless of the underlying loss
- Participant effectively mitigates weather risk using weather hedges in the context of its operations

A Canadian energy utility serving the greater Toronto metro is concerned about a warm winter reducing power consumption and resulting revenues. Over the last 10 years, revenues during 'normal' winters have averaged $20M, but were as low as $10M during the warmest winter, and as high as $30M during the coldest winter. The December – February time period is the most critical. The utility wants to ensure total HDD's are no more than 1°C below normal.

Historical Snapshot

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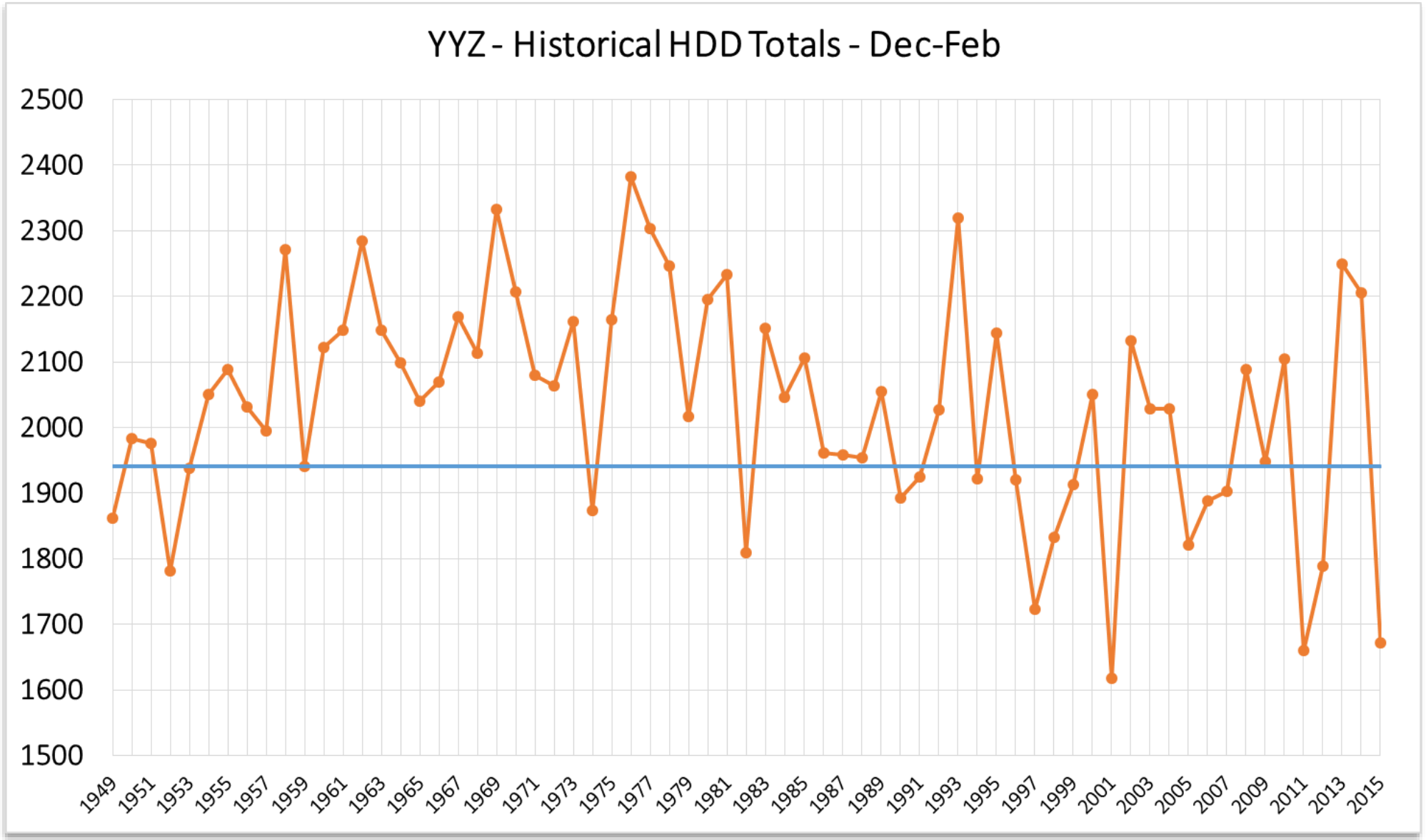

Historical Payout Chart

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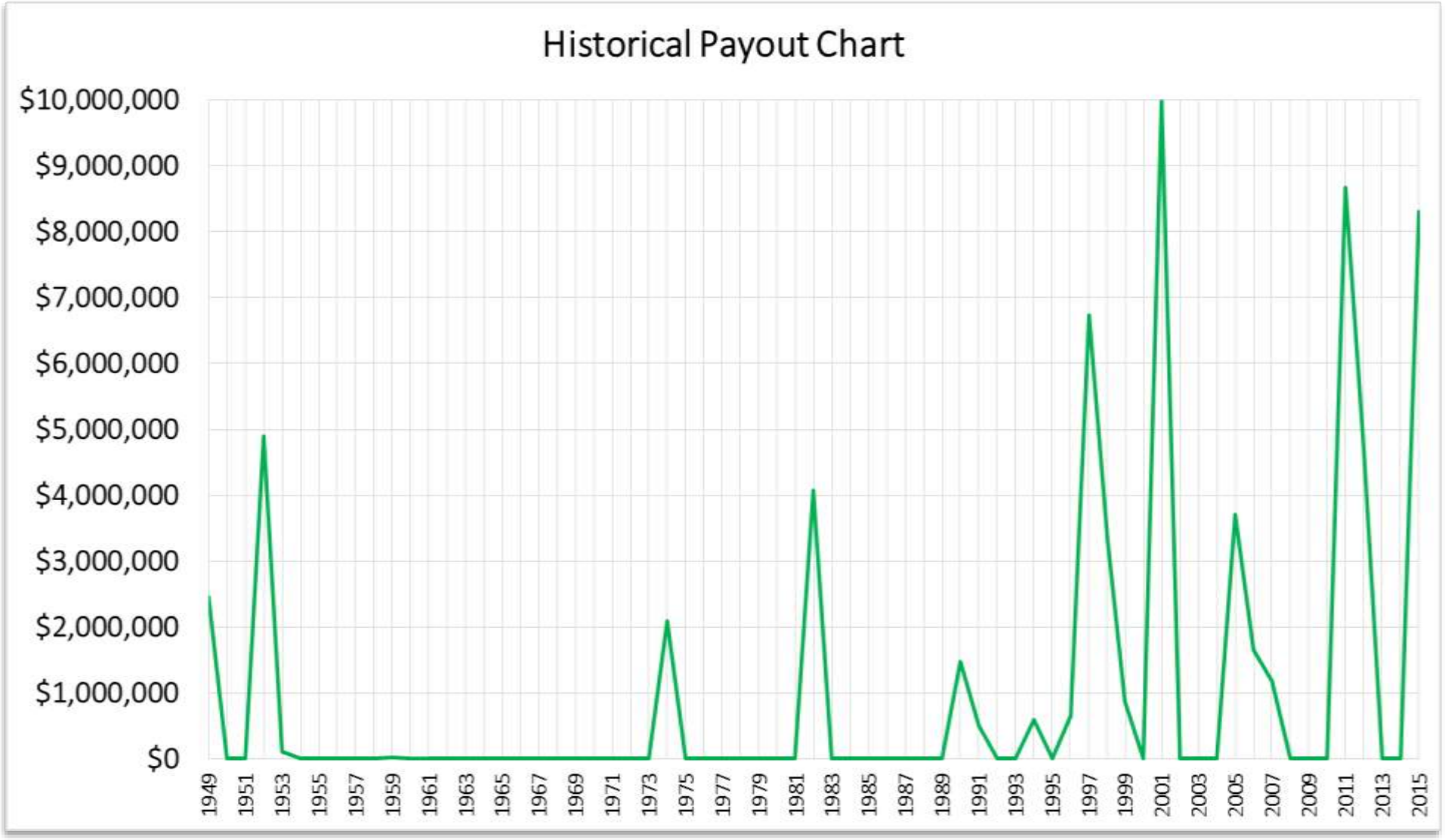

Other Applications

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Temperature

- Too many heat waves – unmanageable price spikes
- Warm winter – lower revenues, lower prices
- Cool Summer – lower revenues, lower prices
- Cool periods following hot spells – backup generation expense

Precipitation

- Excess rainfall – reduction in irrigation power demand

Proprietary

- Ice hours – lower revenues, capital expense
- Weather-Contingent Gas – weather-price elements
- Weather-Contingent Power – weather-price elements

Questions?

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"Everybody talks about the weather, but nobody does anything about it."
-Charles Dudley Warner

Well Now You Can!

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