Mitigating risk in the delivery of new UK energy infrastructure – implications for funding and construction

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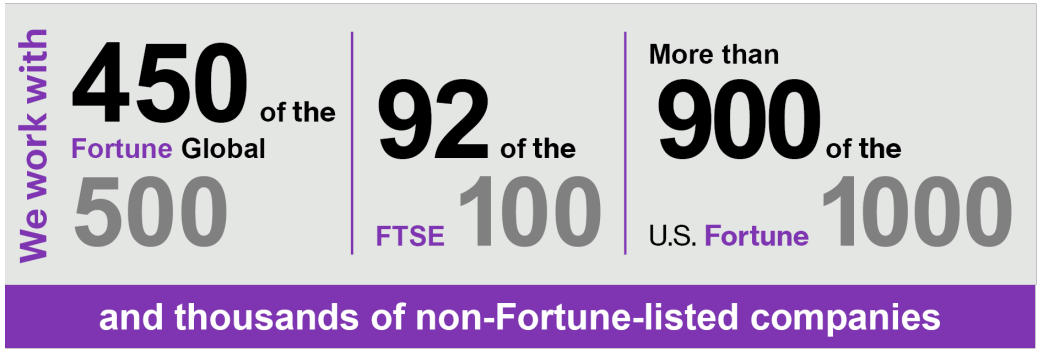


January 2022

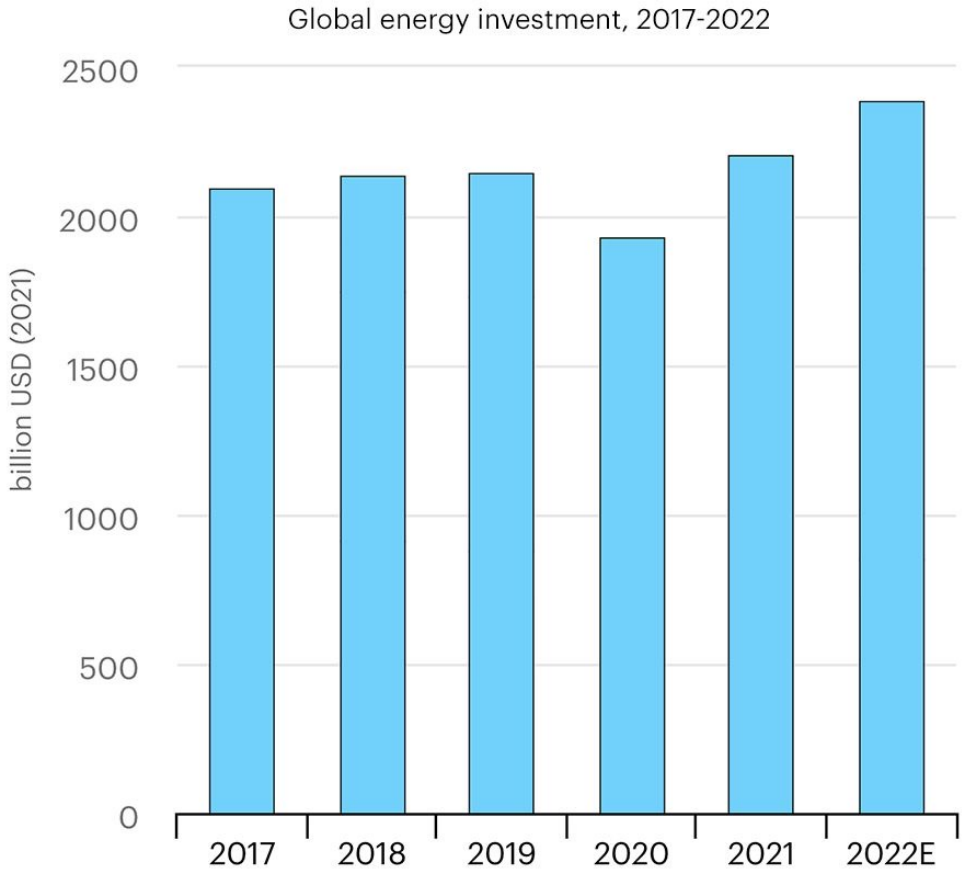
Most development requires Finance.

Insurance a prerequisite of Lenders.

Insurance Market for most Clean Energy risks is developed and has a healthy appetite.

But there are challenges….

Record clean energy spending is set to help global energy investment grow by 8% in 2022

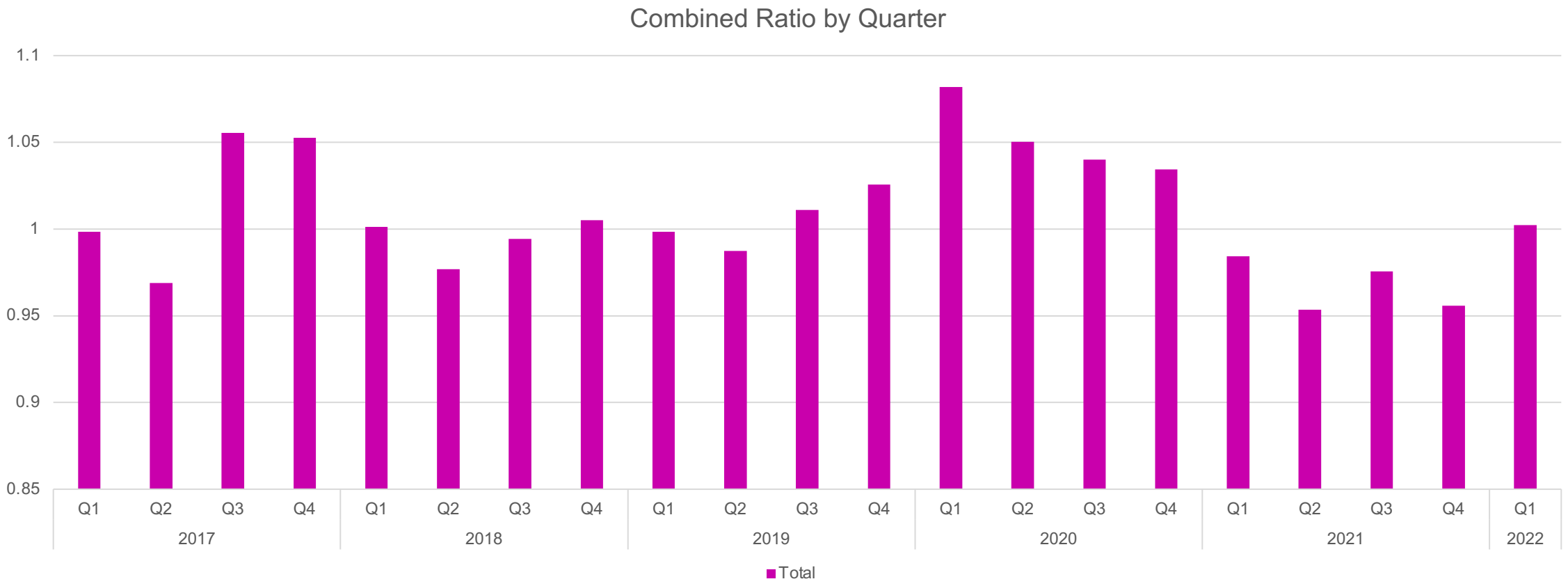


2022E = estimated

1. https://www.iea.org/news/record-clean-energy-spending-is-set-to-help-global-energy-investment-grow-by-8-in-2022

Insurance Market Conditions

Combined ratio by quarter- Sourced from Bank of England

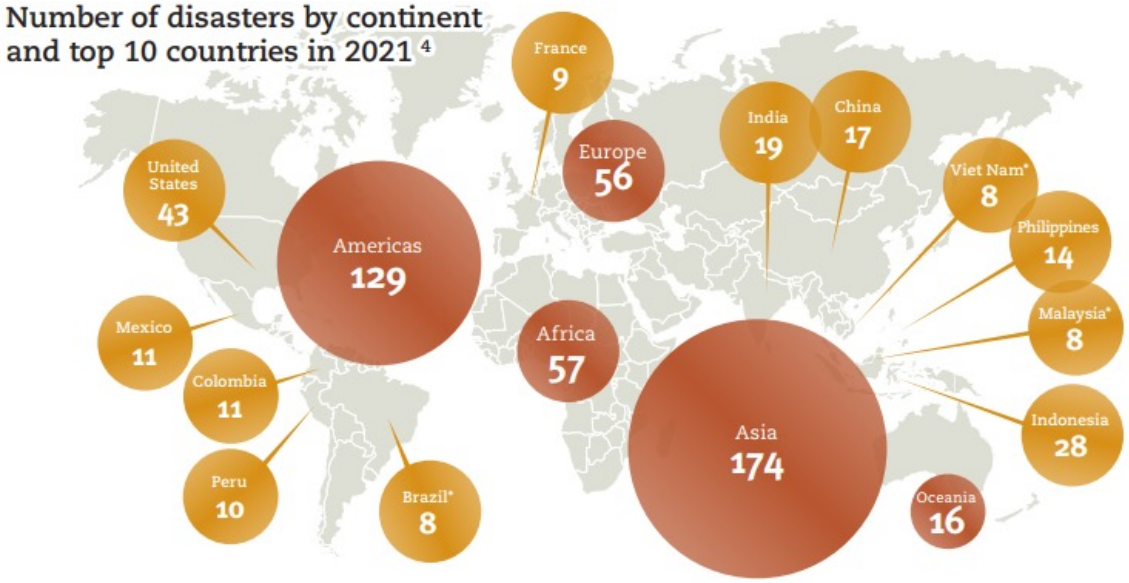


2. https://www.bankofengland.co.uk/statistics/insurance-aggregate-data-report

Growth in Natural Catastrophe losses

Over the last 20 years the number of natural catastrophe has nearly doubled

- The UN's research into catastrophes, has revealed that the number of natural disasters has nearly doubled in the last 20 years.
- There were 7,348 recorded disaster events worldwide, during the last two decades
- These two decades of disaster also caused $2.97 trillion in losses to the global economy (3)
- In 2021, the Emergency Event Database (EM-DAT) recorded 432 disastrous events related to natural hazards worldwide (4)



(5)

3. https://news.un.org/en/story/2020/10/1075142
4. https://reliefweb.int/report/world/2021-disasters-numbers
5. https://cred.be/sites/default/files/2021_EMDAT_report.pdf

Natural Catastrophe

Frequent catastrophic events, in combination with the need to meet evolving regulatory requirements, can threaten company business models, which makes insuring some risk unaffordable for customers or unfeasible for insurers.

Wildfire

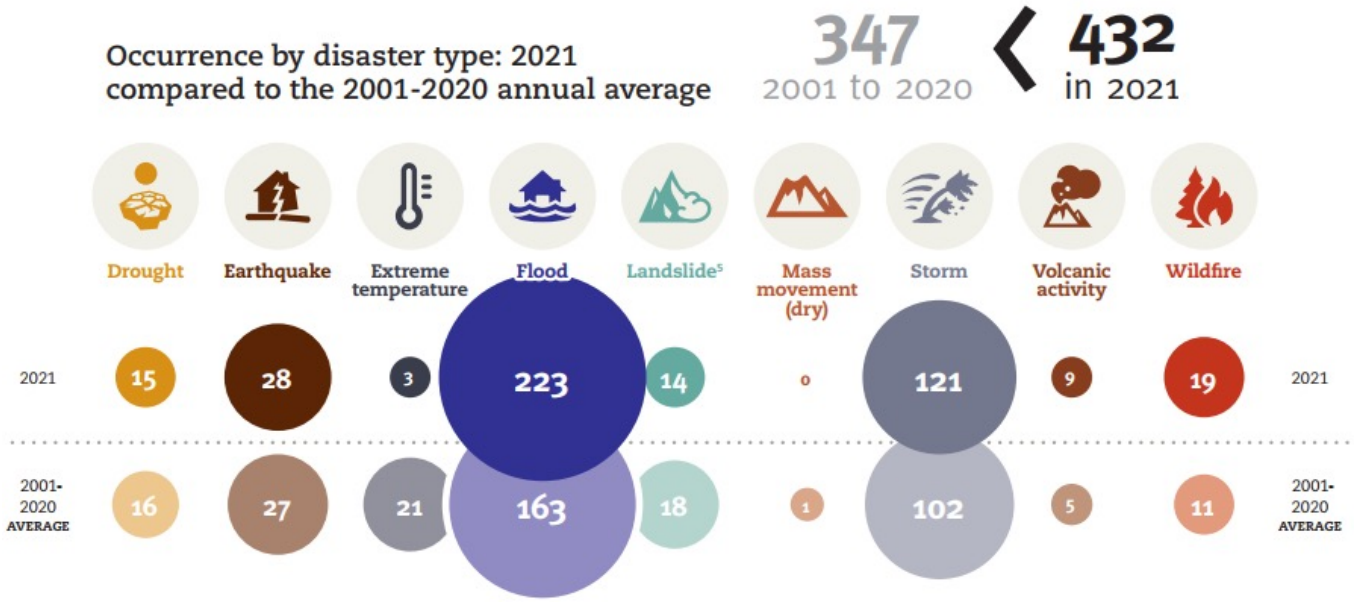
- Globally there were a high number of wildfires in 2021 (19 events) compared to the 2001-2020 average of 11 per year.
- Combination of heat waves and persistent drought events in 2021, causing 9 billion US$ in total economic costs. (6)

Hail

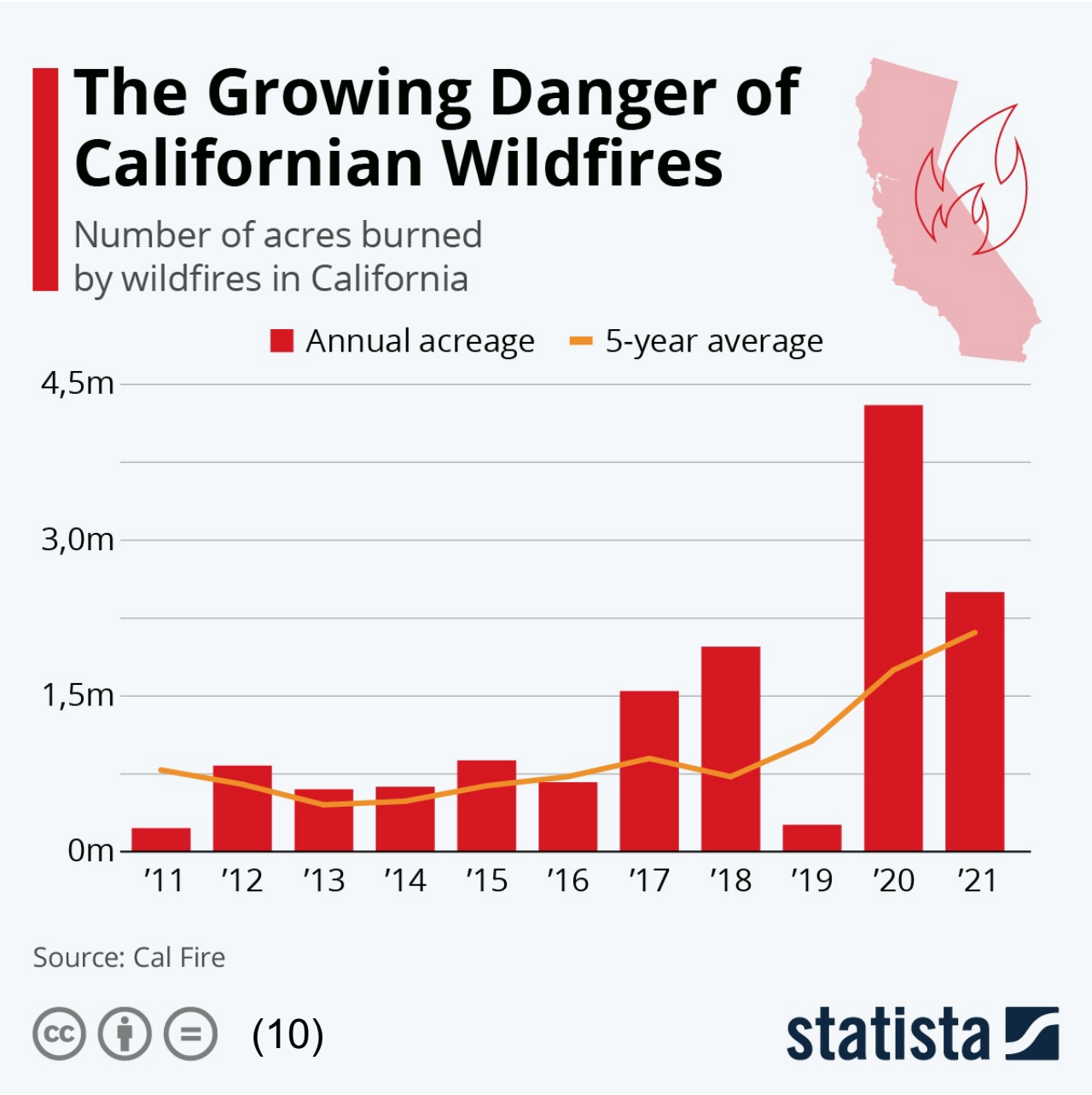
- A 2019 hailstorm damaged 400,000 panels of a Texas solar farm and resulted in $70 million to $80 million in losses. (7)
- Microcracks can occur in solar panels, and they can propagate throughout the panel over a period of time.

Tornado

- The outer wall of the funnel can form in a matter of minutes, and experience wind speeds of up to approximately 500 km/h which can cause catastrophic damage to wind and solar farms (9)



6. https://www.mckinsey.com/industries/financial-services/our-insights/climate-change-and-p-and-c-insurance-the-threat-and-opportunity
7. https://news.ambest.com/articlecontent.aspx?pc=1009&AltSrc=108&refnum=308714
8. https://willistowerswatson.turtl.co/story/renewable-energy-market-review-2021-ungated/page/20/1
9. https://www.munichre.com/en/risks/natural-disasters-losses-are-trending-upwards/thunderstorms-hail-and-tornados.html



California's wildfires are causing more and more damage

- The amount of land burned by wildfires in the state has risen steeply in the past five years.
- The Washburn Fire in California has burned at least 1,591 acres of land
- This is costing California more and more money – up from $61 million in the 1990s to more than $400 million in the 2010s.

What is the damage?

- Forced curtailment and consequential loss of production of solar generation, due to utility grid shutdowns to prevent fires
- Reduced output of non-exposed solar assets, as a result of reduced sunlight and soot from wildfires falling on the panels
- Liability of third-party damages for fires originating from an energy generator's physical assets (11)

10. https://www.weforum.org/agenda/2022/07/californian-wildfires-danger-environment/?utm_source=slipcase&utm_medium=affiliate&utm_campaign=slipcase Growing danger of Californian wildfires. Image: Statista.
11. https://willistowerswatson.turtl.co/story/renewable-energy-market-review-2021-ungated/page/20/1

Challenges for Insuring Renewable Energy risks

Technology

Is technology prototypical?

- Most technology used in renewable energy developments will be thought proven.
- However, insurers will often consider evolving technology or new uses to be prototypical.
- Insurers will want to see Performance Data.
  - Performance Data not always available from manufacturers.

Blade furniture

- How does it increase the bearing stress?
- Impact upon the life of the asset?
- Potential for Serial Losses across multiple assets.

Larger turbines

- As turbines grow values increase and more insurance is needed.
- Often requires more insurers to participate and increases the complexity of the programme.

Carbon Capture Usage & Storage (CCUS)

- A suite of technologies that can play a diverse role in meeting global energy and climate goals

Hydrogen

- High production, maintenance and repair costs

Battery Energy Storage Systems

Why are insurers wary of providing cover for BESS?

- Carnegie Road BESS in Liverpool, UK 20MW battery energy storage system (BESS)
- This site was considered to use proven technology with a competent owner. It comprised of 3 battery containers and 1 switchgear container
- Despite being close to fire hydrant and the scene being attended by several fire brigade engines, the fire went on for several hours (12)

12. https://www.energy-storage.news/fire-at-20mw-uk-battery-storage-plant-in-liverpool/

Battery Energy Storage Systems

Insurer needs

- Minimum insurer standards:
  - Spacing including ancillary equipment (transformers, inverters).
  - Fire suppression – sprinklers + available water supply.
  - Need insurance Engineering report.
- Common risks associate with batteries:
  - Fires will often lead to large losses.
  - Thermal Runaway causing insurers to be very cautious.
  - No accepted industry standards for fire protection.

Battery Risk

What are the standards?

- NFPA 855, the Standard for Installation of Stationary Energy Storage Systems (ESS).
  - NFPA 855 looks at fire spread from the ESS as a whole, rather than between components within the ESS (13)
  - Allows a number of requirements to be disregarded if full scale fire tests take place and the AHJ agrees
  - Gives standards for construction of buildings associated with indoor systems.
  - Provides separation distances between the ESS and other exposures
- FM Global 5-33 - Electrical Energy Storage Systems. This will give guidance for separation distances, construction standards and fire suppression systems, along with fire water flow rates required.
- Testing – UL 9540a
  - Limited application
  - No pass or fail.

13. https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=855

The DUT usually cools down at this point – showing the true chemical thermal runaway reaction is not present – or there is no longer sufficient chemical energy and fuel present

Renewable Energy – Risk Complexities

Inflation

- General increase in prices
- Particular inflation in renewable energy components due to demand and scarcity.
- Cost of steel for wind turbine blades risen by 50% since pre pandemic (14)
- Requirement for more insurance which requires more capacity.

Supply Chain

- Increasingly complex Supply Chains
- Suez Canal
- Lead times for replacement parts (15)

Cyber

- Remote sites
- Energy Industry is vulnerable to cyber attacks (16)
- 1st Party & 3rd Party risk

14. https://www.theguardian.com/environment/2022/may/24/supply-chain-delays-and-steel-costs-are-part-of-perfect-storm-stalling-renewable-energy-growth
15. https://www.mckinsey.com/industries/travel-logistics-and-infrastructure/our-insights/overcoming-global-supply-chain-challenges
16. https://ecfr.eu/article/why-europes-energy-industry-is-vulnerable-to-cyber-attacks/

What can you do?

- **Work with a specialist Broker.**
  - Climate risk can change quickly, revisions to policies that are based only on historical data may not reflect the full cost of climate risk. Indeed, common catastrophe models, which are mostly based on historical data, are unlikely to accurately project risk because the climate now behaves differently.

- **Engage insurance Engineers at an early stage.**
  - Lesser-known risks associated with renewable energy projects are present at all stages of construction and operation. The long list includes the reliability of catastrophe models, manufacturer designs and test results of assets, training and capability of construction contractors, critical updates of technologies, assets operation and maintenance procedures.
- **Ensure access to Manufacturers performance data.**
  - A solution can lie in a government-backed scheme or insurance product that encourages small renewable project operators to upgrade components such as new wind turbines and more efficient power generators. If system components are upgraded then system warranties can then be extended.
- **Ensure EPC contracts require contractors to provide detailed information well ahead of completion.**