

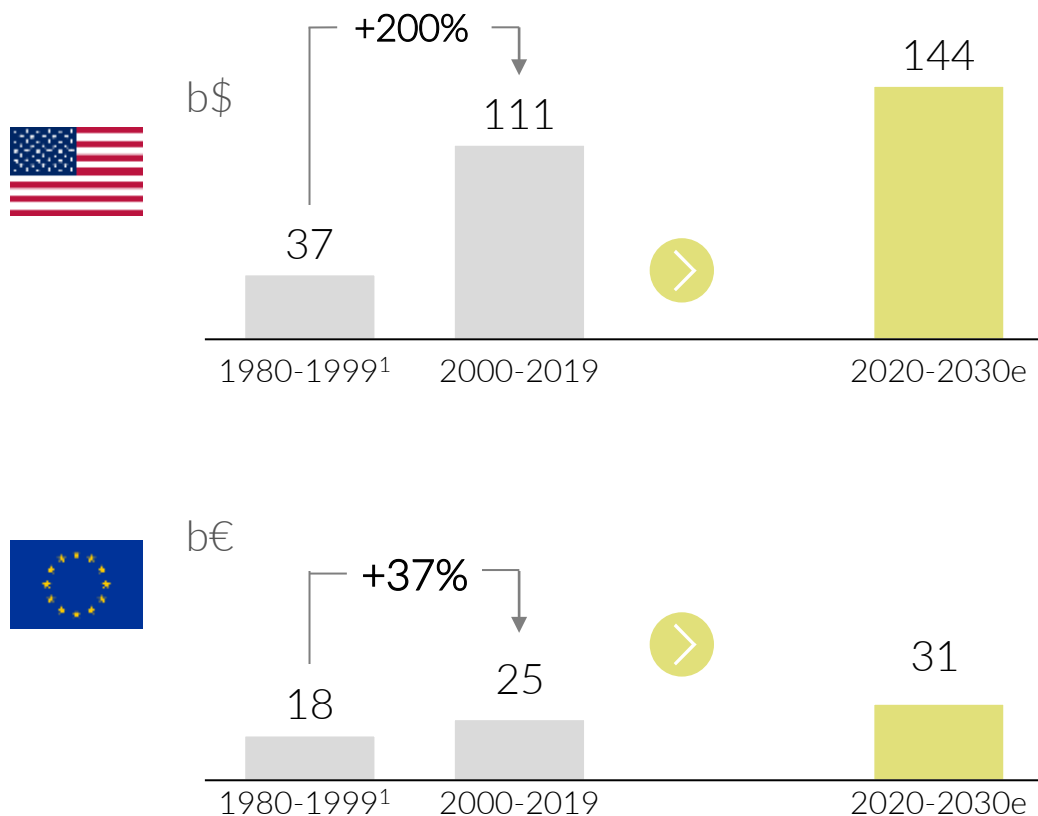
Coupling resilience with grid modernization and expanding prosumers market

Combining mature and rapidly expanding grids in two continents

January, 27 2022

More frequent extreme weather events affect reliability

ECONOMIC DAMAGES CAUSED BY WEATHER EVENTS HAVE BEEN INCREASING SINCE 1980



Expected total GDP loss caused by extreme weather

~10% (EU) and ~14% (US) of GDP losses are estimated to be caused by utilities' power outages

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*The electricity system is witnessing **increasing pressure from climate change**. Global warming, rising sea levels and extreme weather events... pose a significant challenge to the resilience of electricity systems*

IEA Climate change: An increasing threat

THE ENERGY TRANSITION WILL MAKE THE ROLE OF ELECTRICITY EVER MORE IMPORTANT

(1) Sources 2021 BCG analysis with inputs from European Environment Agency and (US) National Center for Environmental Information.

Recent weather events

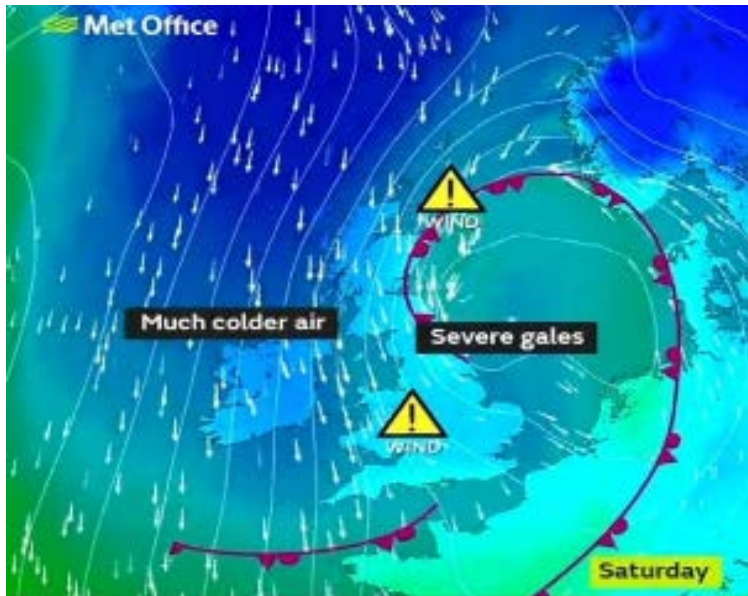
ES: Storm Filomena, from 8th to 10th January 2021



- Snowfall not seen in a 100 years
- City of Madrid heavily affected
- Impact very concentrated in central Spain

Recent weather events

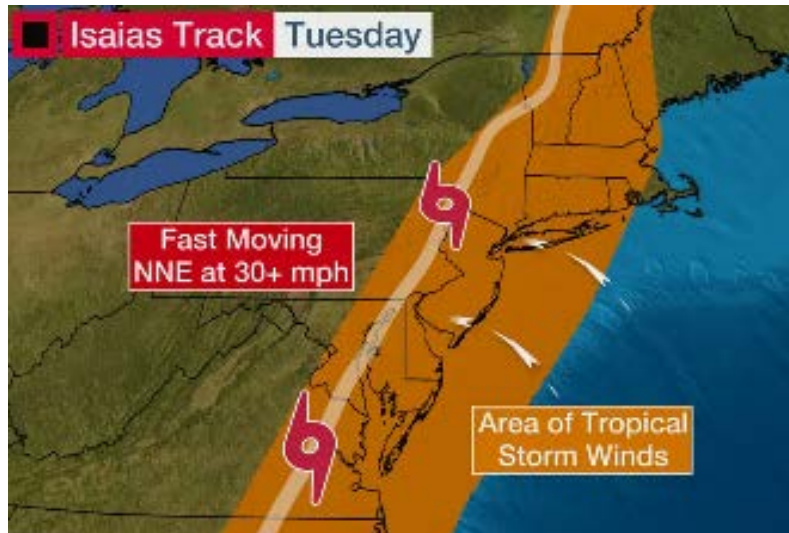
UK: Storm Arwen 25th and 26th November 2021



- Deep pressure moving southwards from the Atlantic Ocean
- Worst in 25 years
- 1 million customers affected in the UK.

Recent weather events

US: Storm Isaias 3rd and 4th August 2020



- Strongest tropical cyclone since Hurricane Rita in 2005



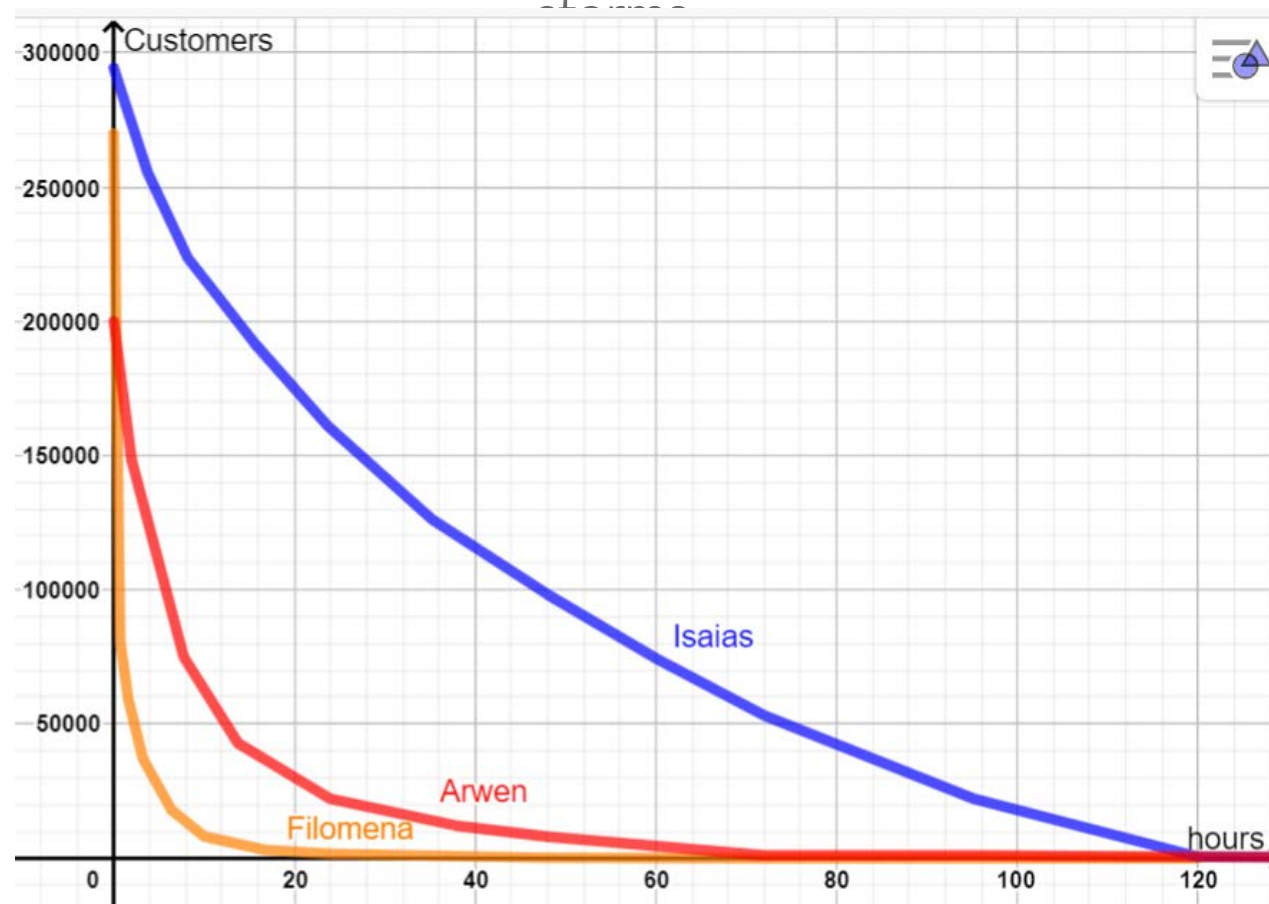
- 3 million customers affected



- 340 k customers affected in Avangrid service area

Storm restoration times

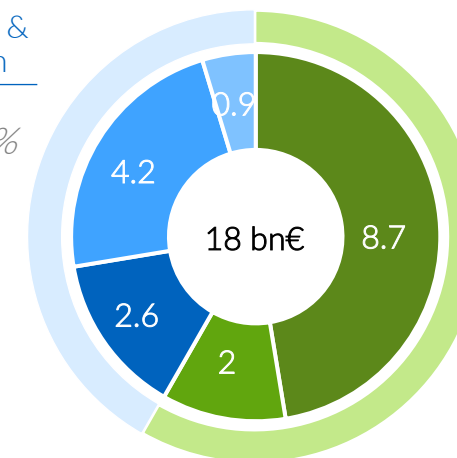
Summary of restoration times for the three



Improvement still needed in the US storm response time

2021-2025 Investment by category (bn€)

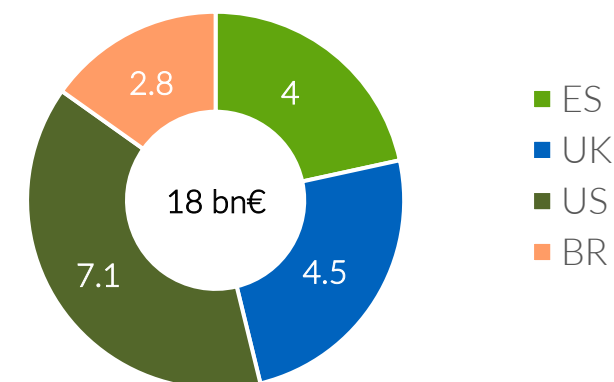
Digitalization & Electrification
7.6 42%



Resiliency
10.7 58%

- Modernization
- Resiliency & Biodiversity
- Digitalization
- Electrification
- Renewables Connections

2021-2025 Investment(*) by country (bn€)



(*) Only regulated networks

Conclusions

Grids must be resilient to serve the energy transition

- Electricity networks need to ramp up investment because....
 -a more resilient grid is needed to adapt to future climate conditions
 - ... electricity grids are the key enabler of the energy transition and net zero
- The starting point is different in each jurisdiction
- Positive steps have been taken by regulators.



FRANK PARTNERSHIP BETWEEN COMPANIES AND REGULATORS IS THE KEY TO SUCCESS.