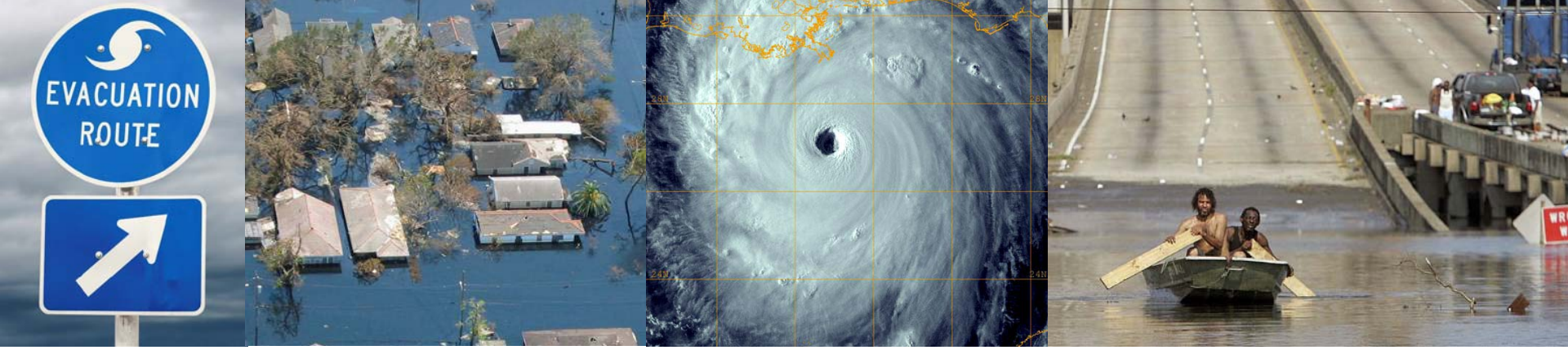


Effectively addressing climate risk through adaptation for the Energy Gulf Coast

Brent Dorsey
Entergy, Environmental Strategy & Policy

The Atlantic Council – Washington, DC
Climate Change and Extreme Weather Vulnerability Assessment of the US Energy Sector:
Building a Secure and Sustainable Energy Future
July 24 – 25

Entergy®

Entergy & Adaptation

- Regardless of Climate, significant risks exist for the Gulf Coast
- Entergy and America's Wetlands Foundation joint sponsorship of adaptation analysis
- Leverage McKinsey/Swiss Re analysis
- Provide decision makers with the appropriate fact base and framework to identify risks and adaptive strategies
- Focus on Gulf of Mexico "Energy Coast"

Adaption Follow Through . . . Actions ETR is Taking

- **America's Wetland Foundation**
  - Joint Sponsorship with America's Wetland Foundation
  - Study released at World Deltas 2010 Dialogue
  - Blue Ribbon Resilient Communities Program
    - Launched Feb, 2011 - concluded May, 2012
    - Eleven locally focused meetings in the four state analysis area

- **Entergy Asset Resiliency**
  - Internal Evaluations of Critical Infrastructure
  - Focus on T&D, Generation and Vegetation Management
  - Expand to include other affected utilities

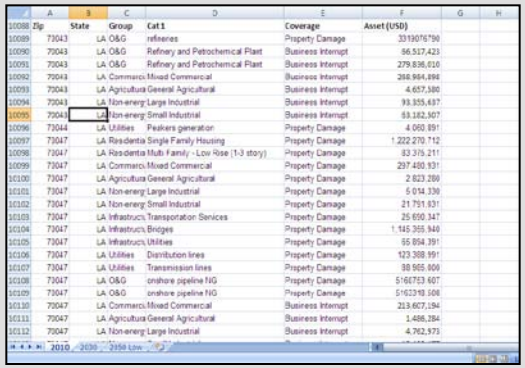
- **Legislative and Regulatory**
  - Leverage work with Federal Efforts
    - Adaptation - more focused regionally than "Cap & Trade"
    - Intersection of Oil Spill Fund
    - Incorporate with Energy/Environmental Policy

Methodology uses asset, hazard, and vulnerability modules to determine expected annual losses due to climate-related events

A detailed asset baseline is developed ground up

- Over **23 asset classes assess** across **800 zip codes**
- Baseline is then grown to 2030 using industry projections
- Over **15,000 rows of data** for each year's projection (over **100,000 rows total**)

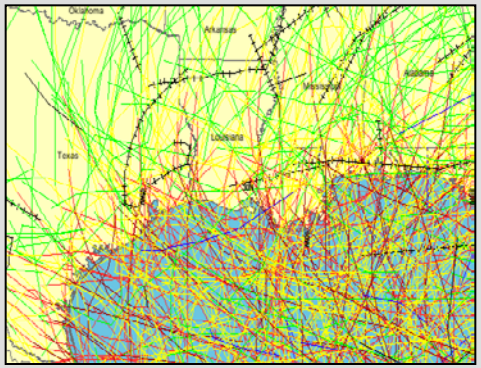
Sample asset data sheet



Hazard is assessed and scenarios are created

- Used **27** IPCC **Global Climate Models (GCMs),** to construct 2030, 2050, and 2100 scenarios
- Based on historical events, **10,000+ hurricane simulations** generated

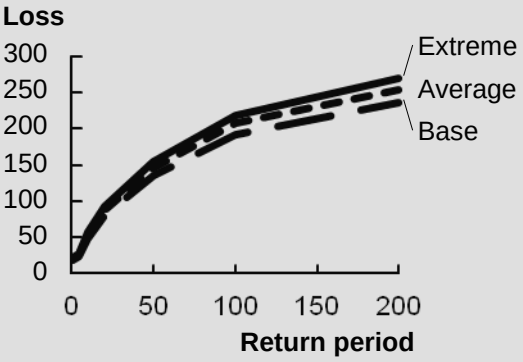
Illustrative generation of hurricane paths/intensities



Hazard is assessed and scenarios are created

- **Swiss Re** uses their **proprietary vulnerability curves** to assess the impact of these events for **each asset class** in **each zip code** and to turn these into loss curves

Loss frequency curves for hazard scenarios



Source: Swiss Re; Team analysis

Gulf Coast suffers from a number of climate and non-climate related hazards

Hazards	Brief overview	Effect
 Wind related damage	**Damage can occur across the Gulf Coast region** and in areas further inland	▪ Potential **increase in wind speed of 1.4-2.9% in 2030** due to warmer sea surface temperatures
 Global sea level rise (gradual)	**Global impact resulting from** ice melt and flow that raises sea level across oceans and impacts the Gulf	▪ Relative sea level may **rise by 5-6 inches in 2030** (2.5 - 5 feet by 2100)[1]
 Coastal flooding	**Risk is along the coastline,** linked to hurricane events	▪ **Storms can increase the impact of even modest levels of sea level rise** ▪ Could lead to more frequent/severe flooding of coastal zones
 Gulf Coast subsidence	**Falling shoreline** due to absence of replenishing sediment in wetlands and ground depression due to heavy extraction	▪ **Unrelated to climate change** ▪ Local and most intense in Southern LA ▪ Most intense areas:5 inches by 2030, 10 by 2050, 22 by 2100

1 Based on Vermeer and Rahmstorf. "Global sea level linked to global temperature." 2009.

Source: *National Hurricane Center, NOAA, American Geophysical Union (AGU), Union of Concerned Scientists (UCS); IPCC AR4; Vemeer and Rahmsorf*

The Gulf Coast is robust economic engine that will be impacted by these events with growing severity

Key areas examined within 70 miles of the coast

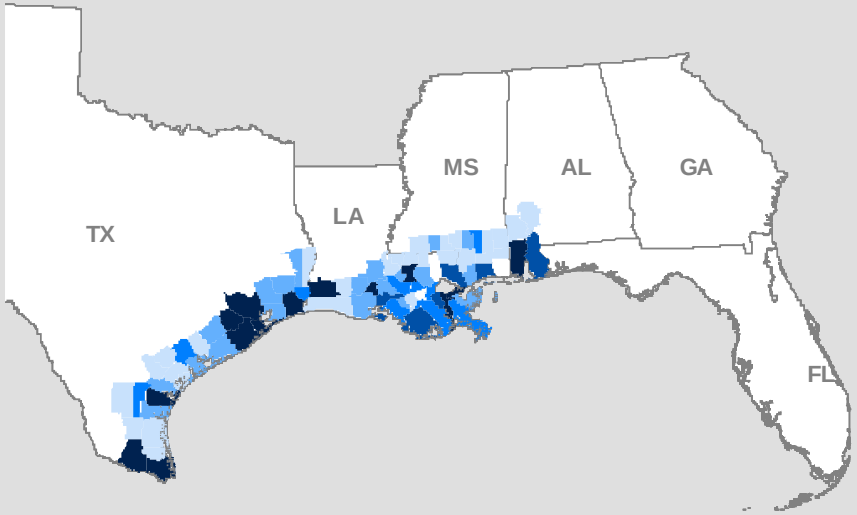
US Gulf Coast region and counties in scope[1]

2010 GDP ($M)

- ≤1,000
- 1,000-2,500
- 2,500-5,000
- 5,000-10,000
- >10,000

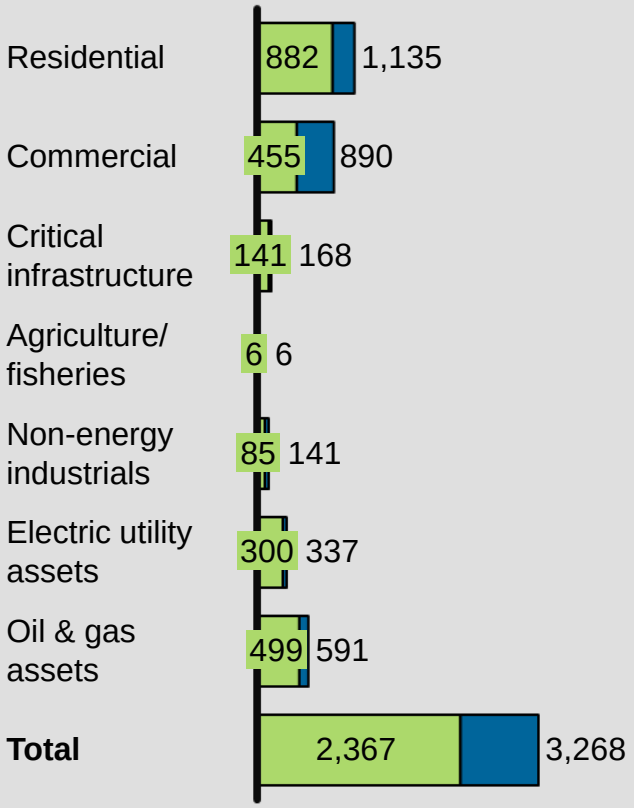
Basic metrics

Counties	77
Area	61,685 sq. mi
GDP	$634 B
Population	11.7 million



Asset values by class

Replacement value by class
$ Billions, 2010 dollars

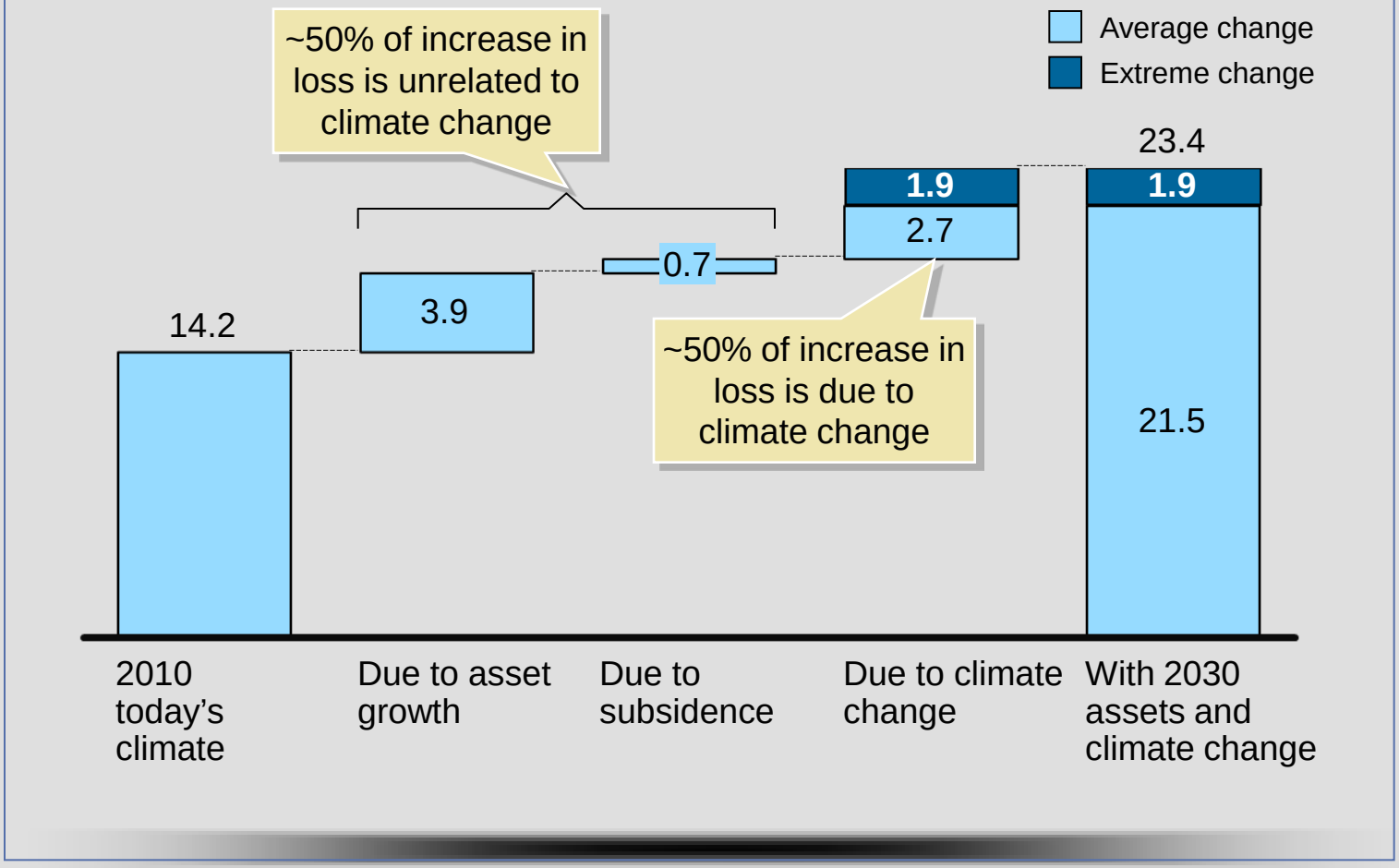


[1] *Includes 30 Louisiana parishes*

Source: ESRI; Energy Velocity

However, regardless of climate change, the Gulf Coast faces increase in risks from natural hazards

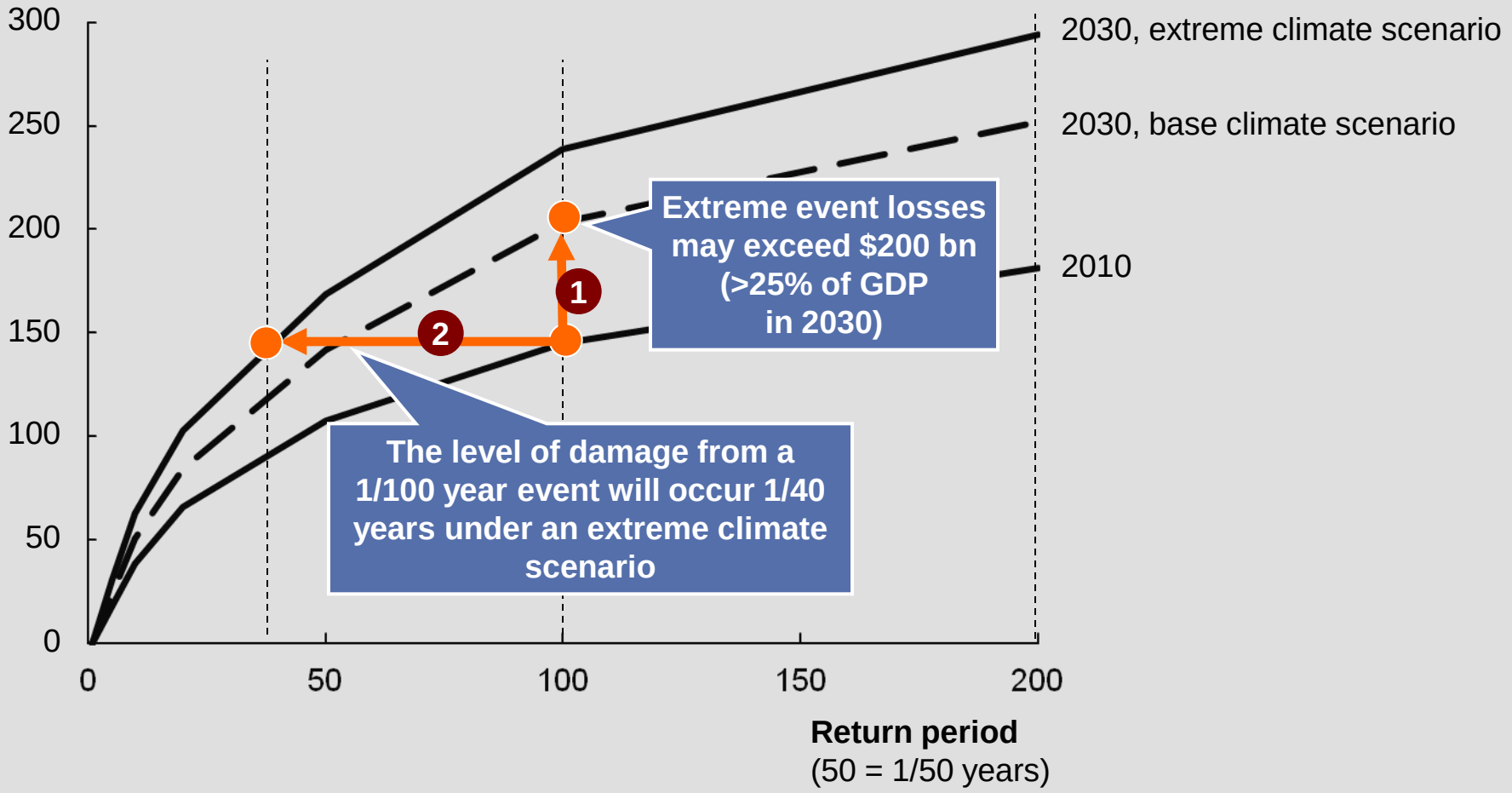
Average annual expected loss in Gulf Coast region by cause
$ Billions; 2010 dollars



Source: Entergy

Furthermore, even in the near term, loss from extreme event "tail risks" may increase and occur more often

Loss frequency curve for annual loss
$ Billions; 2010 dollars

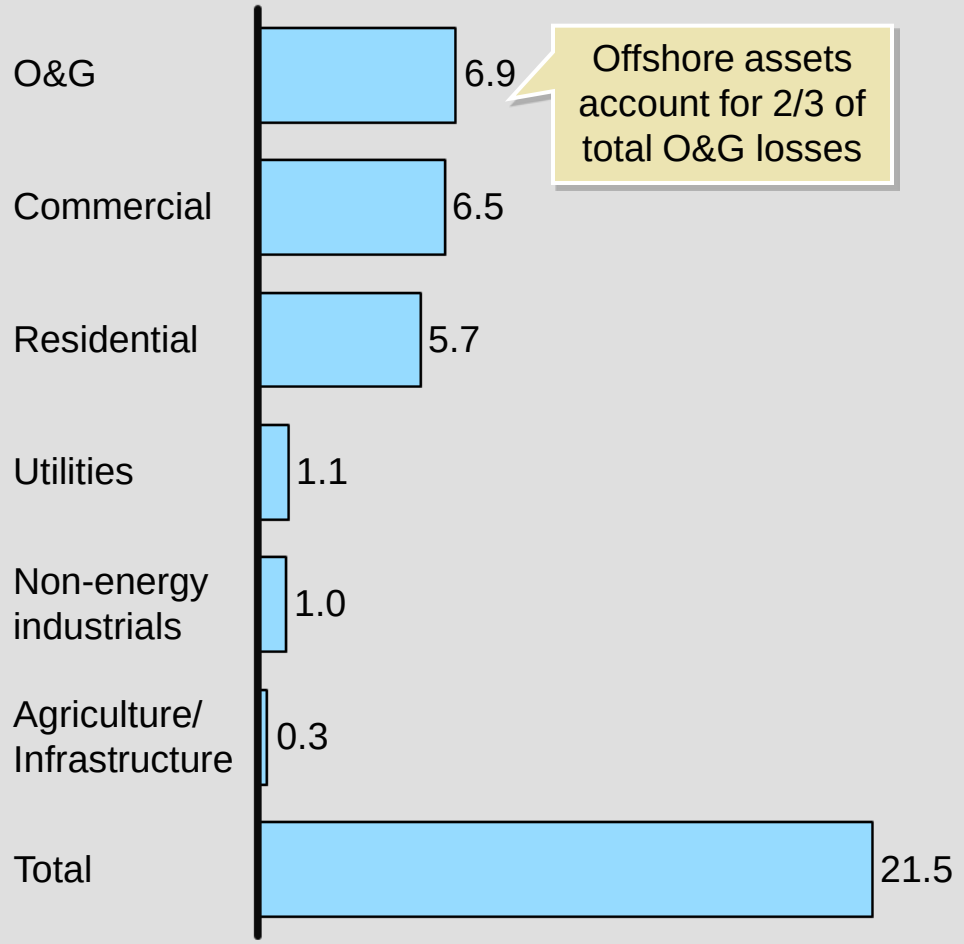


Source: Entergy, Swiss Re; Press searches

Among economic sectors, oil and gas assets are particularly vulnerable

2030, MID SCENARIO

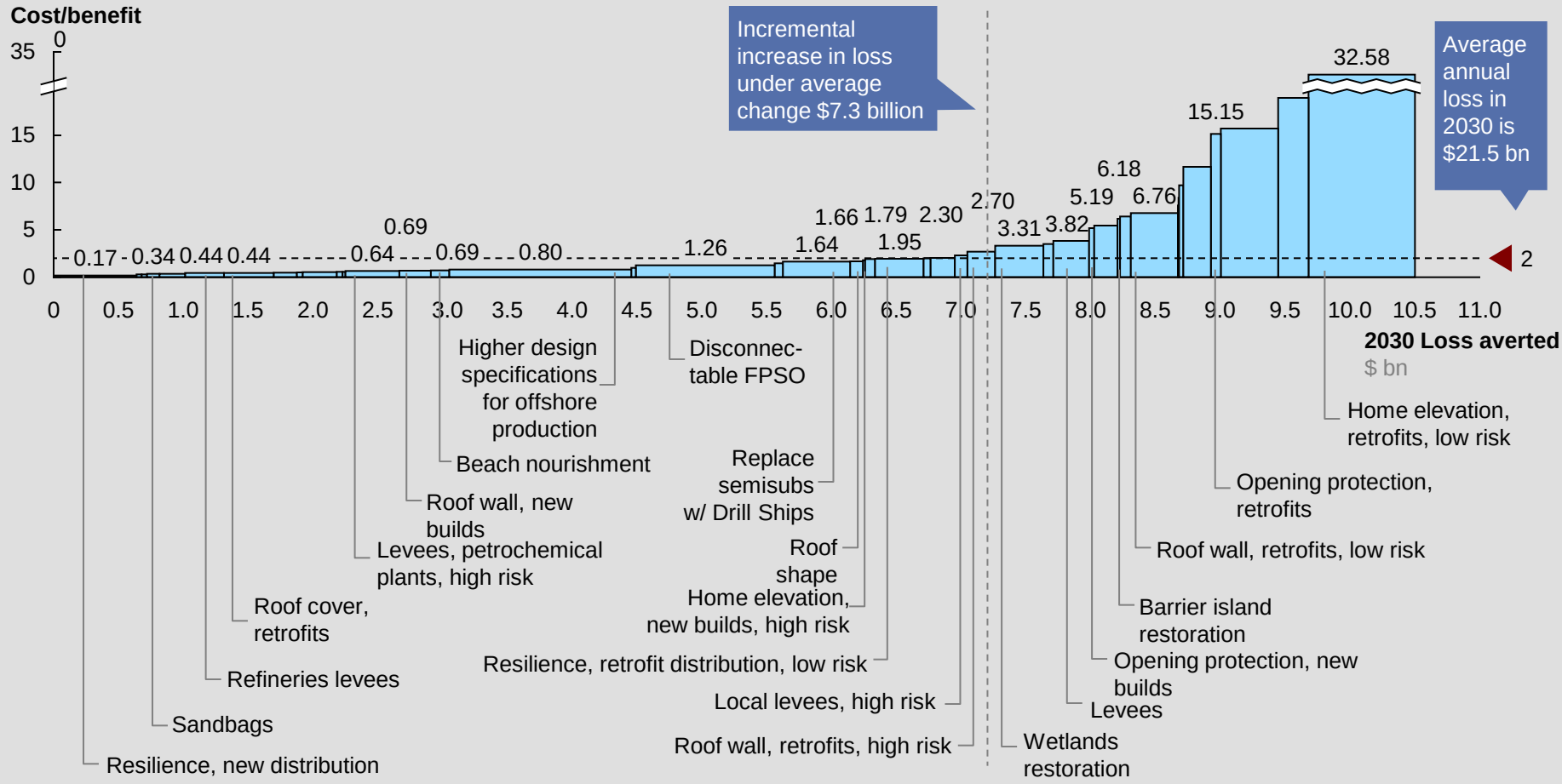
2030 annual average expected loss
$ Billons; 2010 dollars



- **30% of overall damage occurs in the O&G sector,** driven by offshore assets
- **Offshore assets are more vulnerable** than onshore assets
- **Residential and commercial sectors** also face large share of loss

Source: Entergy

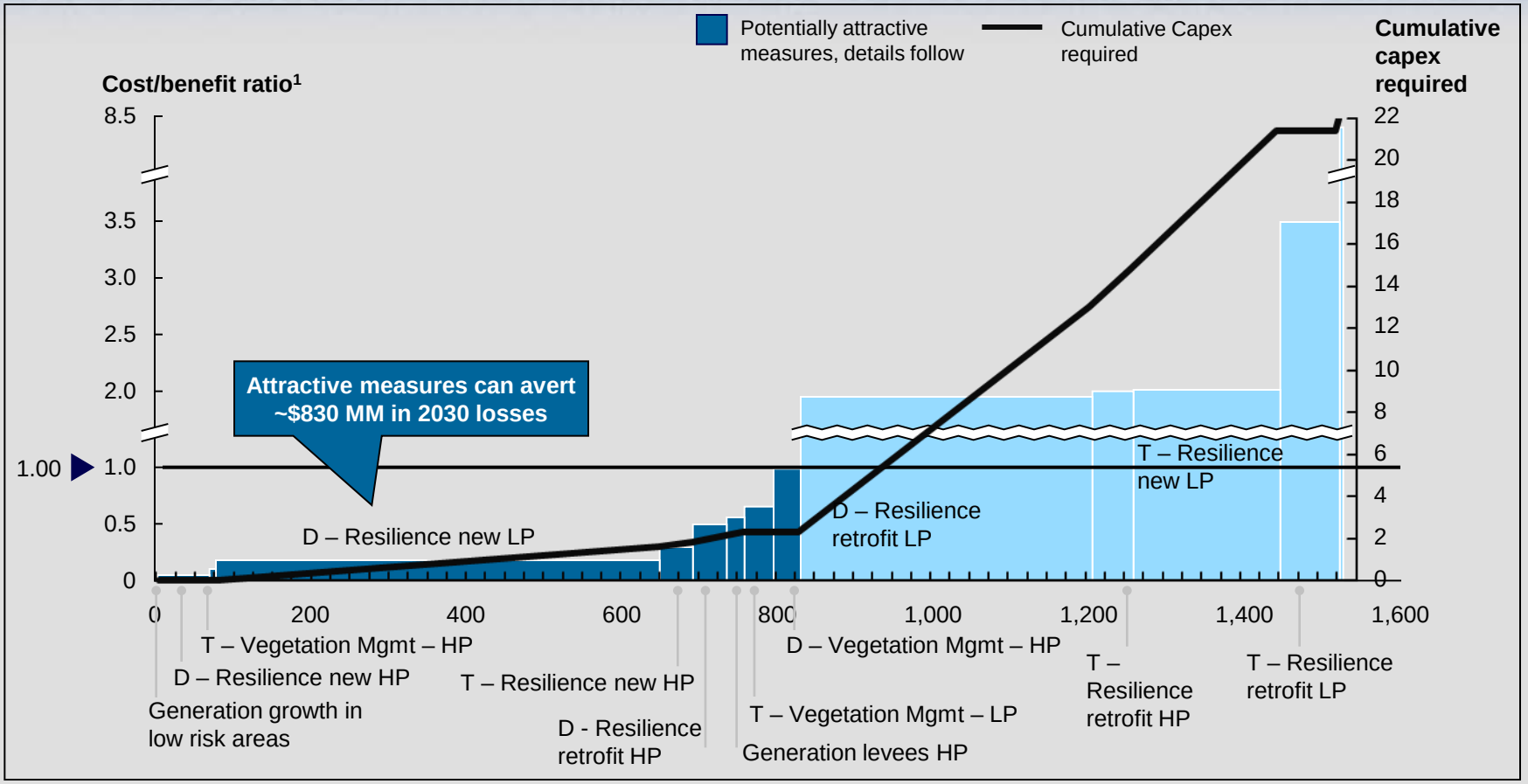
Potentially attractive measures can address the increase in annual loss between today and 2030 and keep the risk profile of the region constant



Source: *Entergy*

Cost beneficial utility measures can address $830 million of loss in 2030

Electric utility measures



- Resilient distribution lines (both new builds and retrofits) are key actions
- Vegetation management has potential to reduce losses at C/B < 1
- Transmission resilience efforts tend to be attractive only in high risk areas

Note: HP refers to High Priority areas (zip codes with high average losses) ; LP refers to Low Priority areas (zip codes low average losses)

[1] Benefits include utility property damage + utility business interruption + commercial and non-energy industrial business interruption aversion

Source: Swiss Re; team analysis

Key messages from adaptation work

1. **The Gulf Coast is vulnerable to growing environmental risks today with >$350 billion of cumulative expected losses by 2030**

2. **Key uncertainties to address this vulnerability include (1) the impact of climate change, (2) the cost and effectiveness of measures to mitigate and adapt and (3) the ability to gain alignment and overcome obstacles moving forward**

3. **Driving a "practical" solution that takes Gulf Coast "resilience" to the next level represents an optimal solution to balance the cost requirements with the risks that impact the Gulf Coast**

Contact Info

Brent Dorsey
Entergy Corp.
bdorsey@entergy.com
(281) 297-3321