Disasters and Recovery – Pathway to Resilient Industry

Hitesh Mohan, INTEK Inc.
Grace Kuczma, INTEK Inc.

Polling

Please go to MENTI.com
Poll ID : 5210 1230

We will have this for 5 minutes after that we will show the results

Discussion Items

- Why Resiliency?
- What is Resilience?
- Cascading Effects of Natural Disasters and Climate Change Influence
- Hurricane Vulnerability
  - Case Study
- Preparedness and Resiliency

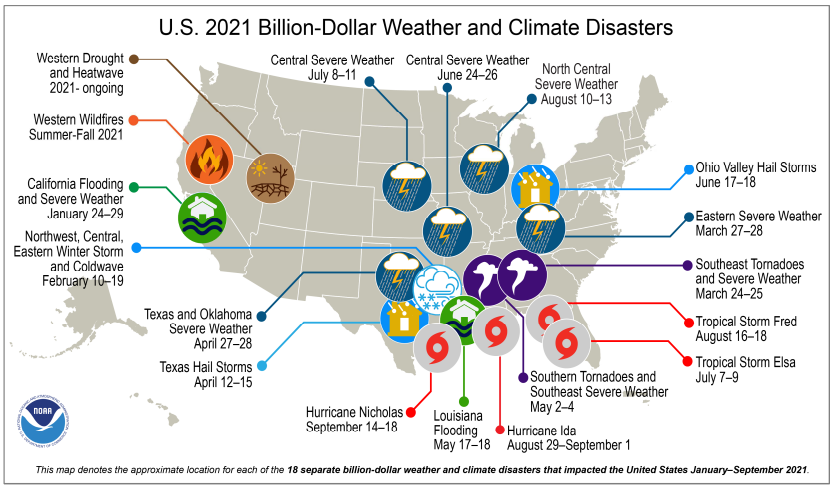
3

Severe Weather Events Increasing

Billion Dollar Events per Year (Cost per Year)

- 1980s: 2.9 ($18.7B)
- 1990s: 5.3 ($28.9B)
- 2000s: 6.3 ($54.7B)
- 2010s: 12.3 ($85.8B)
- 2018-20: 16.7 ($82.2B)
- 2020: 22.0 ($100.2B)

*Damages are dominated by tropical cyclone losses (1980-2020 average **$20.3B per event**)*



4

Why should We Care?
Top Five Global Risks in Terms of Risk

Webinars

	1st	2nd	3rd	4th	5th
2021	Extreme weather	Climate action failure	Human environmental damage	Infectious diseases	Biodiversity loss
2020	Extreme weather	Climate action failure	Natural disasters	Biodiversity loss	Human-made environmental disasters
2019	Extreme weather	Climate action failure	Natural disasters	Data fraud or theft	Cyberattacks
2018	Extreme weather	Natural disasters	Cyberattacks	Data fraud or theft	Climate action failure
2017	Extreme weather	Involuntary migration	Natural disasters	Terrorist attacks	Data fraud or theft

WORLD ECONOMIC FORUM

COMMITTED TO IMPROVING THE STATE OF THE WORLD

5

Investing in Resiliency = Recovery Savings

Webinars

Resiliency
- Robustness
- Redundancy
- Resourcefulness
- Rapidity

For every $1 spent on resilience

Saves $4-9 that would have been spent on recovery

WORLD BANK GROUP

6

What is **Resilience**?

Webinars

DISASTERS ARE INEVITABLE.
WHAT IS RESILIENCE?

Robustness
Redundancy
Resourcefulness
Rapidity

"**Resilience** includes the ability to withstand and recovery rapidly from deliberate attacks, accidents, natural disasters, as well as unconventional stresses, shocks, and threats…"

-National Security Strategy of the United States of America, December 2017

7

Robustness

Webinars

Robustness

The ability of systems, system elements, and other units of analysis to maintain critical operations and functions in the event of a crisis or disruption.

Achieve Robustness through:

- Performing routine inspections
- Promoting sustainable development
- Conducting Capabilities Based Assessments on materials and construction methods
- Containerizing local impact and ensuring the supply chain can function without node (if possible)

8

Redundancy

Redundancy
The ability to satisfy functional requirements if damage to a component or loss of functionality occurs.

Achieve Redundancy through:

- Identifying key chokepoints and/or nodes in the supply chain
- Routinely testing functionality of key chokepoints and nodes
- Ensuring availability of backup components
- Diversifying supply chains and solutions

9

Resourcefulness

Resourcefulness
The ability to identify and prioritize problems and respond to and manage a crisis as it unfolds.

Achieve Resourcefulness through:

- Regularly reviewing, testing, and updating continuity plans
- Seeing how plans and people adapt when an element of the plan fails
- Organizing material, monetary, informational, technological, and human resources
- Prioritizing actions to control and mitigate damage

10

Rapidity

Rapidity
The ability to restore functionality in a timely fashion while containing losses and avoiding disruptions.

Achieve Rapidity through:

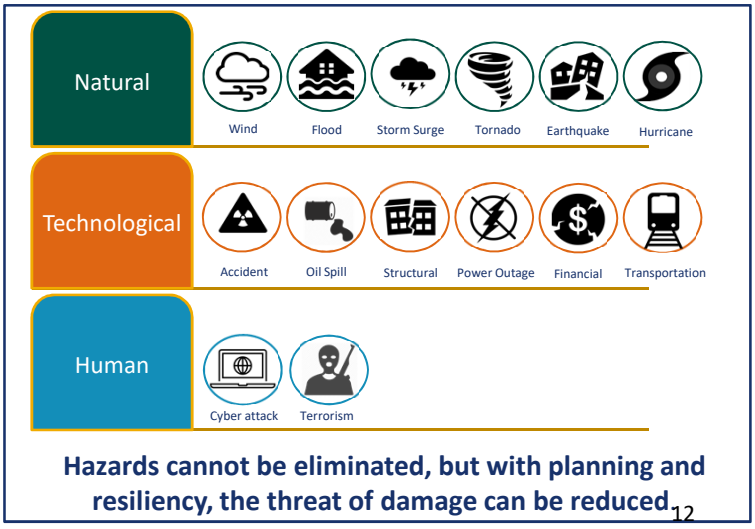
- Developing contingency plans
- Maintaining competent emergency operations
- Enabling people and resources effectively and efficiently
- Ensuring communication and coordination
- Incentivizing preparedness measures and mitigation efforts
- Having national aid procedures in place

11

Hazards

A source of harm or difficulty caused by naturally occurring or human-induced processes or events that has the potential to lead to an emergency or disaster.

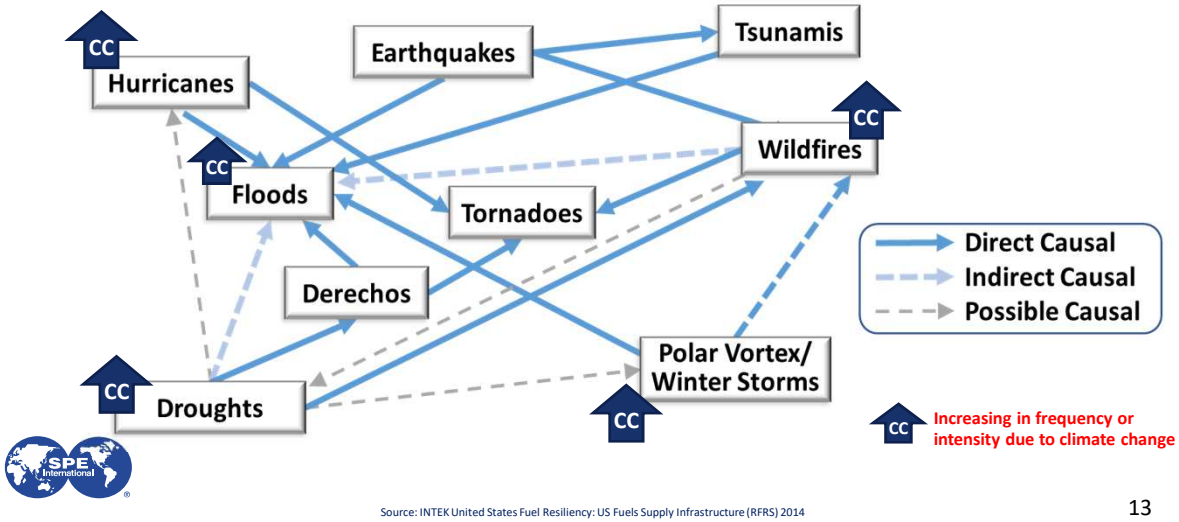
- Climate change may impact the characteristics and probability of many hazards.



Hazards cannot be eliminated, but with planning and resiliency, the threat of damage can be reduced.

12

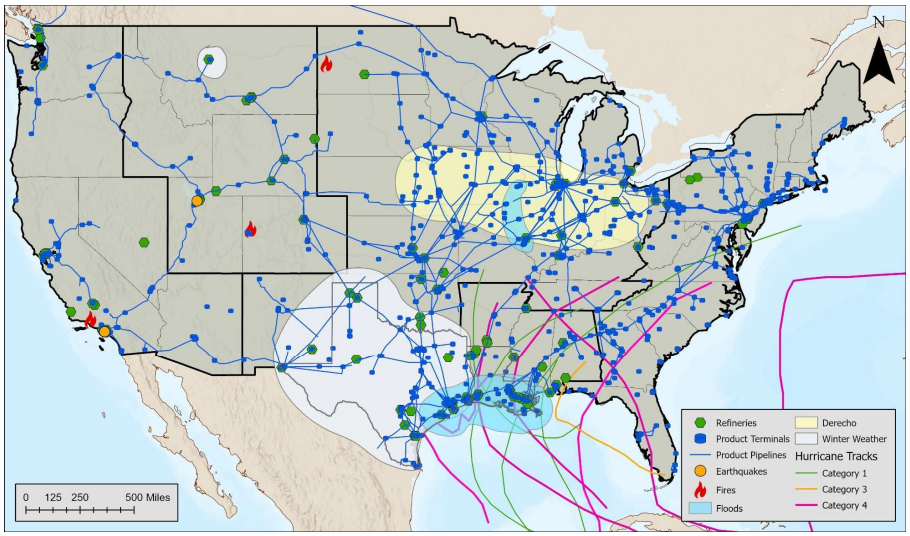
Cascading Effects of Natural Disasters



Source: INTEK United States Fuel Resiliency: US Fuels Supply Infrastructure (RFRS) 2014

13

Natural Disasters Affecting Petroleum Infrastructure (2015-2021)



14

Webinars

Assessment of Fuels Infrastructure Vulnerabilities to Hurricanes

CASE STUDY:

2021 HURRICANE IDA

15

Hurricane Ida

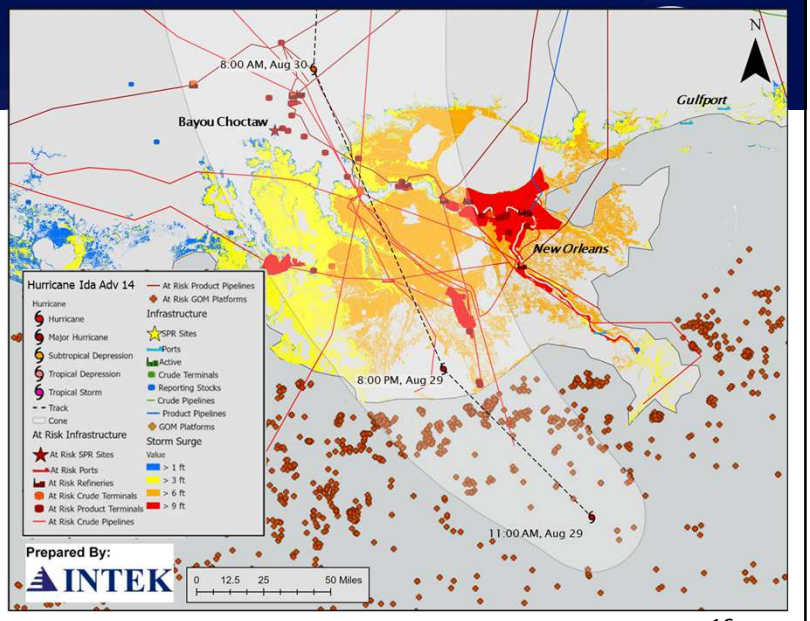
Summary

On August 29, 2021, Hurricane Ida made landfall near Port Fourchon as Cat 4, with maximum sustained winds of 150 mph

Peak power outages up to 1.2 million customers across eight states.

Disrupted 90-95% of offshore oil and gas production

2021 Hurricane season was the THIRD most active year on record

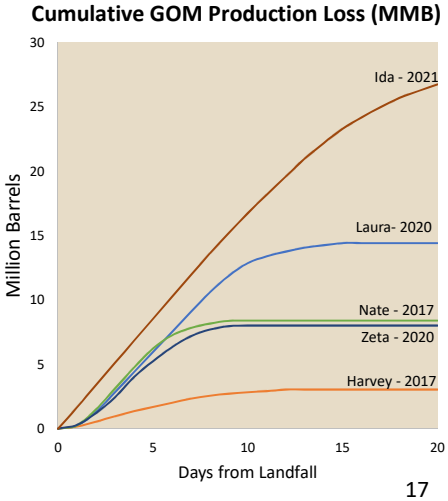


Source: U.S. Energy Information Administration, U.S. National Oceanic and Atmospheric Administration

16

Hurricane Ida GOM Production Impacts

- In the Gulf of Mexico, cumulative production loss totaled approximately 31 MMB of crude oil and 38 BCF of natural gas production- WORST in 16 years
- Globetrotter rig significantly damaged
  - Crew reports state NOAA advisory was not taken- actions were "irresponsible"
  - Estimated would require months for repairs
  - As of Nov. Noble report: was in shipyard for inspections and repairs
- Delta-143 platform sustained significant structural damage
  - Shell expects "resume production from our Olympus platform, which flows across the WD-143 "C" platform, in Q4 2021, and from our Mars and Ursa facilities, which flow across the WD-143 "A" platform, in Q1 2022"



Source: Bureau Of Safety And Environmental Enforcement

17

Impact on Port Fourchon

- Major offshore supply and support logistics hub
  - Over 400 large supply vessels go through port's channels each day
  - ~15,000 flown to offshore locations per month
  - Services 95% of GOM deepwater production
  - Land base for the Louisiana Offshore Oil Port (LOOP)
- Extensively damaged
- Resulted in delays to offshore production recovery
  - Evacuated personnel unable to return offshore
  - Supplies stranded

Sources: houmatoday.com, portfourchon.com

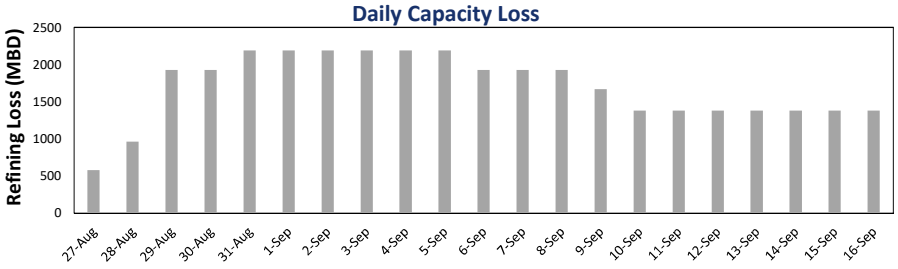
18

Ida's Impact on Refining Sector Operational Capacity

- Impacted operations at 9 refineries
- Phillips 66 Belle Chasse sustained significant damages – the decision was made to idle the refinery, forgoing repairs, and may potentially converted to a terminal
- Flood waters breached levees at refineries
- Unmoored barges damaged a refinery's docks

Peak losses of up to 2.2 MMBD capacity

Cumulative loss over 35 MMB by 9/17



19

Hurricane Ida Impacts cont.

- Lower Mississippi River was closed to traffic for several days and limited flows in the weeks following – caused shipping issues for many industries – including access for crude to New Orleans/Baton Rouge refineries
- Colonial shutdown their Line 1 and 2 pipelines as precaution
- New York Harbor terminals were closed due to floods and power outages
- Jet fuel pipeline in Connecticut was impacted
- Abandoned GOM oil pipeline was damaged during the storm, leaking crude oil

Sources: Reuters, nola.com, nhresister.com

20

Preparedness = Resiliency

NATURAL DISASTERS ARE INEVITABLE

P

ersonnel
- Evacuate and/or protect people
- Readiness to return to operations
- Communication is critical

roperty
- Identify vulnerabilities and act
- Reduce the risk of damage by adopting best practices from similar vulnerable regions
- Prepare disaster recovery plan

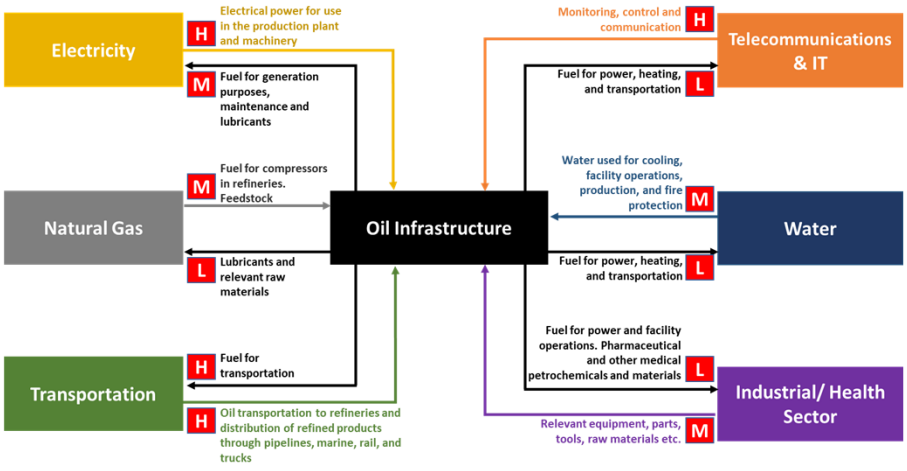
roducts
- Supplies for recovery operations and repairs
- Power and raw materials
- Re-establish the supply chains

Evaluate Best Practices from similar vulnerable regions

Sources: MCEER's Resilience Framework

22

Interdependencies



*Vulnerability: High (H) – Medium (M) – Low (L)

23

Sector Lifelines

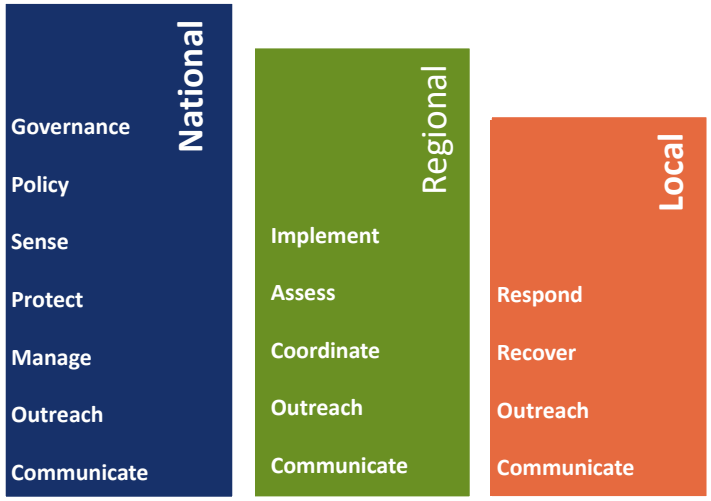
Promotes a response that facilitates unity of purpose and communication among sector

- **Safety and security:** for responders, workers, emergency services
- **Food, water, shelter:** sustain personnel and community
- **Communications:** establish networks for communicating and protocols for response efforts
- **Training:** ensure workers have been trained to respond to and recover from disasters/emergencies
- **Planning:** utilize planning, training, and exercises to facilitate safe and expedited recovery to any situation

Preparedness Cycle

25

In Summary: Resilience is Required at Multiple levels

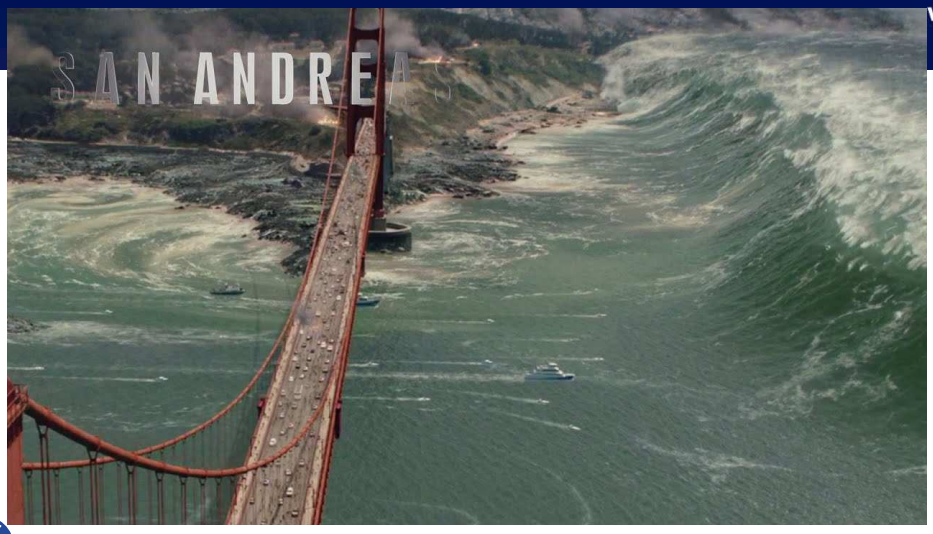


26

In Summary
How can Resiliency be achieved in the Energy Sector?

10

1. Anticipate, adapt, respond to, and recover quickly from disruptive events
2. Protect existing investments in infrastructure
3. Mitigate risks to infrastructure and personnel by improving planning and assessment capabilities
4. Support reliable, sustainable, affordable, modern, and accessible energy
5. Improve resource efficiency in consumption and production of energy
6. Reduce impact of climate change
7. Promote communication and coordination among multilevel stakeholders
8. Cultivate strong networks
9. Support a productive, educated, and trained workforce
10. Encourage development and shared-use technology



28

SPE Webinars are Sponsored by:

SPE

SPE Foundation

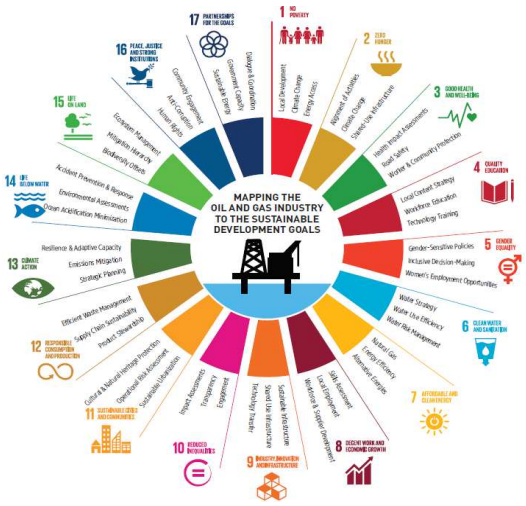
Resiliency and Sustainable Development

Webinars

Resiliency and Sustainable Development

Build Robust, Functional, Viable Societies and Economies

Resiliency



Sustainable Development

Processes

Outcomes

Resiliency and Sustainable Development

Webinars

Resiliency

Robustness **Redundancy** **Resourcefulness** **Rapidity**

7 AFFORDABLE AND CLEAN ENERGY

- Access to Energy
- Use of Alternative Energy
- Modern, Reliable, and Affordable Services

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

- Sustainable Infrastructure
- Shared Use Infrastructure
- Technology Transfer
- Economic Development

11 SUSTAINABLE CITIES AND COMMUNITIES

- Operational Risk Assessments
- Reduce Impact of Disasters
- Inclusive and Sustainable Urbanization

Resiliency and Sustainability: The Energy Sector

Increase **equality**

Contribute to **human well-being** and **security**

Strengthen **institutions**

Support **economic growth**

Reduce **poverty**

Mitigate impacts of **climate change**

Promote **communication and coordination**