# Oil and Gas Industry:




**Jan Dell, AECOM**

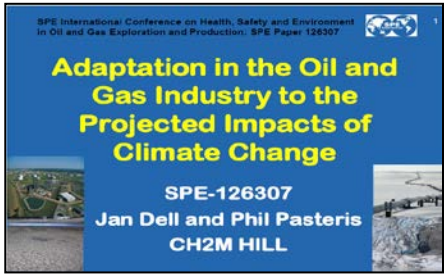
**June 7, 2016**

# The Road to Resilience

**2007: First Business Adaptation WBCSD Publication**

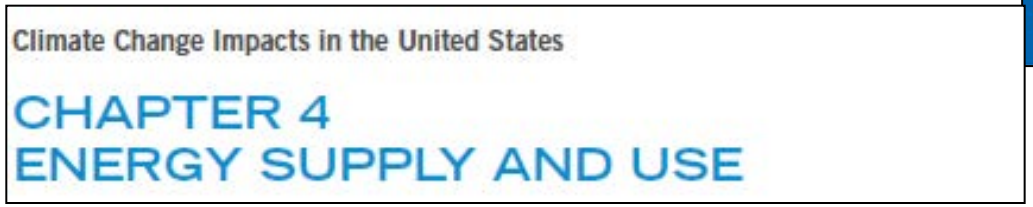

**2007: First Business Adaptation COP13 Side Event in Bali**


**2009: Oil/Gas Industry Consortium Adaptation Workshops & SPE Paper**




**2011: World Petroleum Congress**


**2010 - 2014: US National Climate Assessment**







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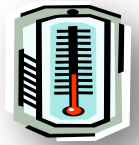
# Why should Oil/Gas Industry be concerned about projected physical impacts?



Temp Increase

Droughts & Floods

More Frequent Extreme Weather Events

Rising Sea Level

Snow Cover Shrinking: Less Storage

Ocean Acidification

Because the industry has many projects and operations:

- In regions of greatest temperature rise and impact (arctic)
- Affected by sea level rise and ocean acidification
- Affected by shrinking snow cover (water supply variability)
- That require significant amounts of water to operate

Drought raising water costs, scarcity concerns for shale plays

THE WALL STREET JOURNAL. Thursday, March 26, 2009

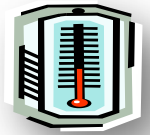
U.S. NEWS

**Water Worries Shape Local Energy Decisions**

*Scarcity Forces Electricity Companies to Rethink Power-Plant Plans, Providing an Opening for Renewable Sources*

BY REBECCA SMITH

# Summary of Physical Impacts



Temp Increase

Droughts & Floods

More Frequent Storm Events

Rising Sea Level

Snow Cover Shrinking

Ocean Acidification

Impacts on…

### Exploration

- Subsidence
- Increased wave loading
- Loss of surface water access
- Sound impacts on sea mammals
- Delays due to Species migration

### Production

- Early season delays
- Pad damage
- Loss of surface water access
- Increased production interruptions
- Ice road – decreased tundra travel

### Transport & Terminals

- Increased ice-load variation
- Damage to coastal facilities
- Increased shipment interruptions
- Improved or reduced shipping lanes or seasons

### Pipelines

- Thaw subsidence and frost jacking
- Increased setbacks
- Loss of capacity in existing pipelines
- Wildfires

### Refining & Processing

- Loss of access to water
- Increased flooding
- Loss of peak cooling capacity

### Neighboring Communities

- Extreme events
- Weather-related mortality
- Infectious diseases
- Air-quality respiratory illnesses
- Loss of species and habitat



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# Key Messages from Industry Experience and Risk Reviews

**Past:**

1. Upstream-Midstream-Downstream Oil and Gas Operations/Facilities are generally resilient to weather-related events now and projected impacts of climate change in next 40 years: **within fenceline operations.**
2. Projects have been designed with safety factors for extreme events (eg 100-yr wave height or flood event).

# Effective Resiliency Planning by Oil and Gas in North America

## Hurricane Katrina and Rita (2005)

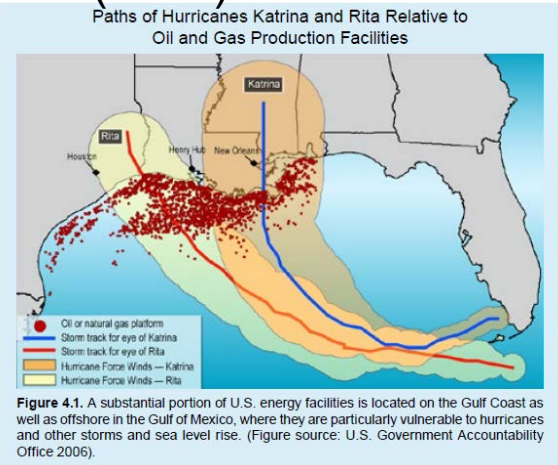
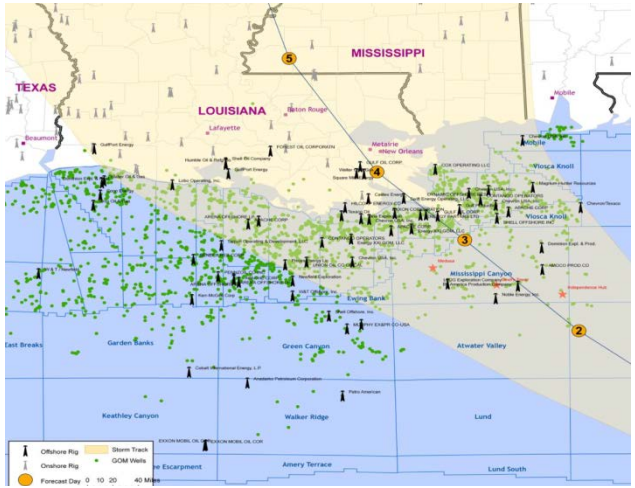
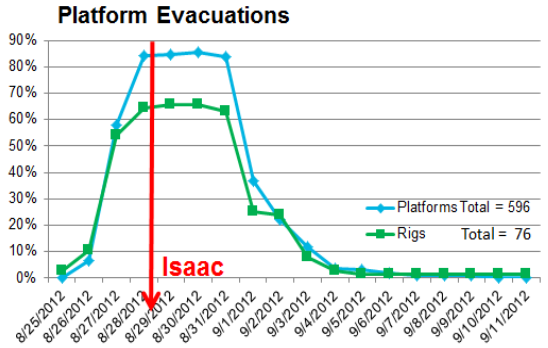


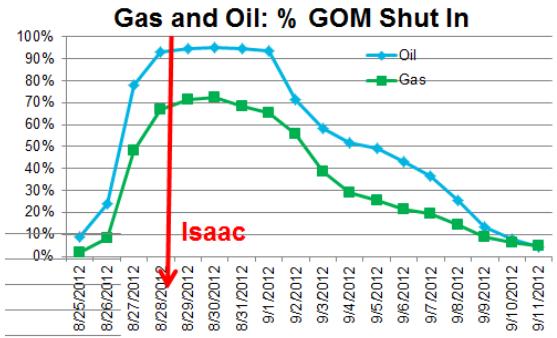

**Figure 4.1.** A substantial portion of U.S. energy facilities is located on the Gulf Coast as well as offshore in the Gulf of Mexico, where they are particularly vulnerable to hurricanes and other storms and sea level rise. (Figure source: U.S. Government Accountability Office 2006).

## Hurricane Issac (2012)

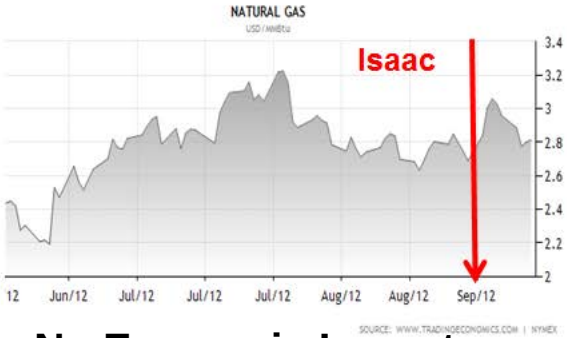



## Safe Shutdown, Safe Start-Up








**No Economic Impact**

**Hurricanes don't scare natural gas anymore**

**Abundance of shale gas dulls the industry's blow from Isaac**

August 31, 2012 | Myra P. Saefong, MarketWatch

# Key Messages from Industry Experience and Risk Reviews

**Past:**

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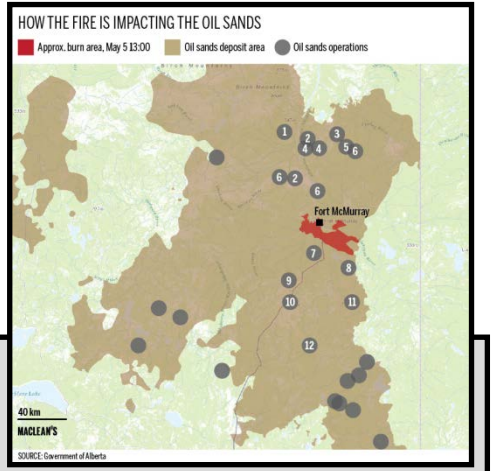
**Future:**

1. The industry is collaborating with external groups to develop forward-looking datasets with granularity needed for input into design and operation. Further collaboration is sought.
2. Climate change impacts, particularly extreme events, have the greatest impact to the industry through the damage caused to communities and disruptions **outside of facility fencelines.** Increased collaboration is warranted.

# Fort McMurray Fire: Was the Oil Industry Resilient?

- Predictions of fire threats were known to operators.
- Emergency response plans for facility and staff protection were in place and put into effect.




Tuesday, May 31, 2016 8:46
**Biggest oil sands producers restore crews;**
**Suncor facilities untouched by wildfire**
Suncor Energy Inc. and Syncrude Canada Ltd., the two largest oil sands miners, are gearing up for production within a week in the wake of a wildfire that idled more than 1 million barrels of daily production from the Fort McMurray area of northeastern Alberta. 88,000 people were evacuated from the region in early May.

Suncor said May 29 that it had moved more than 4,000 workers back into the region to restart its oil sands mining facilities and to resume construction on a new plant. It anticipates that 3,500 more workers will return to work in the coming week. Syncrude said it is also working toward a staged restart of its facilities.

Alberta Highway 63, the main artery connecting the region to the rest of the province, has been reopened to traffic through Fort McMurray to allow employees to return to work camps near the oil sands plants. Suncor said its facilities were undamaged by the blaze. Third-party pipelines to carry product out of the region and electricity service have been restored.

# Thank You

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June 7. 2016

# Session Agenda

| 11:00-12:45 | 2. Best Practices in Building Resilience into Energy Infrastructure |
|---|---|

*In this session, speakers will present case studies to highlight best practices in building resilience into energy infrastructure, from risk identification and assessment to resilience-building actions.*

- How have leading companies identified and characterized climate risks?
- What gaps (e.g. data) or barriers are creating challenges for energy operators in identifying climate risks on energy infrastructure?
- What adaptive practices are energy companies doing to address climate risks?
- How can best practices be transferred across the sector and to other sectors?
- How can policy-makers and other actors facilitate implementation?
- What are available technological solutions that can enhance energy infrastructure resilience?

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