Petroleum Industry: Adaptation to Projected Impacts of Climate Change

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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

2011: World Petroleum Congress

Congress weather warning

2012: IPIECA Adaptation Workshop

2013: US National Climate Assessment
Why should Oil/Gas Industry be concerned about projected physical impacts?

Because we have 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 fresh water to operate

Drought raising water costs, scarcity concerns for shale plays
The SEC highlighted four areas for companies to consider when assessing whether climate-related disclosure is required under its rules and regulations:

- the impact of legislation and regulations, such as laws requiring companies to install pollution control equipment,
- the impact of international climate change accords, such as the Kyoto Protocol,
- indirect consequences of regulation, such as decreased demand for carbon-intensive products and
- physical risks of floods, hurricanes and other natural disasters that may result from climate change.
2009: Consortium O/G Group Workshops

**Goal:** to perform an assessment of the global oil and gas value chain to enable companies to plan for the projected impacts of climate change and build resiliency into their long-term business models.

**Risks Evaluated Across Oil and Gas Value Chain**

- Exploration
- Production
- Transport & Oil Terminals
- Gas Processing Ops
- Oil Refining
- Transport/Pipelines
- Power Generation
- Retail
- Use
2009: Consortium O/G Group Workshops
Regions Reviewed

Arctic
60 to 90 N Lat

US and Canada (non-arctic)
West North America: 30N, 50E TO 75N, 100E
Central North America: 30N, 103W TO 50N, 85W
East North America: 25N, 85W TO 50N, 50W

Europe
Northern Europe: 48N, 10W to 75N, 40E
Southern Europe: 30N, 10W to 48N, 40E

MENA

Australia
N. Australia: 30S, 110E to 11S, 155E
S. Australia: 45S, 110E to 30S, 155E
2009: Consortium O/G Group Workshops

Impact Categories Evaluated:

**Global:**
1) Sea Level Rise (SLR)
2) Ocean pH

**Regional:**
1) Ambient Warming
2) Summer Season Length
3) Sea Ice Thickness and Coverage
4) Snow Depth and Coverage
5) Coastal Erosion Rates
6) Land Condition (Permafrost, Semi-Permafrost, Non-Permafrost)
7) Disease Vector and Species Migration
8) Local Precipitation
9) Storm Frequency and Strength and Wind Speeds
10) Wildfires
Conclusion: Adaptation planning identifies “no regrets” actions and promotes cost-effective resiliency in operations.

Detailed Value Chain Analysis of Climate Change Impacts was performed to identify Opportunities and Risks in Oil and Gas Operations.

Results Detailed in SPE Paper 126307
Summary of Impacts

Weather-related mortality
Infectious diseases
Air-quality respiratory illnesses
Loss of species and habitat
Water
Physical Impacts are Local, Projects are Unique: Adaptation assessments must be performed at site level to identify design and operational actions

Step 1. Identify Future Projected Physical Impacts in a specific area over time range of interest

Step 2. Evaluate Risks to Specific Assets (Oil and Gas Production and Processing, Pipelines, Refineries, Chemical Plants, Staff Offices), Critical Infrastructure and Communities

Impacts Should be Assessed for Risk/Opportunity Significance: Likelihood of Physical Impact and Magnitude of Consequence
Benefits of Shale Gas Production

- **Sources:** Diversification away from coastal/offshore sources
  - US: 2005 GOM = 20% gas, 27% oil prod
  - US: 2012 GOM = 7% gas, 23% oil prod

- **Power Plant Retrofits:** move to gas combustion from coal lowers water intensity in power plants

- **New Gas Power Plants:** move to dry cooling and use of municipal effluent.

**US EIA Data and Projections**
Oil and gas Industry faces a range of risks and opportunities.

Remember on the Road to Resilience:

Steady-State is Out-of-Date: Water availability and variability are increasing concerns.

Local assessments can best identify low cost “no regrets” actions to design resiliency into new projects and existing operations.