ENERGY MACROPERSPECTIVES

THE ROLE OF DEEPWATER DEVELOPMENT

DEEPWATER DEVELOPMENT CHALLENGES
ENERGY MACROPERSPECTIVES
THREE HARD TRUTHS FOR THE ENERGY INDUSTRY

1. STEP CHANGE IN ENERGY USE

2. SUPPLY WILL STRUGGLE TO KEEP PACE

3. ENVIRONMENTAL STRESSES ARE INCREASING
**The World Will Have Solved Its Energy Supply Challenges by 2050**

- **Agree:** 17%
- **Disagree:** 64%
- **Not Sure:** 19%

Source: Economist Intelligence Unit

---

**Energy Consumption % Increase Between 1990 and 2010**

- **EU:** 5%
- **China:** 149%
- **USA:** 19%
- **India:** 116%

Source: Economist Intelligence Unit

---

**World Energy Consumption Increase:**

- **Overall:** 45%

---

**Projected Energy Demand Between 1990 and 2035**

- **Billion Tonnes of Oil Equivalents**
- **Compound Annual Growth Rate (2009-2035):** 1.3%

Source: International Energy Agency

---

**Energy Mix in 2035**

- **Share of Oil & Gas:** 51%
- **CAGR for Biomass, Waste, and Other Renewables:** 9.5%

Source: International Energy Agency
Glow from electric lights at night
(photo from space; NASA)
Glow from electric lights at night (photo from space; NASA)
THE ROLE OF DEEPWATER DEVELOPMENT
NUMBER OF FIELDS IN WATER DEPTHS GREATER THAN 400 METERS

ONSTREA: 254
PROBABLE: 609
TOTAL: 355

CONTRIBUTION TO GLOBAL PRODUCTION

2000: US GoM 222
2010: MED 43
2020: NIGERIA 28

ASIA: 77
ANGOLA: 135
BRAZIL: 66

VOLUMES DISCOVERED IN DEEPWATER FRONTIERS

130 Bln BOE

DEEPWATER DEVELOPMENT

CHALLENGES
DEEPWATER ENGINEERING CHALLENGES ARE SECOND ONLY TO THE SPACE PROGRAM
• EXTREME TEMPERATURES & PRESSURES
• HARSH WEATHER
• REMOTE LOCATIONS
• AN ENGINEER’S DREAM
OPERATED IN THE DEEPWATER US GULF OF MEXICO FOR OVER 30 YEARS WITHOUT A SIGNIFICANT OFFSHORE WELL INCIDENT OR SPILL.

SECOND LARGEST DEEPWATER PRODUCER AND THE ONLY INTERNATIONAL OIL COMPANY TO OPERATE IN DEEPWATER ON FIVE CONTINENTS.

A DEEPWATER TECHNOLOGY LEADER, HOLDING 11 OF 15 WORLD RECORDS IN DEEPWATER DEVELOPMENT.

ABLE TO MEET TECHNICAL AND OPERATIONAL CHALLENGES SAFELY AND RESPONSIBLY IN SOME OF THE WORLD’S TOUGHEST AND MOST COMPLEX ENVIRONMENTS.
DEEPWATER OPERATIONS
IT’S NOT ALWAYS SMOOTH SAILING

HURRICANE KATRINA
GULF OF MEXICO
August 29th, 2005
IMPACT OF KATRINA
MARS TENSION LEG PLATFORM

BEFORE

AFTER
SUPPLY OF TALENT IS A MAJOR CHALLENGE FOR THE INDUSTRY

THE “BIG CREW CHANGE” IS HAPPENING NOW

LOSS OF 5,000 EXPERIENCED PROFESSIONALS BY 2014

WHAT ARE THE CONSEQUENCES OF STAFFING ISSUES?

Source: Schlumberger Business Consulting HR Benchmark 2010
THE INDUSTRY’S LICENCE TO OPERATE IN DEEPWATER DEPENDS ON THE ABILITY TO WORK IN A SAFE AND ENVIRONMENTALLY RESPONSIBLE MANNER.

SHELL’S APPROACH TO RISK MANAGEMENT

The ‘Bow Tie’ Model illustrates the importance of both preventive and recovery measures in dealing with risk. Risk is defined as the likelihood that a Top Event (hazard release) will occur, combined with the severity of the consequences of the event.

Risk Management Responses

- **Hazard:** Potential to cause harm.
- **Threat:** A possible cause that will potentially release a hazard and produce a Top Event.
- **Control Barriers:** Measure to prevent threats from releasing a hazard.
- **Top Event:** The ‘release’ of the hazard, i.e., the first consequence.
- **Recovery Measures:** Limit the consequences arising from Top Event. Events that result from the release of a hazard.
- **Consequence:** The ‘output’ of the Top Event, i.e., the second consequence.

Source: www.shell.com/safety
DEEPWATER DEVELOPMENT WILL CONTINUE TO PLAY A KEY ROLE IN SECURING FUTURE ENERGY NEEDS.

COST PRESSURES AND ECONOMIC FUNDAMENTALS TEND TO DRIVE INNOVATION.

CHALLENGES INCLUDE CONTINUING TO DEVELOP INNOVATIVE TECHNOLOGY, DEVELOPING A SKILLED WORKFORCE, AND MANAGING PROCESS SAFETY RISKS TO RETAIN THE LICENCE TO OPERATE.