• Historical Background
• Recent Developments
• Takeaways
• 1821 - Fredonia, New York - William Hart - drilled into gas-bearing shale, natural gas piped and burned for illumination

• 1859 - Colonel Edwin Drake - Northwestern Pennsylvania - Drilling Rig - Photo on right from the Drake Well Museum

• 1901 - Spindletop, TX - Drilling Mud

• 1938 - Offshore LA - Freestanding drilling platform in the Gulf of Mexico – Brown and Root built for Pure Oil and Superior Oil Company
• 1947 - Brown & Root built for Kerr - McGee and its partners - first oil rig out of sight of land
• 1947 - Hugoton field of Kansas - hydraulic fracturing used to stimulate production
• 1967 - Oil discovery at Alaska’s Prudhoe Bay
• 1973 - Arab oil embargo
• 2000’s - U.S. oil & gas boom
US oil and gas extraction employees, seasonally adjusted

• 17% (2014) of USA Crude Oil production comes from offshore, almost all in Gulf of Mexico
• USA is a global leader in technology development for offshore exploration and production

“How inappropriate to call this planet Earth, when it is quite clearly Ocean...” Arthur C. Clarke
Deepwater Development Systems

Bottom Supported and Vertically Moored Structures

- Fixed Platform (FP)
- Compliant Tower (CT)
- Tension Leg Platform (TLP)
- Mini-Tension Leg Platform (Mini-TLP)

Floating Production and Subsea Systems

- SPAR Platform (SP)
- Floating Production Systems (FPS)
- Shuttle Tanker
- Floating Production, Storage & Offloading (FPSO)
- Subsea System (SS)
Seepage from hydrocarbon reservoirs is common, both onshore and offshore.

Locations of seeps provide unique habitat for rare deep sea fauna.

Regional seafloor mapping provides valuable data for oceanographic research.

**Hydrocarbon Seep Detection, a Cutting Edge Exploration Technology**

- Sea surface oil slicks can be detected by satellite.
- Bathymetric surveys can detect associated seafloor topographic features and rising columns of gas bubbles.
Wind Energy, a Clean, Renewable Energy Resource

- No operational offshore wind farms in USA, well established in other countries
- Strong growth potential for USA technology and research
- Current focus of commercial leasing is on the east coast
- First project to commence operations offshore Rhode Island late 2016
Takeaways

• What is next?
  – Technology
  – Regulatory (e.g. tax, competition/anti-trust, environmental, safety, etc.)
  – Geopolitical

• Key - Fostering innovative approaches