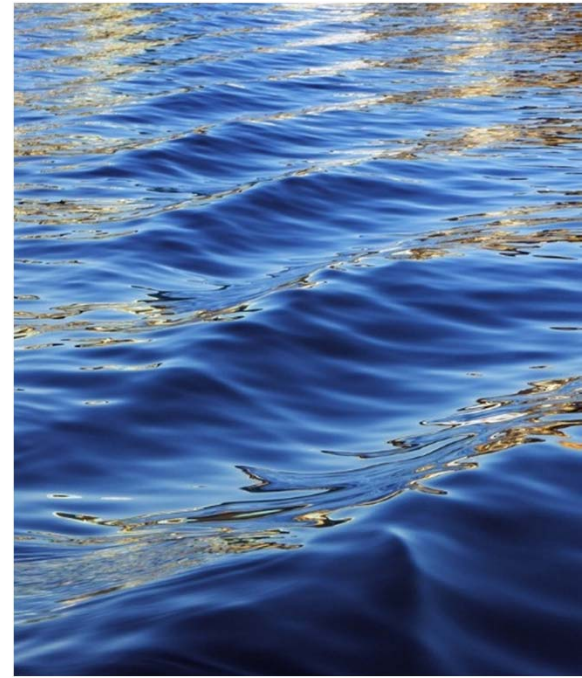




Sustainability Through the Supply Chain

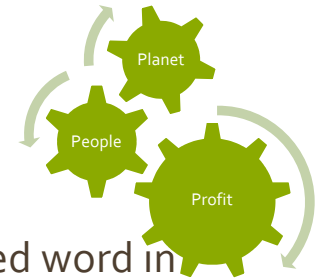
Jennifer M. Bell



Purpose

- Define Sustainability
- Discuss What a Socially Responsible Investment Looks Like
- Corporate Sustainability Leaders
- Stages of Sustainability Commitment

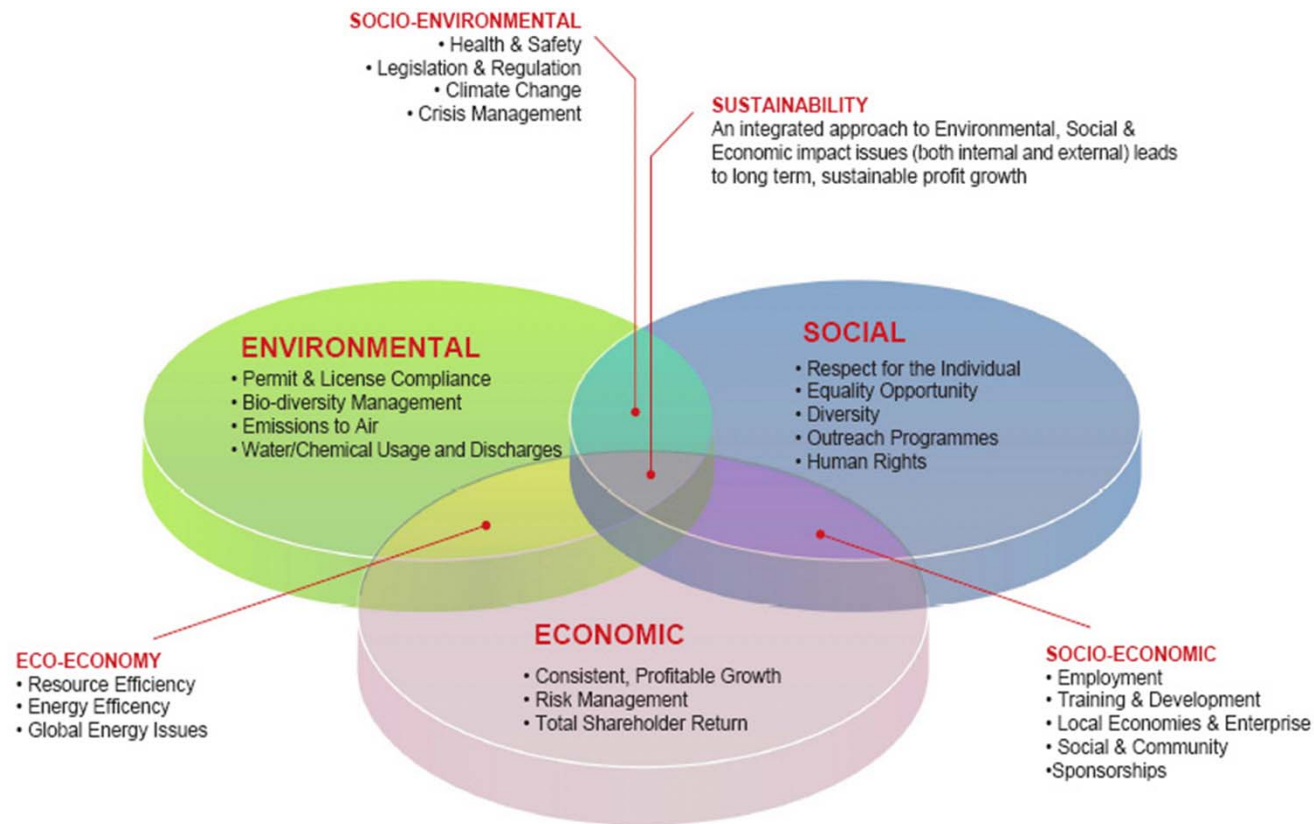
How do you define sustainability?



- Sustainability has been called one of the least meaningful and most overused word in the English language. David Owen, *The Conundrum: How Scientific Innovation, Increased Efficiency and Good Intentions Can Make Our Energy and Climate Problems Worse*
- Corporate Sustainability is a business approach that creates long-term shareholder value by embracing opportunities and managing risks deriving from economic, environmental and social developments. Dow Jones Sustainability Indices
- Sustainability has been defined as economic development that meets the needs of the present generations without compromising the ability of future generations to meet their own needs. Gro Brutland
- Sustainability Performance is the social, environmental and economic performance of a company and relates to the objectives that are important to the internal and external stakeholders. Marc Epstein

Triple Bottom Line

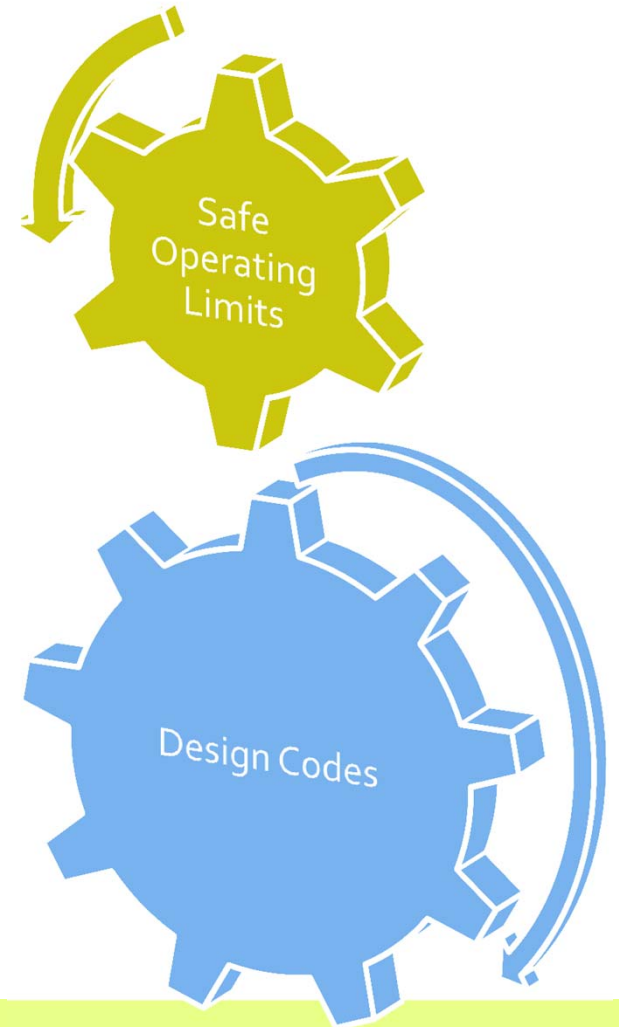
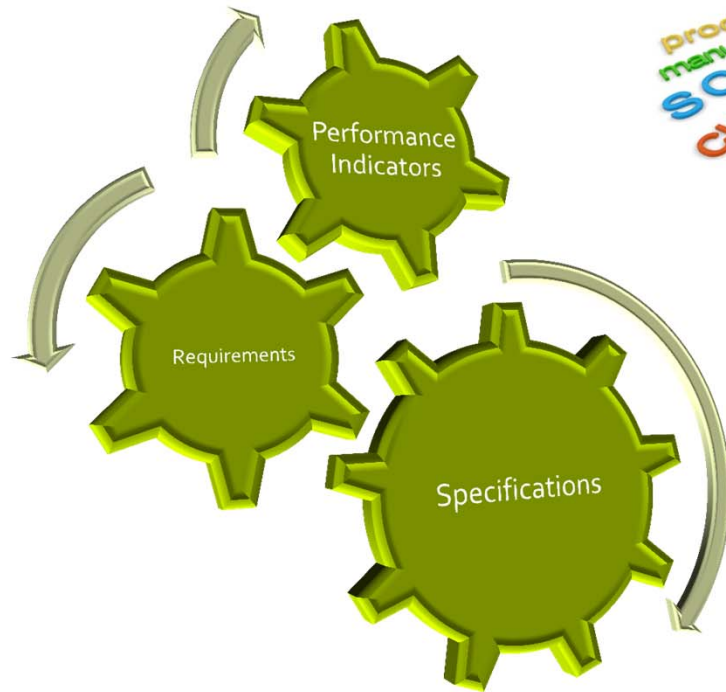
- Socially Responsible Investment
- Business Drivers
- Game Changing Challenges



Energy Producers



Supply Chain



Where does Sustainability begin?

Design

Construction

Start Up

Operations

Inspection

Maintenance/Repair



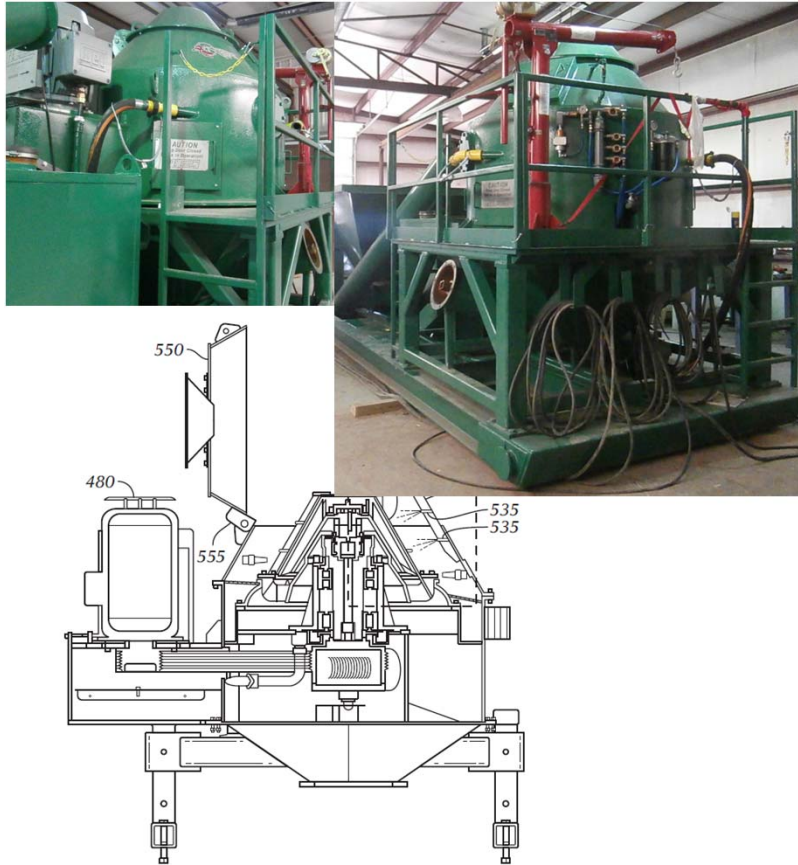
Game Changing Challenges Sustainable Innovation



Precise Drilling Concepts

- Environmental – OSHA
- Social – Respect for the Individual
- Socio-Environmental – Reusable
- Economic – Risk Management
- Eco-Economy – Resource Efficiency
- Socio-Economic – Local Economy

Game Changing Challenges Sustainable Innovation

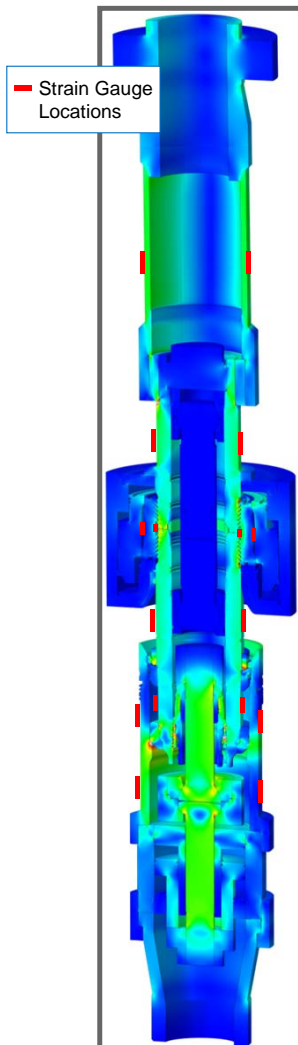


Drill-Gen Inc

- Environmental – EPA Regulation
- Social – Respect for the Individual
- Socio-Environmental – HSE
- Economic – Risk Management
- Eco-Economy – Energy Efficiency
- Socio-Economic – Local Economy

Game Changing Challenges Sustainable Innovation

Dril-Quip



Wellhead System

➤ Assembly:

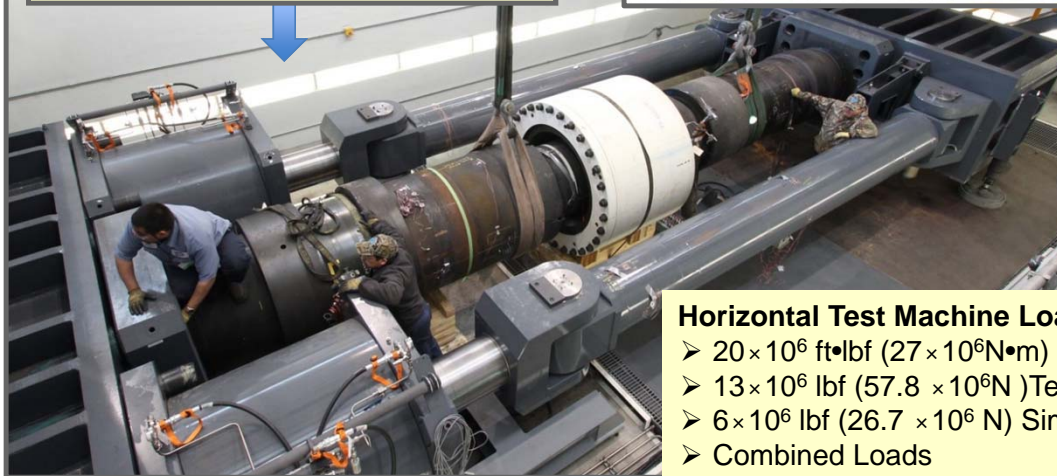
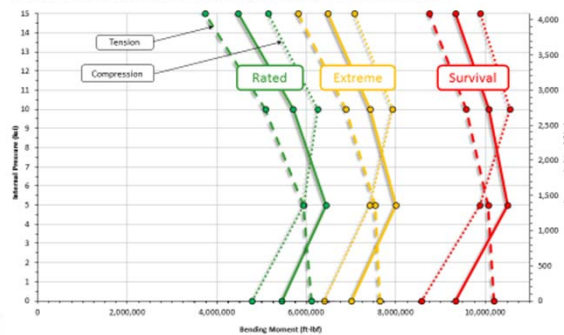
- Wellhead Connector
- Low Pressure Housing
- High Pressure Housing

➤ Process:

- Preloaded System
- 6MM lbf. Casing Weight
- Apply Loads per Capacity Chart
- Results Comparison
- Inspection
- Third Party Witness

3D FEA Capacity Chart

INTERNAL PRESSURE VS. BENDING WITH TENSION/COMPRESSION AND PRESSURE END LOAD



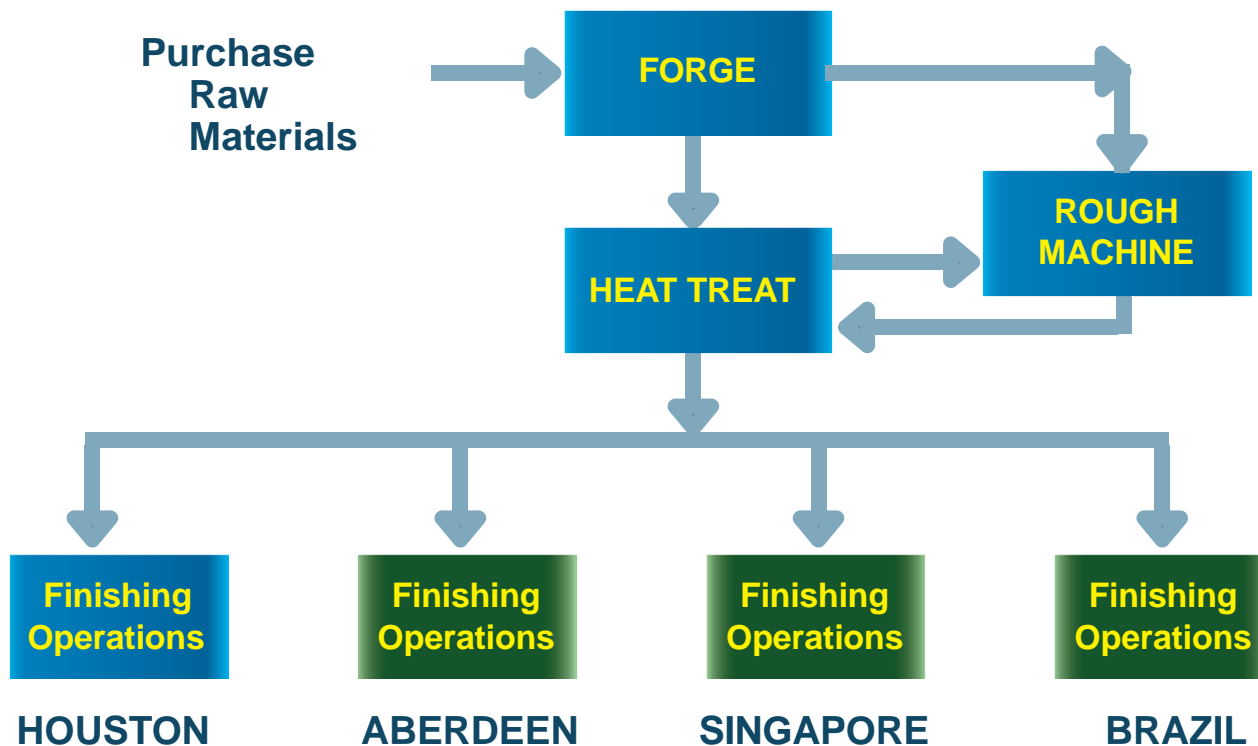
API PER15K System Analysis & Testing

Horizontal Test Machine Load Capacity

- 20×10^6 ft•lbf (27×10^6 N•m) Bending
- 13×10^6 lbf (57.8×10^6 N) Tension/Compression
- 6×10^6 lbf (26.7×10^6 N) Simulated Casing Loads
- Combined Loads

Game Changing Challenges Sustainable Innovation

Dril-Quip Vertical Integration



Dril-Quip

- Environmental – EPA Regulation
- Socio-Environmental – HSE
- Economic – Risk Management
- Eco-Economy – Energy Efficiency
- Socio-Economic – Local Economy

The Last 20 years and The Future

- Reducing Cycle Time and Accelerating First Production
- Willing to Employ New Technology
- Future of Fossil Fuels Evolution or Revolution
- How the Industry Deals with Soft issues
- Developments for Unconventional Fields

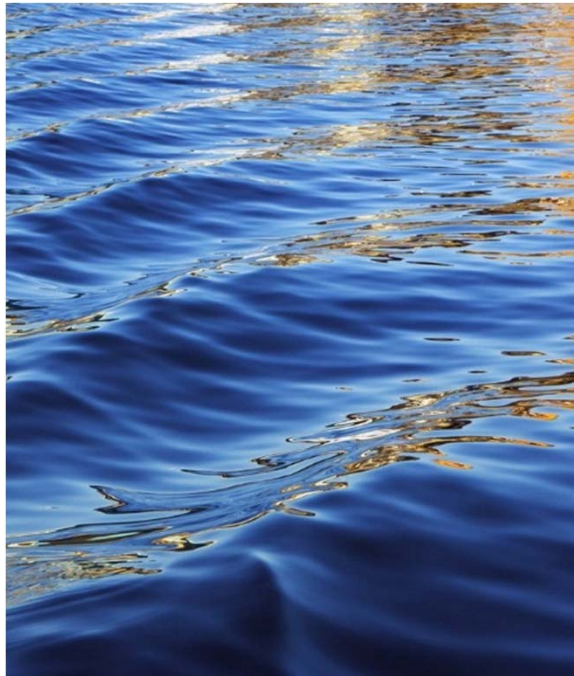


References

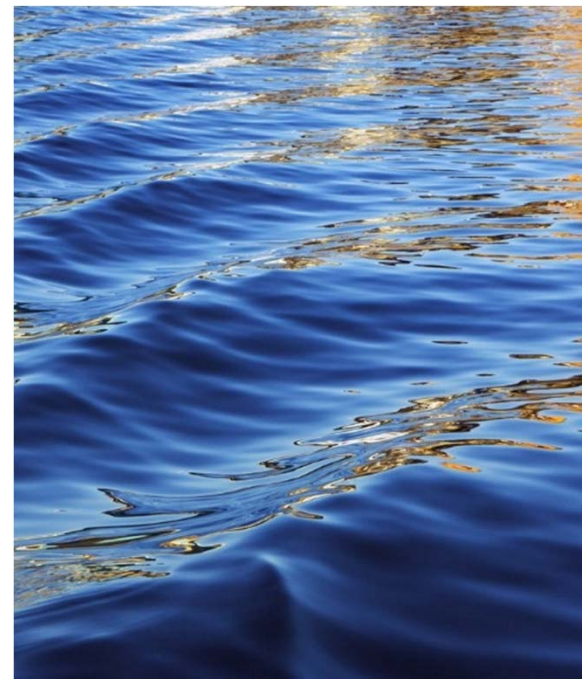
Next Generation HPHT Subsea Wellhead Systems Design Challenges and Opportunities

Jim Kaculi, D.Eng., P.E., Dril-Quip, Inc.

**Interlinking Engineering and Social Performance
into Sustainability Using the Triple Bottom Line
Principle:** J. Bell, BSc Eng, MBA, Elements Offshore



THANK YOU



BACK UP SLIDES

GAME CHANGING CHALLENGES

Patents & Intellectual Property

- Patents are government acknowledgement of innovative leaps which are recognized by the public as improvements of society.
- Intellectual property allows smaller companies to invest R&D into sustainable solutions knowing they are in a position to recover such investments.
- ASME Silver Patent Award
 - Colby Ross, Halliburton – 2014
 - Tom Bailey, Weatherford - 2012
 - Jon Khachaturian, Versabar - 2011
 - Ray Ayers, Stress Engineering - 2009
 - Mike Williams - 2008
 - Joe Pallini - 2007
 - Dan Scott - 2006
 - Jack Miller - 2005
 - Gerald Baker - 2004
 - Charlie Bridges - 2002
 - Rolf Pessier - 2001
 - Carl G. Langner - 2000

Game changing challenges WorkForce Development

Houston Community College

