Water in the Energy Production Industry

Presentation to...
Water Risks are Real Now

IPCC: Climate Change projected to Increase Droughts and Floods

Population Growth will Decrease Per Capita Availability

Drought threatens 1.5 million in southwest China
Global Water Scarcity is Increasing

Faster than Expected

- 1.1 billion people (20% of world population) – are without access to safe drinking water
- 2.6 billion people (40% of world population) - do not have access to adequate sanitation.

http://www.good.is/post/water/
Global and Local Water Drivers and Constraints

**Increasing Need for Water**
- Increasing Population
- Increasing Industrialization
- Mismanagement of Resources
- Land degradation

**Finite Water Resources**
- Unreliable supplies
- Increasing variability
- Declining quality
Energy production is increasingly constrained by water issues.

Water Worries Shape Local Energy Decisions

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

By Rebecca Smith

Energy-Water Integration Act of 2009

Will Energy Producers Run Out of Water Before They Gather Steam?

By Jeff Kaye
Petroleum Industry’s Value Chain

- Exploration
- Production
- Transport & Oil Terminals
- Gas Processing Ops
- Oil Refining
- Transport/Pipelines
- Power Generation
- Retail
- Use
Petroleum Industry’s Value Chain

Areas of High Water Use and Wastewater Discharge Intensity

- Exploration
- Waterflood, Oil Sands, Gas Shale Fracing
- Production
- Transport & Oil Terminals
- Gas Processing Ops
- Cooling and Warming Water
- Oil Refining
- Produced Water
- Transport/Pipelines
- Cooling Water
- Power Generation
- Discharged Water
- Car Wash
- Retail
- Future: CCS, Oil Shale?
- Cooling and Wastewater
- Use
Water Hot Spots for Upstream and Downstream Operations

Source: EarthTrends2001- WRI
Oil Industry Water Risks

**Operations**
- Insufficient or unreliable water supplies for existing and future operations → stranded assets
- Insufficient capacity to treat and dispose of produced water, cooling water, and wastewater
- Inability to dispose of wastewater to existing destinations
- Increased raw and wastewater treatment and disposal costs

**Health, Ecosystems, and Social Responsibility**
- Friction with competing industries and users
- Lack of community acceptance
- Difficulty in securing new permits and legal license to operate
- Health of employees and consumers
Increasing External Pressure from Affected Stakeholders:

- Environmental Non-governmental Organizations (NGOs)
- Biodiversity Advocates
- Communities
- Agriculture
- Ranchers
- Fishing Industry (Commercial and Recreational)
- Local Industry
- Social Investment Funds
- Governments (Local and Federal)

Water is a shared fenceline issue
Sustainable Water Management: Best Practices

- Water Policy and No-Impact Commitments
- Transparency: Measurement and Reporting
- Internal Reuse of Frac, Produced and Wastewaters
- External Beneficial Reuse
- Use of Low Quality Water (Municipal WW or Saline)
- Beyond the Fenceline: Community Programs
- Protection of Ecosystems and Biodiversity

Policy: Protective and Productive
External Beneficial Reuse of Produced and Wastewaters

Agricultural Irrigation and Wetlands Development

• **PETRONAS**: is a partner in the development of Putrajaya, which includes the 200-hectare Putrajaya Wetlands

• **Chevron** in California: produced water for orchards

• **Shell/Petroleum Development Oman**: reed beds with a capacity of 45,000 m3/day

• **CNOOC Khartoum refinery, Sudan**: reed pond and biodiversity habitat
Use of Municipal Wastewater instead of Fresh Water

- **Chevron, El Segundo, California**: 8 million gallons per day = 80% of Water Consumption
- **Chevron, Richmond, California**: 6 mgd = 50% of water consumption
- **BP**: Carson, California (> 3 mgd) and Bulwer Island, Australia in refineries
- **PetroCanada, Edmonton, Canada**
- **Occidental Petroleum**: 5 to 8 mil gal per month for steamflood in Hobbs, New Mexico.
- **Shell**: Schoonebeek, Netherlands - reuse of municipal wastewater to make steam
Community Water Programs

**PETRONAS, Egypt:** Expansion of Egypt LNG's (JV Co.) water treatment system capacity to supply free, clean water to the town's 405,000 residents.

**Nexen, Yemen:** Provision of water supply, sanitation and capacity building in local village for 5000 people.

**ConocoPhillips: Timor-Leste:** The two water pumps will assist 1,650 people in the villages Ferik-Katuas and Laulara by improving hygiene and supporting local agriculture, which in turn improves nutrition.

**Shell, Niger Delta:** Provision of water supply to local village.

**Total, Indonesia, Mahakam Delta** Program launched in 2000. Village committees were set up to manage and maintain the water supply facilities. Householders pay a monthly fee, ensuring the sustainability of the project.
Take Away Messages:

Energy production needs water

Water availability is an increasing constraint to production

Industry is seeking and implementing sustainable water practices for energy production