Women’s Global Leadership Conference
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The Bridge
A Balanced Look at the Global Energy Transition

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The University of Texas at Austin
The Bridge

I. Context

II. Global Energy Options

III. The Bridge

IV. Progress and a Request
The Bridge

- The Bridge is a feature length documentary on global energy.
- The mission of the documentary and its companion website is to educate the broad global public about the realities of energy, in hopes that they can make informed decisions - in the ways they live, the products they buy, and the policies they vote for - and in turn, help enable for all of us a secure energy future.
The Bridge

- Fossil fuels are the foundation of our energy system, now and for many years to come. Our future economic prosperity, and even our environmental investment, depends on stabilizing the supply of fossil fuels and using them more efficiently.

- Simultaneously, alternative energies must be embraced bilaterally, as the resources that will power the world of our children’s children. Using the prosperity that fossil fuels provide, we must move intelligently and...
The Bridge

- To help viewers understand a topic of this scope, the film will travel to the premiere energy production sites worldwide. It will interview CEOs of the world’s leading energy companies, high ranking government officials, and globally recognized energy experts.

- Complex topics will be unraveled and demonstrated through visual examples and cutting edge graphics. Key issues, like carbon, efficiency and electrical storage and transmission, will be presented in groundbreaking and...
The companion website will include all findings from the film, and more. It will serve as a resource archive and clearinghouse, permanent and evergreen.

Both elements, the film and the website, will be expertly crafted, to entertain and engage while they educate, through memorable communication methods that “stick.” Together, they will take viewers on an active journey of discovery, making learning experiential and long lasting.
The Bridge

- The project’s on-location “explorer” and on-camera narrator is Dr. Scott Tinker, Director of the Bureau of Economic Geology, State Geologist of Texas, professor at the University of Texas, and renowned global lecturer on energy, economy and the environment.

- The film and website will be produced by Arcos Films, under the direction of Harry Lynch, an award-winning documentary filmmaker with a diverse and thorough energy background.
Scott and Harry on Location in Iceland
I. Context

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Energy End Use

Electricity
- Conventional Oil
- Coal
- Hydro
- Uranium

Transportation
- Conventional Oil

Heat
- Biomass
- Natural Gas

U.S. Data

Data: EIA 2007
Unconventional Oil

North Dakota
Bakken
Options to Petroleum for Transportation

I. Biofuels
   1. 10-20 year ramp up

II. Natural Gas (CNG, LPG, LNG)
   1. Deliverability and access

III. Electricity (Batteries)
   1. Means coal, natural gas, nuclear…

IV. Hydrogen
   1. “Just ten years away!”
Biofuels

Carbohydrates to Liquid Hydrocarbons

Perennial Cellulosic
- Sorghum
- Switch Grass
- Miscanthus
- Shrub Willow
Biofuels Challenges

- Fresh Water Use
- Land Access
- Biofuel Refineries
- Drought
Energy End Use

U.S. Data

Data: EIA 2007
Global Natural Gas

Production

Global Natural Gas

Data: BP, 2009

USGS Estimates ~ 13,000 TcF
Conventional Resources

Total World Production (Tcfy)
R/P

Data: BP, 2009
LNG

Qatar

North Field
U.S. Natural Gas Production

EXHIBIT 8: UNITED STATES UNCONVENTIONAL GAS OUTLOOK (BCF/DAY)

Source: Modified from American Clean Skies Summit 2008

After Steve Harvey, EIA
## Global Unconventional Gas Resource Estimates

<table>
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<tr>
<th>Region</th>
<th>Coalbed Methane</th>
<th>Shale Gas</th>
<th>Gas in Tight Sands</th>
<th>Total</th>
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<td>North America</td>
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<td>Other Asia Pacific</td>
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<td>South Asia</td>
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<td>World</td>
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<td>16,103</td>
<td>7,406</td>
<td>32,560</td>
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</tbody>
</table>

Source: SPE Paper 68755
Major Trade Movements

Data: BP, 2008
Natural Gas Challenges

- Deliverability
- Access
- CO$_2$
Energy End Use

- Conventional Oil
- Natural Gas
- Biomass
- Coal
- Hydro
- Uranium

Transportation

Electricity

U.S. Data

Data: EIA 2007
Global Coal Reserves/Production

Commercially Enabled CCS

EOR

CMVA

BEG Gulf Coast Carbon Center
Coal Challenges

- $\text{CO}_2$
- Air Quality
- Fresh Water
- Mining Impacts
Hydro

Norway

300 MW Nameplate

Tinker, 2009
Hydro Challenges

- Fresh Water Capture
- Land Use & Topography
- Drought
Nuclear

Le Hague Waste Recycling
Normandy, France
Nuclear Challenges

- Public Perception
- Front End Cost
- Waste Disposal
- Permitting and Regulatory
Horse Hollow Wind Energy Center, Texas
735.5 megawatt (MW) nameplate
291 1.5 MW and 130 2.3 MW wind turbines
47,000 acres (190 km²) of land.

San Gorgonio Pass Wind Farm, California (619 MW Nameplate)

Copenhagen, Denmark

40 MW Nameplate
Wind Challenges

- Transmission
- Energy Storage
- Materials
- Infrastructure
Solar

Spain

Andusal, PV
60 MW Nameplate

Solucar, CSP
11 MW Nameplate

Olmedilla de Alarcon, Parabolic Troughs
50 MW Nameplate

Tinker, 2009
Solar Challenges

• Manufacturing
• Energy Storage
• Transmission
• Land Use
Geothermal

Iceland

300 MW Nameplate
Geothermal Challenges

• Thermal Conversion
• Geology
Electricity Options

- **Efficiency**
  - Fuel, lighting, electronics, insulation
  - *Challenge: Rebound effect*

- **Coal**
  - Abundant, reliable, cheap and dirty (CO$_2$)
  - *Challenge: Sequestration (IGCC w/ CCS), financing, public perception*

- **Nuclear**
  - Abundant, reliable, moderate price and cleaner
  - *Challenges: Waste disposal, security, front end cost, perception*

- **Natural Gas**
  - Abundant, reliable, volatile price, and cleaner
  - *Challenges: Global deliverability (LNG) and Access*

- **Alternatives (hydro, wind, solar, geothermal, tides, waves...)**
  - Cleaner, less reliable, can be more expensive
  - *Challenge: Intermittency, scale, cost*
Electricity Options

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**A Grand Challenge:**

- Improved Electricity Storage and Transmission
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Primary Energy Demand & Forecast

1.25% annual demand growth

Tinker, 2009

Fossil Fuels

Petroleum

Coal

Natural Gas

Hydroelectric

Biomass, Geothermal, Solar & Wind

Nuclear


Global Energy Consumption (quads)

0% 5% 10% 15% 20% 25% 30% 35% 40% 45%

% Total Consumption

Tinker Forecast

91% 87% 80%

Fossil Fuels

~255Q ~415Q ~495Q

Fossil Fuels

20% Non Fossil

1.25% annual demand growth

Historical Data: EIA October 2007
Primary Energy Demand & Forecast

1.25% annual demand growth

Historical Data: EIA October 2007

Global Energy Consumption (quads)

Energy Transitions Take Time

Tinker Forecast

91% 87% 80%

Petroleum Coal

Natural Gas Hydroelectric Nuclear

Biomass, Geothermal, Solar & Wind

% Total Consumption

Global Energy Consumption (quads)


1.25% annual demand growth

20% Non Fossil

Fossil Fuels

Tinker, 2009

Historical Data: EIA October 2007
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Shoots Completed

- Hydro in Norway
- Wind in Denmark
- Geothermal in Iceland
- Solar in Spain
- LNG in Qatar
- Oil segment in Middle East
- Nuclear
  - France (Le Hague)
  - US (STP)
- Biofuels in the US
- NYMEX
“Our food and water, shelter and transportation, communications, light, heat and cooling – every function and facet of modern life is built upon energy. And globally, 87% of it comes from fossil fuels.

But, with carbon and supply concerns, we have begun the shift to alternatives. We must navigate this transition very carefully to ensure the stability of economies and the health of the environment. And for this, a solid energy education is essential.”

THE BRIDGE
An Energy Education Project

Interviews Completed

- CEO BP
- CEO Statoil
- CEO DONG Energy
- CEO RasGas
- CEO Kuwait Energy
- CEO Abengoa Solar
- Deputy CEO Kuwait Oil
- Deputy CEO Bahrain Petroleum
- Senior Vice President Vestas
- President of Iceland
- Minister of Oil for Bahrain
- Director OECD Nuclear Energy Agency
- Deputy Director of the IEA
- Leading scientists and engineers
Please visit the AAPG Foundation website to learn more and to support The Bridge documentary.

http://foundation.aapg.org/thebridgefund.cfm