Natural Gas and Water in the New Energy Economy

A program of action

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Business as usual:
Coal Plants – 2000 million tons of CO$_2$ + toxics

Source: Platts Powermap (fourth quarter 2009 database).
Coal is not clean
Nor are the fleets
Natural gas in the new Energy Economy-

1. enormous new supply
2. can be deployed at scale now
3. reduces local air pollution
4. essential for wind and solar
5. turns the US from climate laggard to leader
6. energy security
Substitute natural gas into the power and transportation sectors

<table>
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<tr>
<th>Projects</th>
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<tr>
<td>1. Encourage EPA to drive the low-carbon energy transformation</td>
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<td>2. Design a program to displace coal with renewable energy and natural gas.</td>
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<td>3. Prepare and execute a multi-state plan to retire inefficient coal plants in favor of natural gas and renewable energy.</td>
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<td>4. Initiate initiatives to support switching fleet vehicles to natural gas.</td>
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<td>5. Work with renewable energy producers, power generators, and environmental groups to out-compete coal on cost, reliability, jobs and environmental benefits.</td>
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Surface impacts on:
1. Surface water
2. Shallow Groundwater
3. Biodiversity and Ecology
4. Local Communities

The Jonah Gas Field
Located in Wyoming’s Upper Green River Valley, Jonah contains an estimated 7 to 10 TCF. In the last 10 years, the field turned from sagebrush into one of the nation’s richest gas fields with 500 wells. A new proposal would add 3,100 more wells.

The image was acquired September 3, 2003, covers an area of 10.7 x 13.5 km
NASA/GSFC/METI/ERSDAC/JAROS, and U.S./Japan
ASTER Science Team
DEP orders Texas company to cease gas drilling in Pennsylvania

Bloomberg: Drilling Rules Change May Harm Industry, Exxon Says

Wall Street Journal: Blowout Occurs at Pennsylvania Gas Well

Blast at Abandoned W. Va. Coal Mine Injures 7
Flames Shoot 70 Feet in Air as Workers Drilling Gas Well Hit Pocket of Methane in Old Coal Mine Chamber
Events have created an urgent CASE FOR CHANGE.
Responsible production: a new joint program

6. Create a forum for NGO and Industry to analyze and determine which controls should be instituted to ensure that natural gas exploration and production is clean, safe and green while remaining price-competitive.

7. Consolidate industry best management practices (BMPs) for controlling the gas fields and prepare a compendium that would form the basis for good rulemaking by the states.

8. Promote concentrated well and infrastructure development to radically reduce the impact of gas production through unitization and pooling.

9. Prepare and execute a multi-state plan with state regulators in shale gas states where the risk of losing the license to operate is the highest.
Align Goals

Regulators
- Reduced Risks to as low as reasonably practical

Industry
- Regulatory Efficiency
- Reduce costs

NGOs
- Public Assurance that industry is responsible “show me”
Simple model

Hazard Event

Hazard

Significant effect

Standards, best practices, regulations, innovations, elegant design, clever approach, smart way to do things

Control

Recover
Program Timeline

10/10 Framing workshop
  - Vision
  - Action Plans

1/11 Public Launch
  - Public forum
  - Press Release

3/11 Milestone 1
  - Drafts
  - Review
  - Revisit
  - Revise

5/11 Milestone 2
  - Drafts
  - Review
  - Revisit
  - Revise

7/11 Milestone 3
  - Drafts
  - Review
  - Revisit

9/11 Final Delivery
  - Final Compendium
  - Regulatory Program
  - Industry Program

Well Completion
  - Local
  - Groundwater/Surface water protection
  - Frack fluid/Produced water Disposal

Field scale development
  - Regional
  - Air, Landscape/biodiversity, Community
  - Unitization and Pooling

Management systems
  - Risk management
  - Model HSE case
  - Integrated controls and audit

Implementation
Lead the change

1. Where are we now?

2. Where do we want to be?

3. How are we going to get there?

- Decision Hierarchy:
  - Given: facts, assumptions and decisions already made and taken as given for this opportunity
  - Focus Decisions: major focus decisions to be addressed by the team
  - Tactics: secondary decisions that are supporting decisions and/or can be decided later

- Action Plan:
  - What
  - What
  - When

- Value Drivers and CSFs
  - Value Drivers
  - CSFs

- Opportunity & Threat Grid
  - Opportunities
  - Threats

- Strategic Fit
  - Fit strategy (on strategy)
  - Fit opportunity (does it fit?)

- Definition of Success
  - Reference Date
  - Definition of Success
  - Critical Success Factors
  - Measures of Success