America’s Energy Choices & Shale Gas

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Total U.S. Energy Production at Record Levels

Gas Production in 2011 Set Record

U.S. Oil Production Increasing For First Time in 35 Years

U.S. oil Imports Decline From 60% in 2005 to 47% in 2010
U.S. In Energy Boom: Key Facts

- Nuclear Production Near Record High Set in 2008
- Coal Production Peaked in 1998 and Has Been Declining Slowly
U.S. In Energy Boom: Key Facts

- Renewable Energy will Exceed Nuclear in 2011
- Renewables & Nuclear Amount to 20% of Total Energy Consumption
U.S. In Energy Boom: Key Facts

- U.S. Energy Consumption Peaked in 2007
- Currently Below 2000 Levels
- Oil Consumption at May 1999 Level
- Gasoline Consumption at September 2011 Level
Renewable Energy of all Types (Ethanol, Hydro, Biomass) provided 10% of all US Energy in 2010

Coal was 43% of Power Generation in 2011

Coal Likely to be 41% by 2013
Wind & Solar Key Facts

- U.S. Wind Capacity Increased From 25,000 to 47,000 Megawatts from 2008 to 2011
- U.S. Solar Capacity Increased From About 400 to 4,000 Megawatts from 2008 to 2011
- U.S. Installed Solar Prices Have Dropped Sharply From About $10 Per Watt to $3 Per Watt From 2007 to 2011
- Global Investment In Renewable Power Production Exceeded Fossil Fuel Investment In 2010
Pennsylvania’s Strategic Objective:

- Produce the Gas and Protect the Environment
Marcellus Production Is Roaring

- More Than 4,000 Wells Drilled
- 3.5 Billion Cubic Feet/Day by End of 2011
- 2011 Producing at a Rate of 1.2 Trillion Cubic Feet/Day
- About 6% of U.S. Total Gas Production
Marcellus Production Is Roaring

- Production Will Likely Increase to 7 or 8 Billion Cubic Feet/Day by 2015
- Or Nearly 3 Trillion Cubic Feet/Year
- About 12% of U.S. Total Gas Production
Marcellus Production Is Roaring

- New York May Begin Drilling in 2012
- 85% of NY Marcellus Area Possibly to be Opened
- New York City and Syracuse Watersheds Off Limits
Protecting the Environment – Issues for the Public

1. Impact on water from drilling / wastewater
   - Streams
   - Private water wells
   - Withdrawals

2. Operational Problems/Accidents
   - Spills
   - Leaks
   - Fires – Response time
   - Blow outs – Response time
   - 50 plus emergencies responses
3. Truck Traffic Impact & Safety
   - Congestion
   - Road damage
   - Unsafe trucks

4. Gas Migration

5. Public Lands: State Forests & Parks
6. Taxation
   - 70% support for drilling tax as of 1/1/2011

7. Staffing of Oil and Gas Program
   - Number of employees
   - Location

8. Air Impacts
   - Nox
   - HAPs
9. No Clear Benefit for Public Health In Minds of Public from Gas Production
   - 100,000 megawatts nationally of 40 year old, poorly controlled gas
   - Just 110,000 natural gas vehicles in USA

10. Disclosure of Chemicals

11. Credibility of Regulation/Regulators
Regulatory Response

- Review & Strengthen All Rules
  - 4 Regulatory Packages Enacted
    2. Waste Water Disposal/TDS Rule: August 2010
    4. 150 Feet Mandatory Buffer from All Development for 22,000 Miles of High Quality Steams: November 2010
Protecting the Environment

Water Withdrawal Rule

- Driller With Application to Drill Must File Water Plan
- Water Plan Must Specific Amount of Withdrawal & Source of Water
- Water Comes From:
  - Streams & Reservoirs
  - Purchases From Water Authorities & Companies
  - Mine Pools
Protecting the Environment

- If Water Withdrawn From a Stream, the Amount is Compared to other Stream Flow Assuming Stream is in Drought Status

- Withdrawal From Streams Only Approved if Withdrawal Would Not Damage a Stream During Drought
Protecting the Environment

Drilling Standards Rule

- Adopts Stringent Standards for:
  - Design of Gas Well
  - Construction of Gas Well
  - Materials Used in Gas Well
  - Monitoring of Gas Well
  - Testing of Gas Well
  - Reporting to DEP
Protecting the Environment

Gas Drilling Standards Rule

- Requires Mandatory Disclosure of Chemicals Used
- Toughest Rule in Nation
Protecting the Environment

- 150 Feet Mandatory Buffer from All Development for High Quality Streams
- More than 22,000 Miles of HG Streams
- 25% of All PA Streams
Protecting the Environment

- Public Lands & Shale Forests
- Rendell Issued Executive Order Placing a Three Year Moratorium on Further Drilling in State Forests
- 700,000 Acres out of 2.2 Million Acres of State Forests Have Been Leased for Drilling
Protecting the Environment

- State Parks Includes Ones Where State Does Not Own Mineral Rights
- Support Moratorium on State Forest Further Leasing
- Oppose Drilling in State Parks
Regulatory Response

- **Staffing**
  - 88 Positions in Oil Gas Program as of September 2008
  - Raised Fee When Applying For a Permit from $100 to as much as $10,000 for Deep Wells
  - Doubled Staff to 202 by January 2011
Enforcement of Rules

- 1,200 Violations Issued During 2010
- 1,100 Violations Issued During 2011
- Companies Pay for Clean Up of Spills, Leaks, Gas Migration
Protecting the Environment

Three Remaining Main Environmental Issues

- Air Emissions
  - Smog
  - July 28, 2011 Proposed EPA Rule
Protecting the Environment

- Methane Leakage
  - NETL 2011 Study
  - CMU 2011 Study
  - Worldwatch Institute 2011 Study

- Gas Migration
  - Duke University Study
  - Penn State University Study
Protecting the Environment

- Pavillion, Wyoming
- Dimock, Pennsylvania
Protecting the Environment

- 100,000 megawatts of Nation’s 308,000 Megawatts of Coal Fired Power Plants are 40 Plus Years Old with Limited or No Pollution Controls

- Old Coal Fired Power Plants Emit 90% of the Toxic Air Pollutants – Mercury, Lead, Arsenic – From Power Plants
Protecting the Environment

- EPA States that Proposed Air Toxic Rule Will Save Up to 34,000 Lives Per Year
- Natural Gas Plants Emit Zero Mercury, Lead, Arsenic and Meet Proposed EPA Air Toxic Rule
- Natural Gas Plants Emit Virtually No Soot
- Coal Power Plants Emit Twice the Carbon Pollution of a Gas Plant
Natural Gas Good For Economy

Shale Gas Production Boom

- Shale Gas Less than 1% of U.S. Gas Supply in 2000
- Shale Gas Production at 2 Bcf/day in 2007
- Shale Gas Production at 16 Bcf/day in February 2011
- Today Shale Gas is as much as 34% of U.S. Natural Gas Production
Natural Gas Good For Economy

1. Shale Gas Production Has Lowered Natural Gas Prices Significantly
   $13 for Thousand Cubic Feet July 2008
   $2.50 for January, 2012

2. Shale Gas Has Saved Residential Gas Heating Customers About $500/year
   51% of Homes Use Natural Gas as a Heating Fuel
3. Shale Gas Has Saved Residential Electricity Customers About $500/year
   - 25% of U.S. Electricity Supply Comes from Natural Gas Plants
   - Natural Gas Plants Often Set Wholesale Price of Electricity

5. U.S. Exports About $400 Billion/year for Foreign Oil

- 60% Oil Imports in 2005
- 47% Oil Imports in 2010

Natural Gas is Cheaper and Cleaner Than Oil
But Major Market Failure Blocks Transition from Oil to Gas in Transportation
Natural Gas Good For Economy

- Keys to Getting Off Foreign Oil By No Later Than 2025
  - Natural Gas Vehicles
  - Electric Vehicles
  - U.S. Oil Production
  - Biofuels
  - Efficiency

- Goal Should be to Decrease Oil Imports 3 Percentage Points Per Year for Next 15 Years