The 4th Japan-U.S. Joint Public Policy Forum
The Future of Energy: Choices for Japan and the United States

David Pumphrey

Senior Fellow and Co-Director

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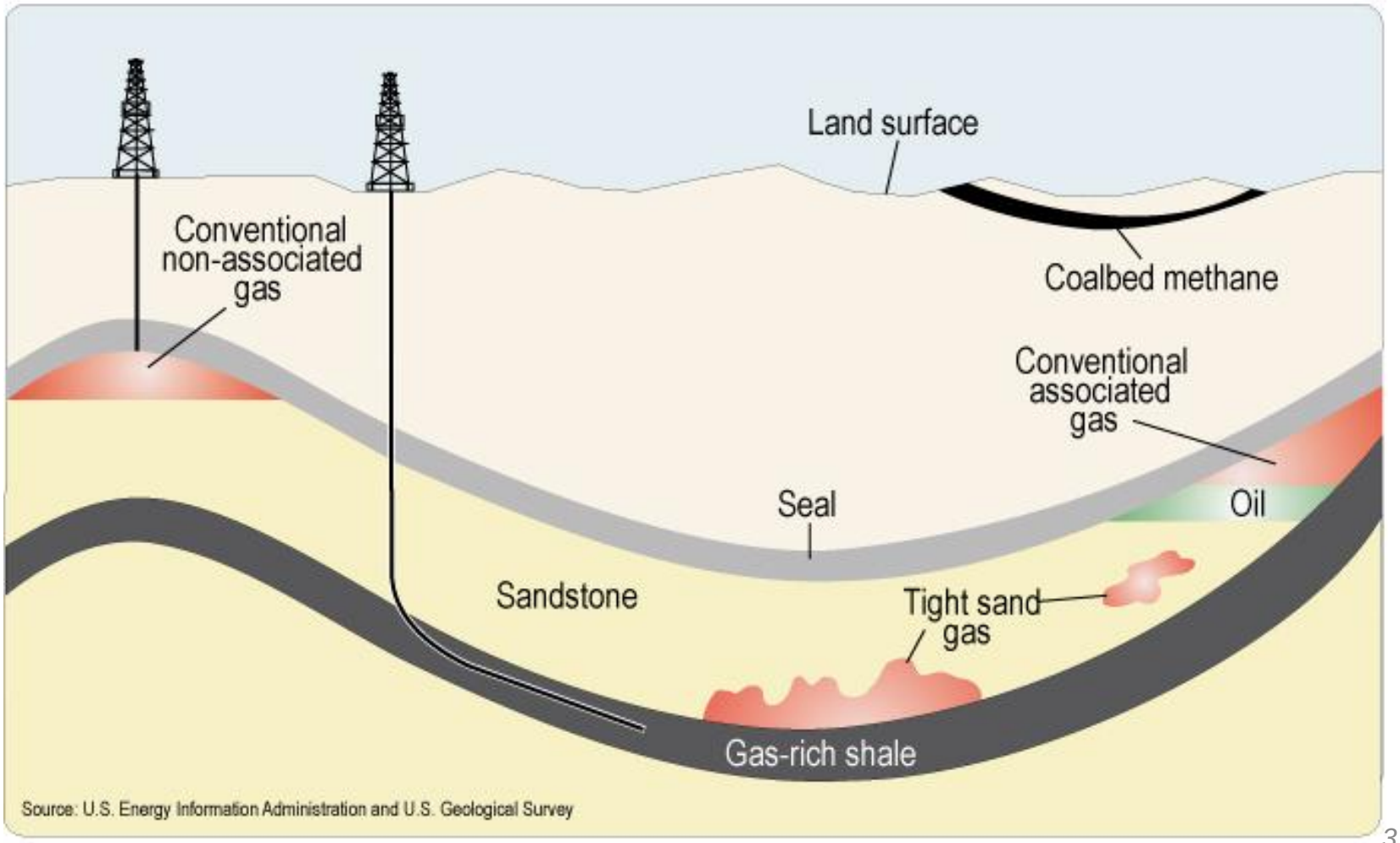
CSIS | CENTER FOR STRATEGIC & INTERNATIONAL STUDIES | Energy & National Security Program

U.S. Energy Policy has Emphasized Transformation to Clean Energy

- Economic stimulus package 2009 included $80 Billion to clean energy investments. Tax incentives maintained
- Vehicle Fuel Efficiency standards increased. Faster implementation of other efficiency standards.
- EPA began process to regulate greenhouse gases and moved on additional regulations affecting coal.
- Climate legislation failed.
- Copenhagen commitment to 17% reduction in 2020 from 2005 baseline.
- Unexpected increases in natural gas and oil production now driving U.S. energy sector.

"The nation that leads the world in creating a new clean energy economy will be the nation that leads the 21st century global economy" – President Obama

New Technologies and Practices Drive Production from Shale and other Unconventionals Deposits

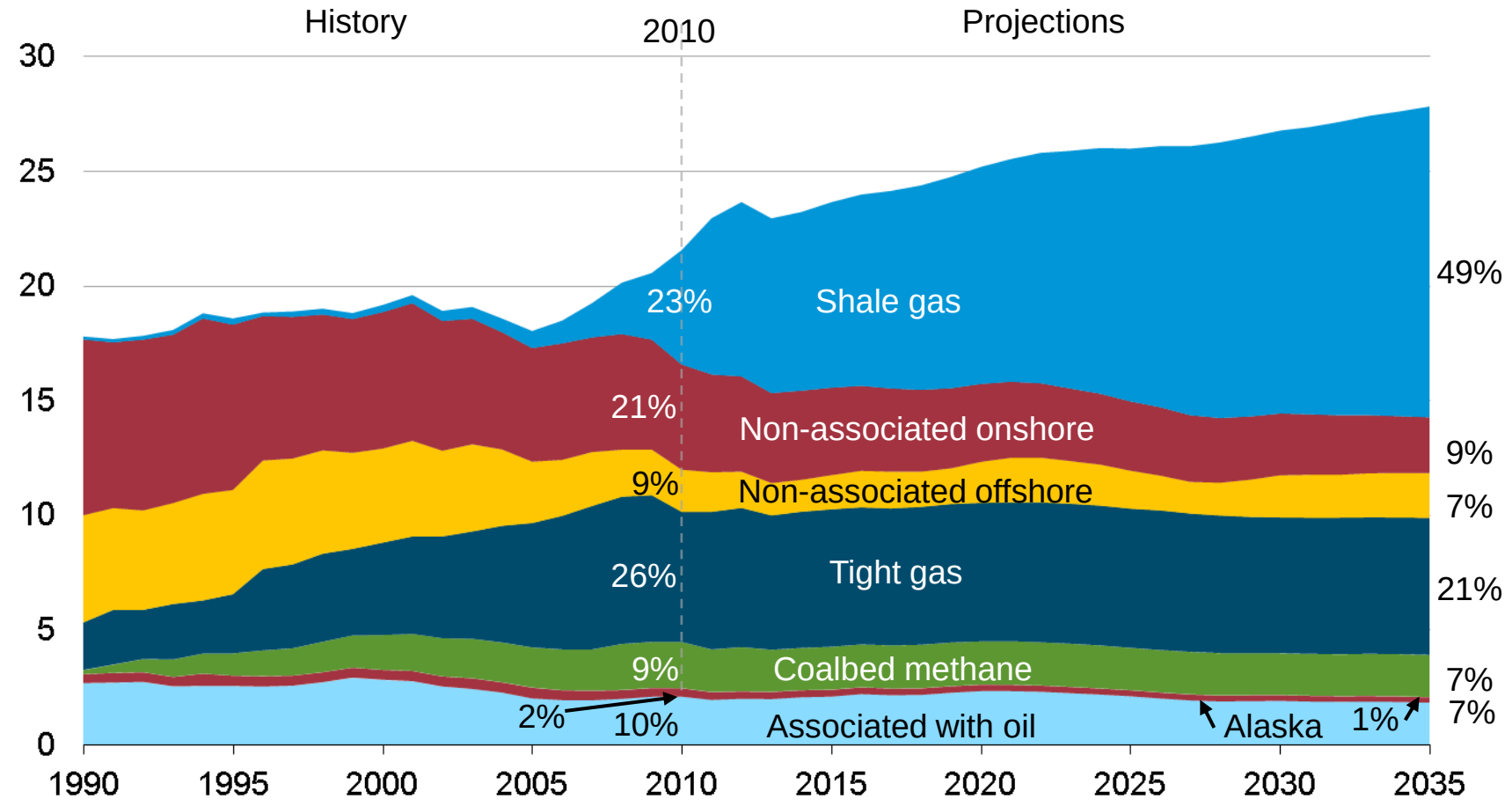


Unconventional Resources are Extensive

Source: U.S. Energy Information Administration based on data from various published studies. Canada and Mexico plays from ARI.
Updated: May 9, 2011

Increased Contribution of Shale Gas to Total US Supply

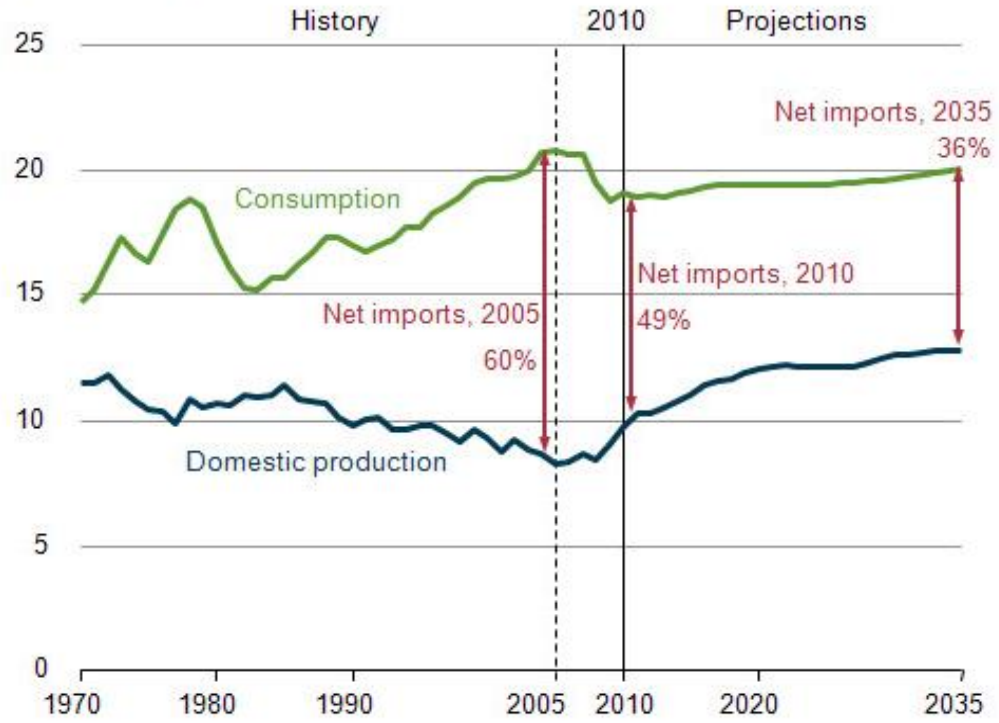
U.S. dry gas production
trillion cubic feet per year



Source: EIA, Annual Energy Outlook 2012 Early Release

U.S. Oil Outlook also being Reshaped by Unconventionals as well as Efficiency means lower imports

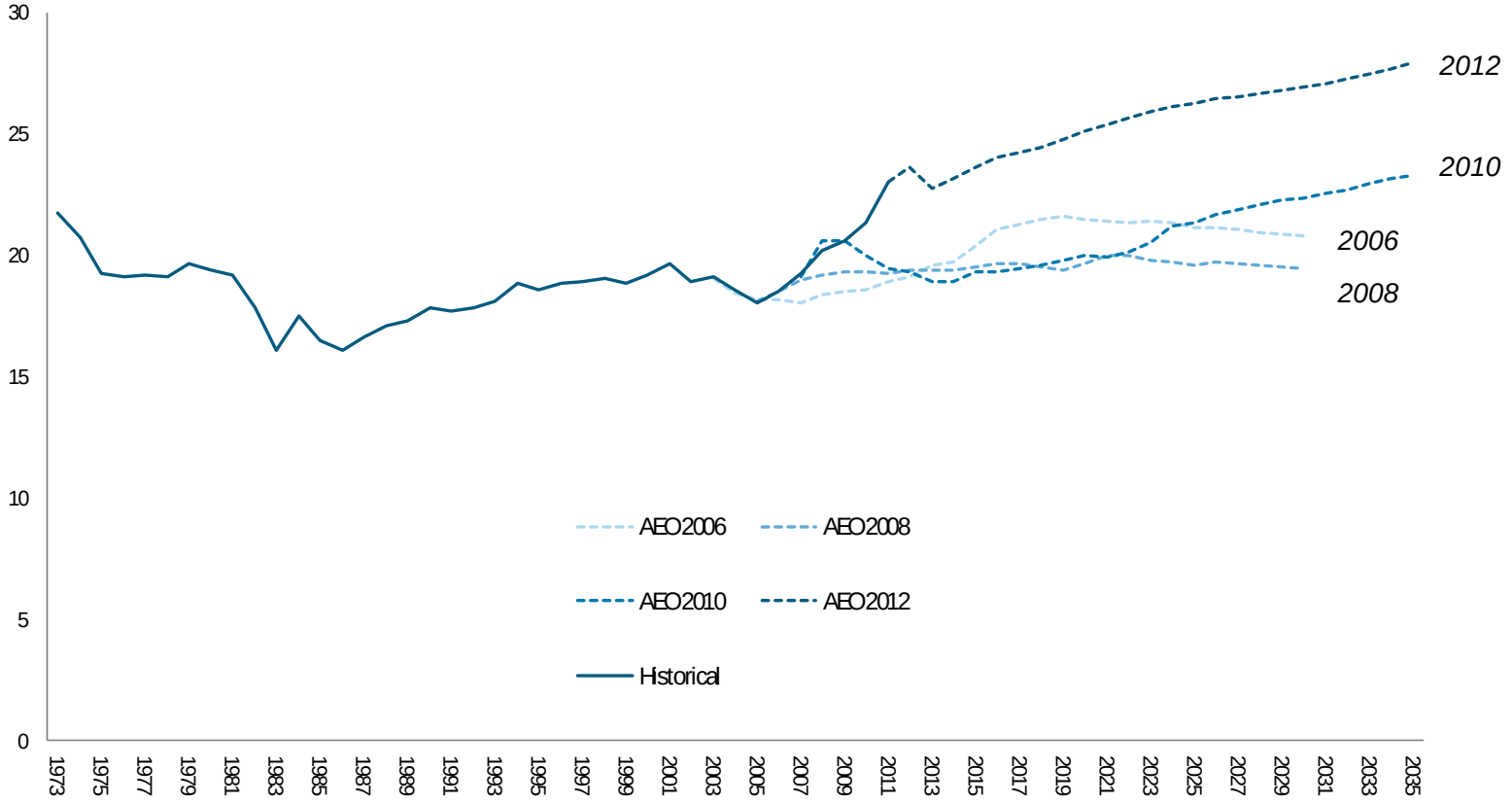
Figure 3. Total U.S. petroleum and other liquids production, consumption, and net imports, 1970-2035
(million barrels per day)



Source: U.S. Energy Information Administration, Annual Energy Outlook 2012, June 25, 2012

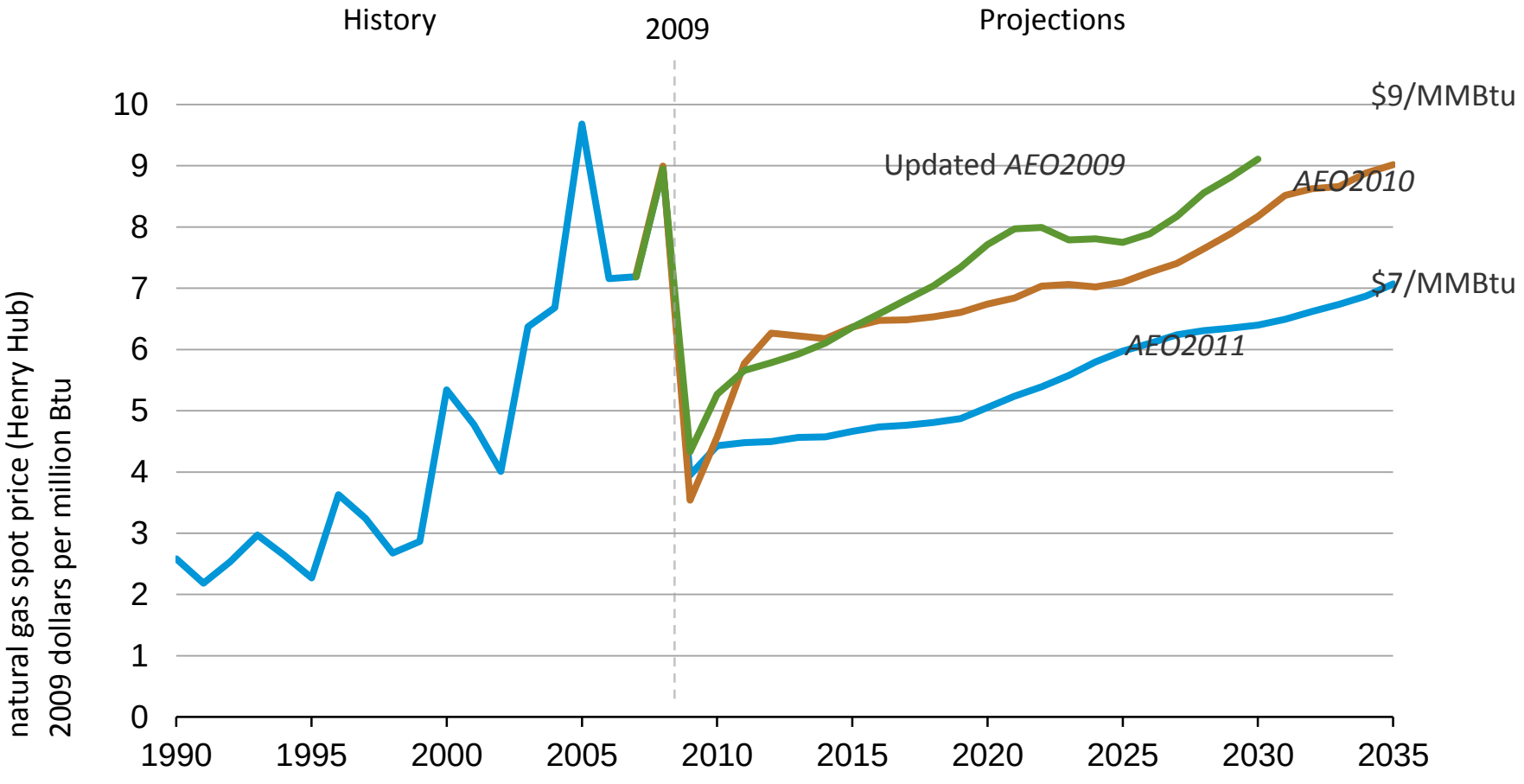
Expectations of Natural Gas Production Have Increased Significantly

EIA US natural gas production projections, tcf/year



Source: EIA AEO Forecasts from Trevor Houser, Peterson Institute for International Economics, Unpublished Manuscript

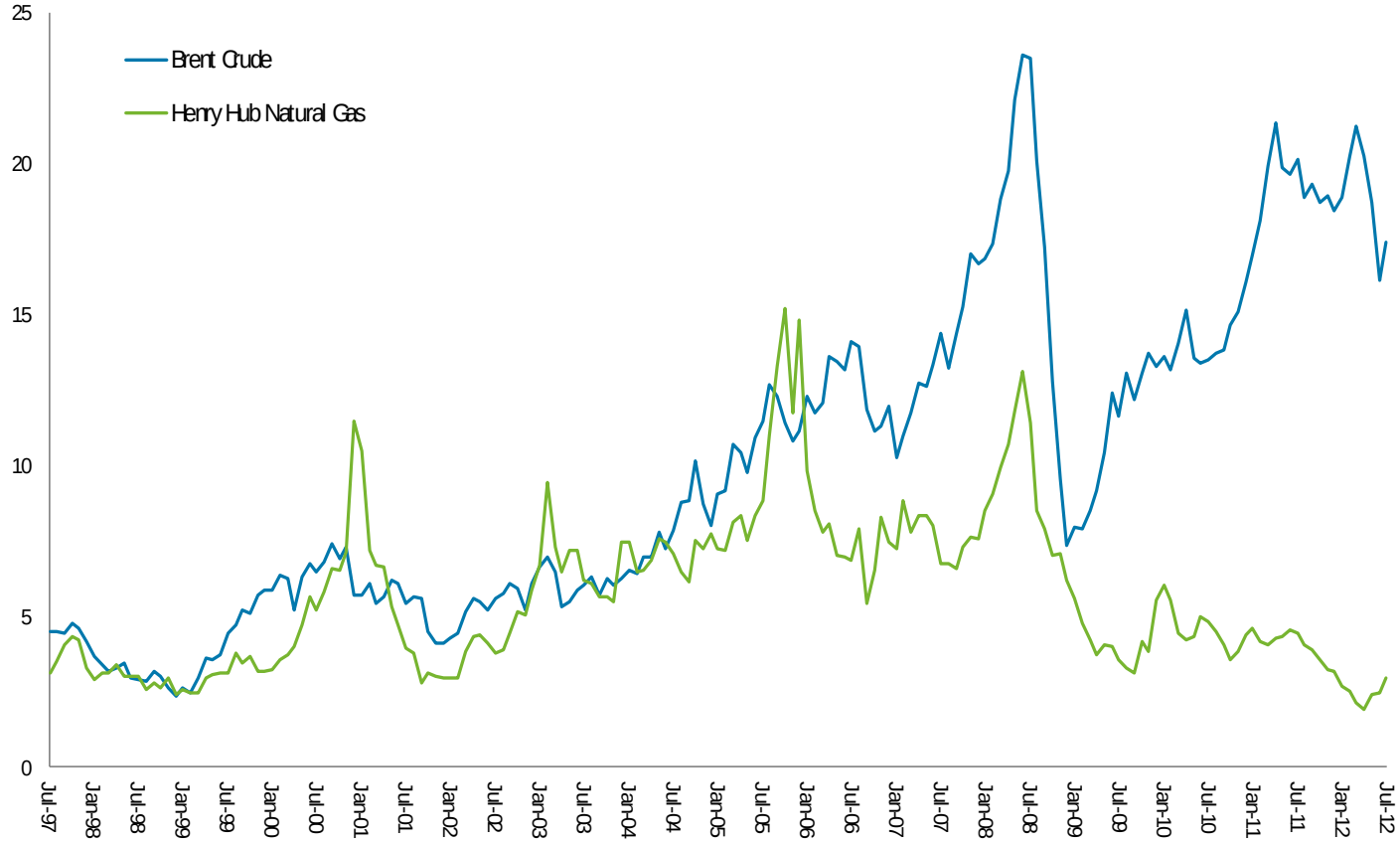
And Natural Gas Price Expectations are Significantly Lower



Sources: EIA, Annual Energy Outlook 2011; EIA, Annual Energy Outlook 2010; and EIA, An Updated Annual Energy Outlook 2009 Reference Case

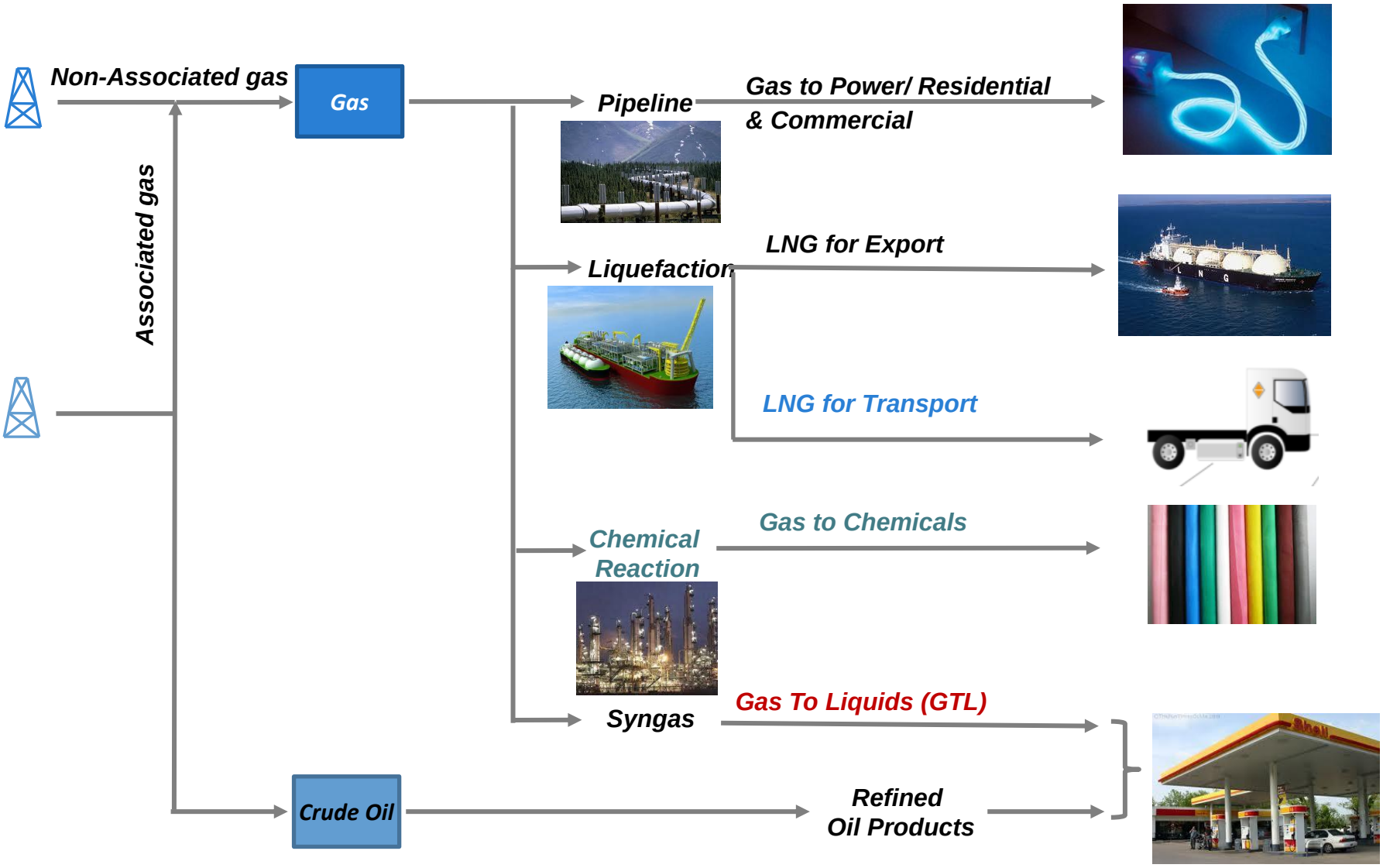
Oil and Gas Prices have Disconnected

Crude and Natural Gas Prices, 2011 USD per MMBTU



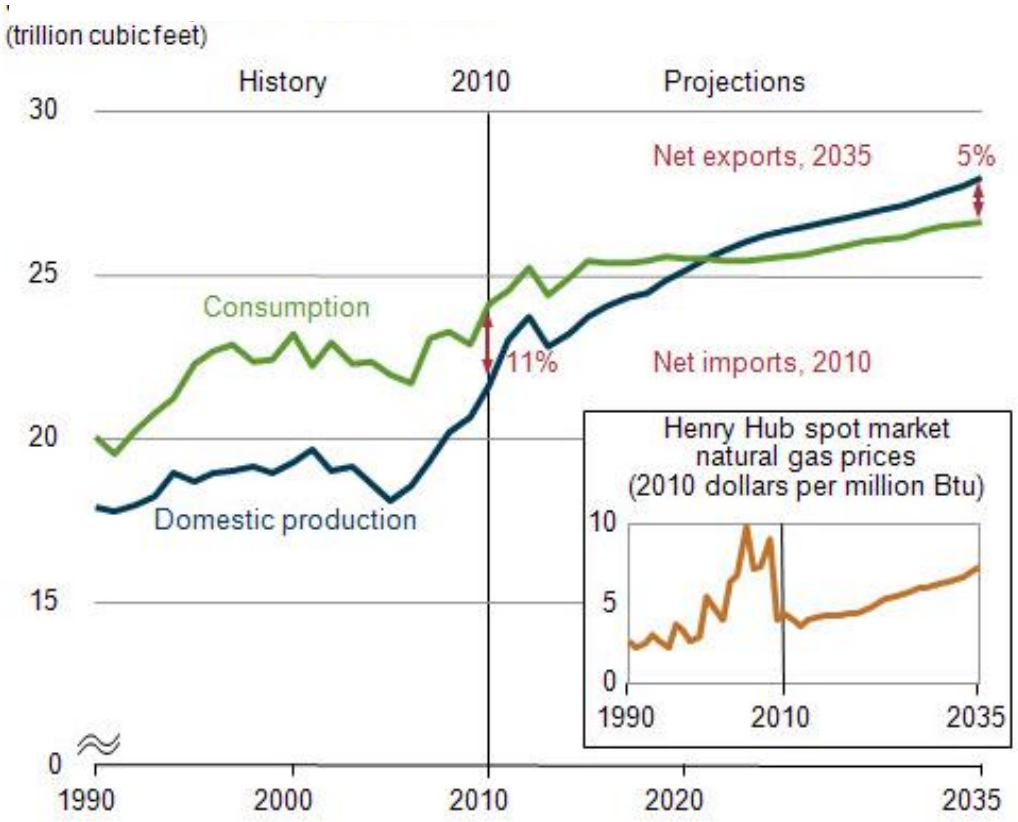
Source: EIA from Trevor Houser, Peterson Institute for International Economics, Unpublished Manuscript

An Overview of Natural Gas Pathways



Source: Royal Dutch Shell

Increasing Natural Gas Production Allows U.S. to Transition from Net Importer to Net Exporter of Natural Gas

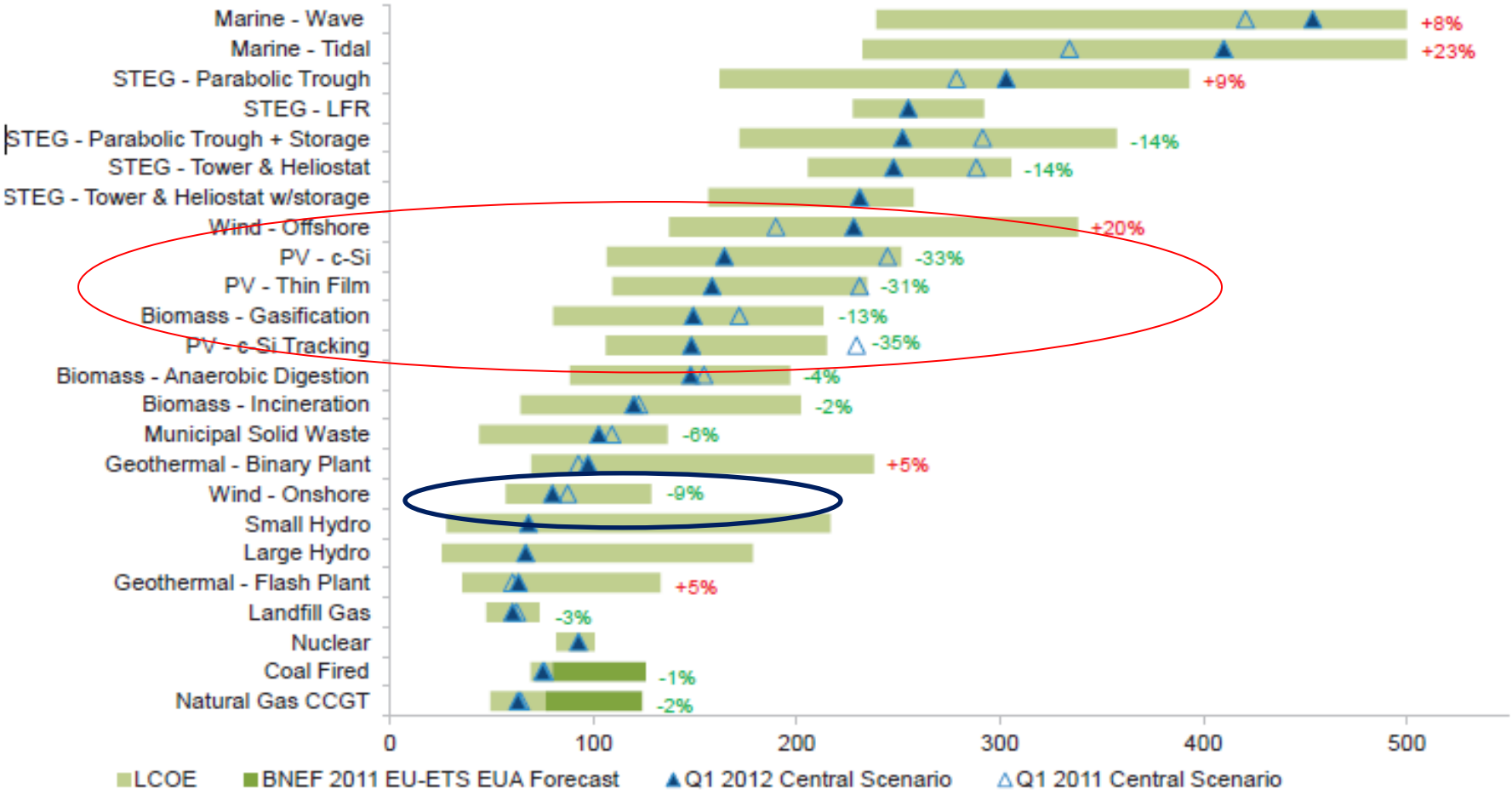


Source: U.S. Energy Information Administration, Annual Energy Outlook 2012, June 25, 2012

Shale Gas has Major Implications for Electric Power Sector

- Utilities switching to gas fired capacity rather than coal. Coal share of power generation reduced.
- Cheaper gas combined with new environmental rules will accelerate closer of older coal power plants.
- Investment in new nuclear power plants will likely not happen except for protected markets or with substantial government support.
- Existing nuclear power plants under competitive pressure.
- Investment in renewable energy will also be challenged though state renewable standards and tax credits will provide support.

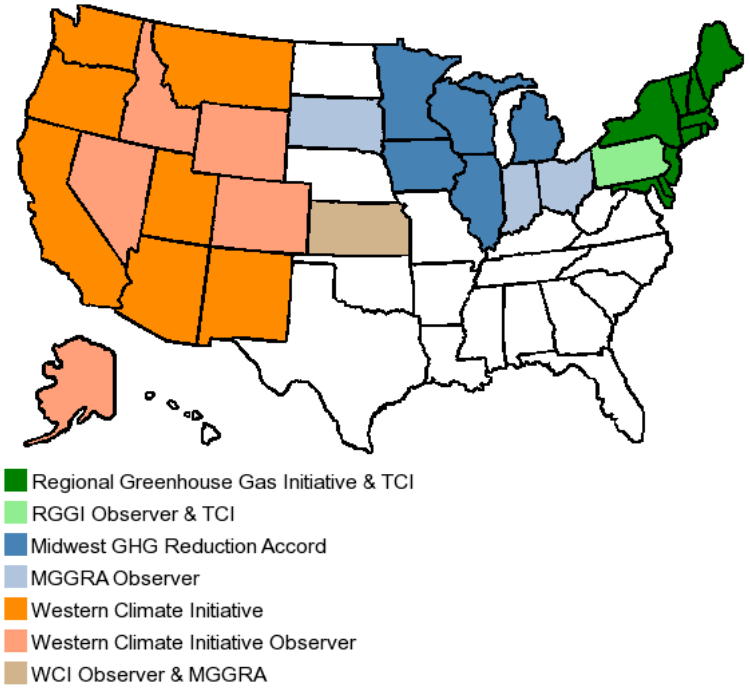
FIGURE 28: LEVELISED COST OF ELECTRICITY FOR DIFFERENT GENERATION TECHNOLOGIES, Q1 2012 V Q1 2011
$ PER MWH

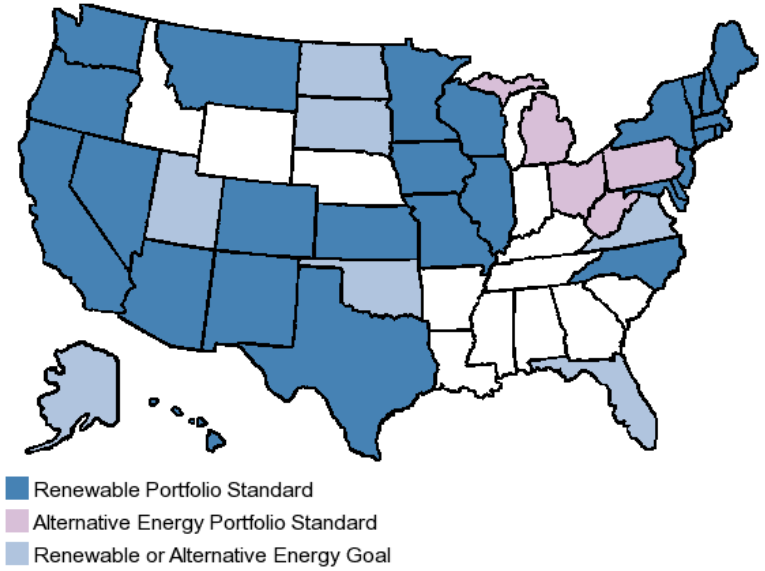


Source: Bloomberg New Energy Finance estimates

Federal and State Actions Supporting Renewable Energy

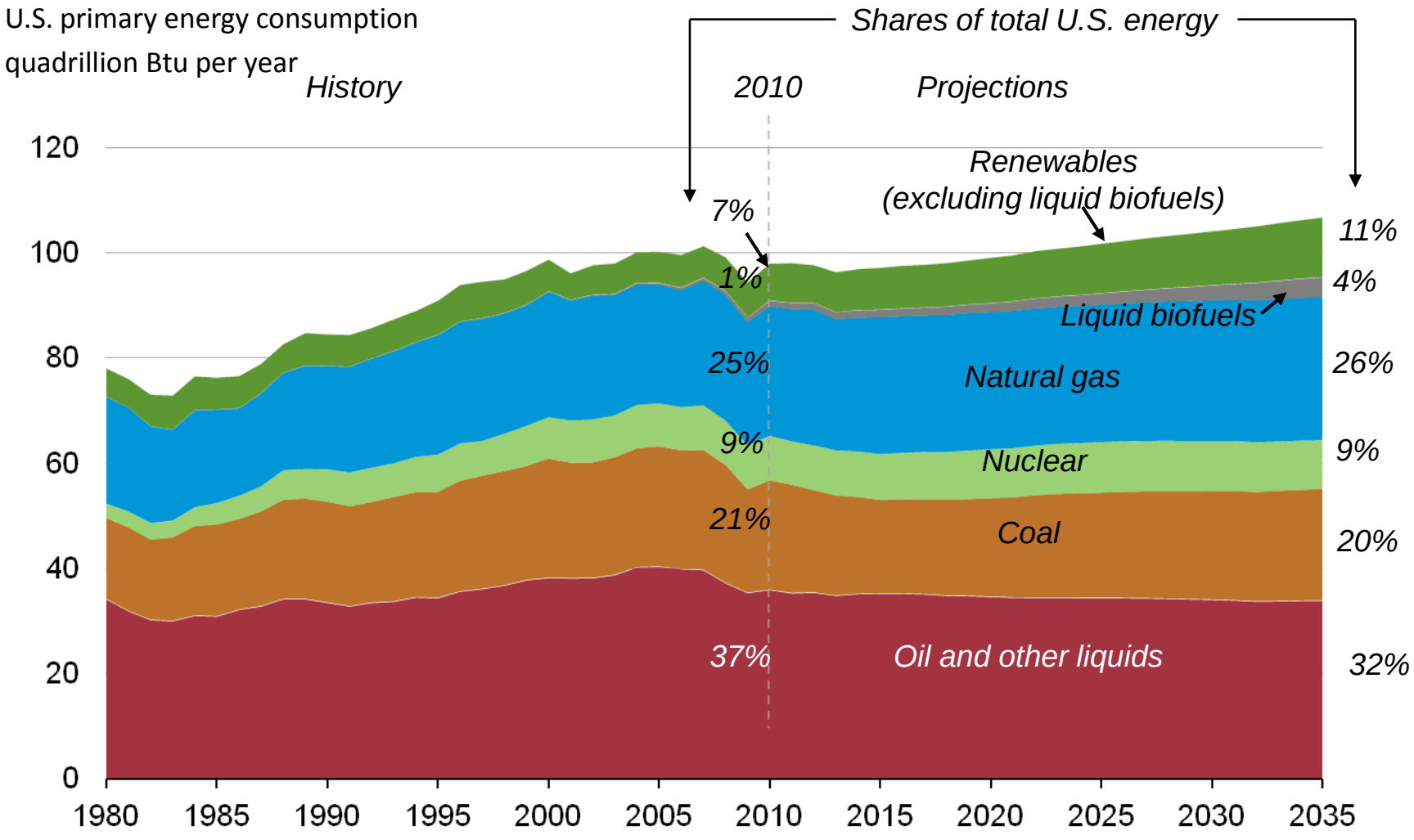
- Federal production tax credits supporting solar and wind energy.
- No progress on national clean energy standard.
- 36 states have some sort of renewable or alternative electricity standard (27 States have mandatory renewable RPS, 5 states have RE goals, 4 states have alternative portfolio standards that include CCS)
- 42 states offer green pricing - 11 have made it a mandatory utility offering
- One fully operational cap and trade market and one to begin soon





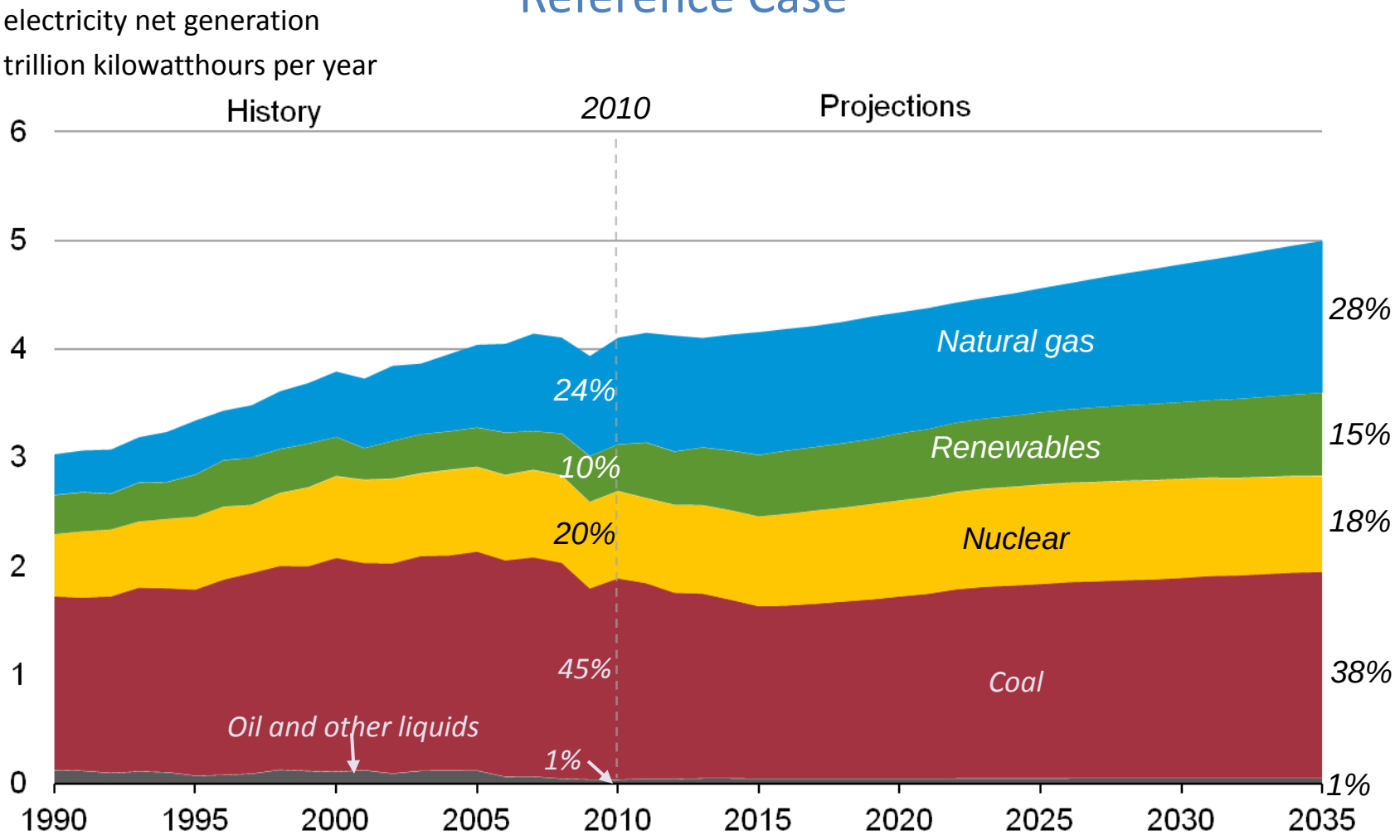
Source: Pew Center on Global Climate Change

Energy use grows slowly. Efficiency improves and mix shifts toward renewables and natural gas



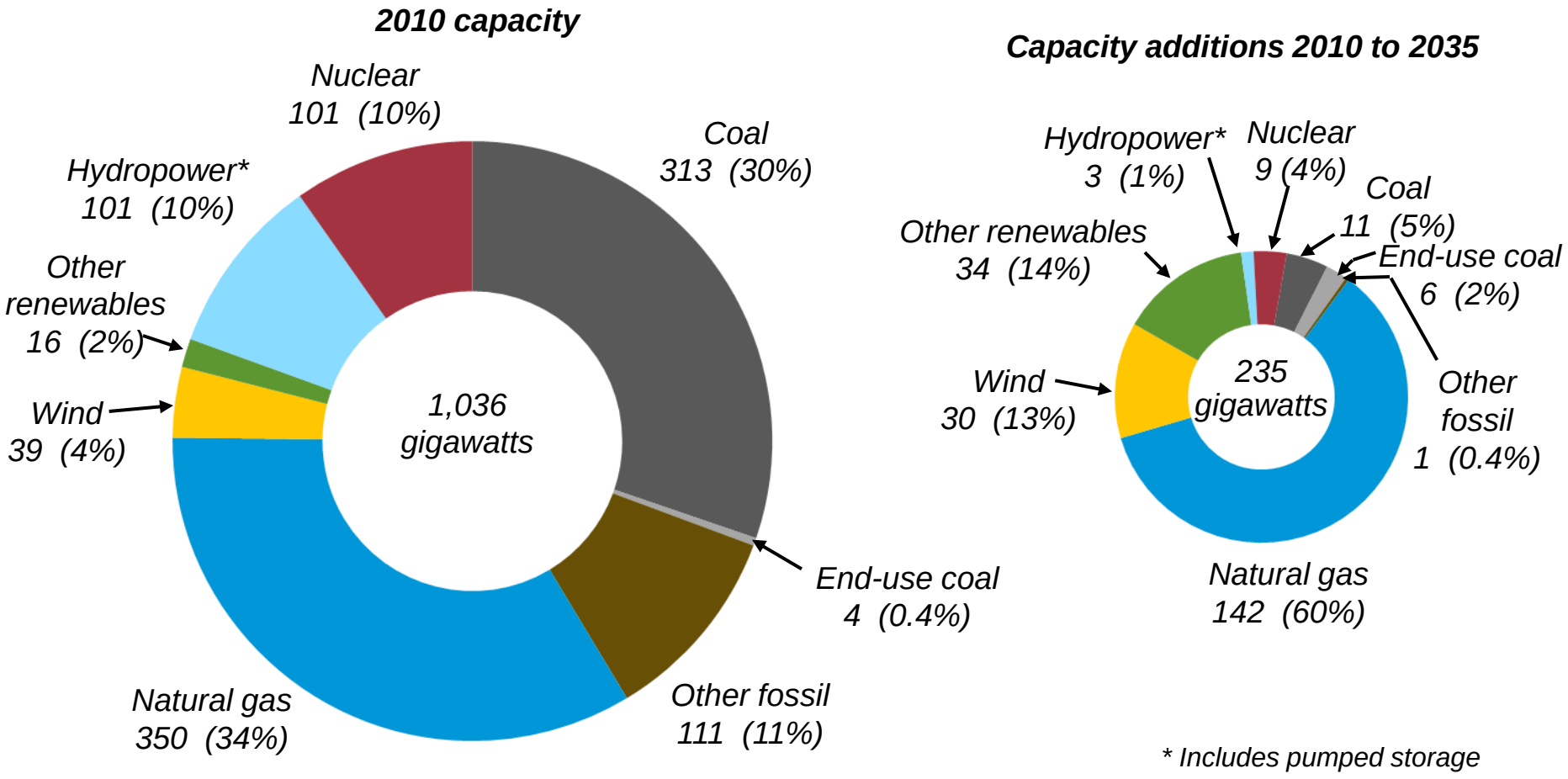
Source: EIA, Annual Energy Outlook 2012

Electricity Generation Shifts to Natural Gas and Renewables in Reference Case



Source: EIA, Annual Energy Outlook 2012

Natural gas and Renewables May Account for More than 90% of New Capacity to 2035



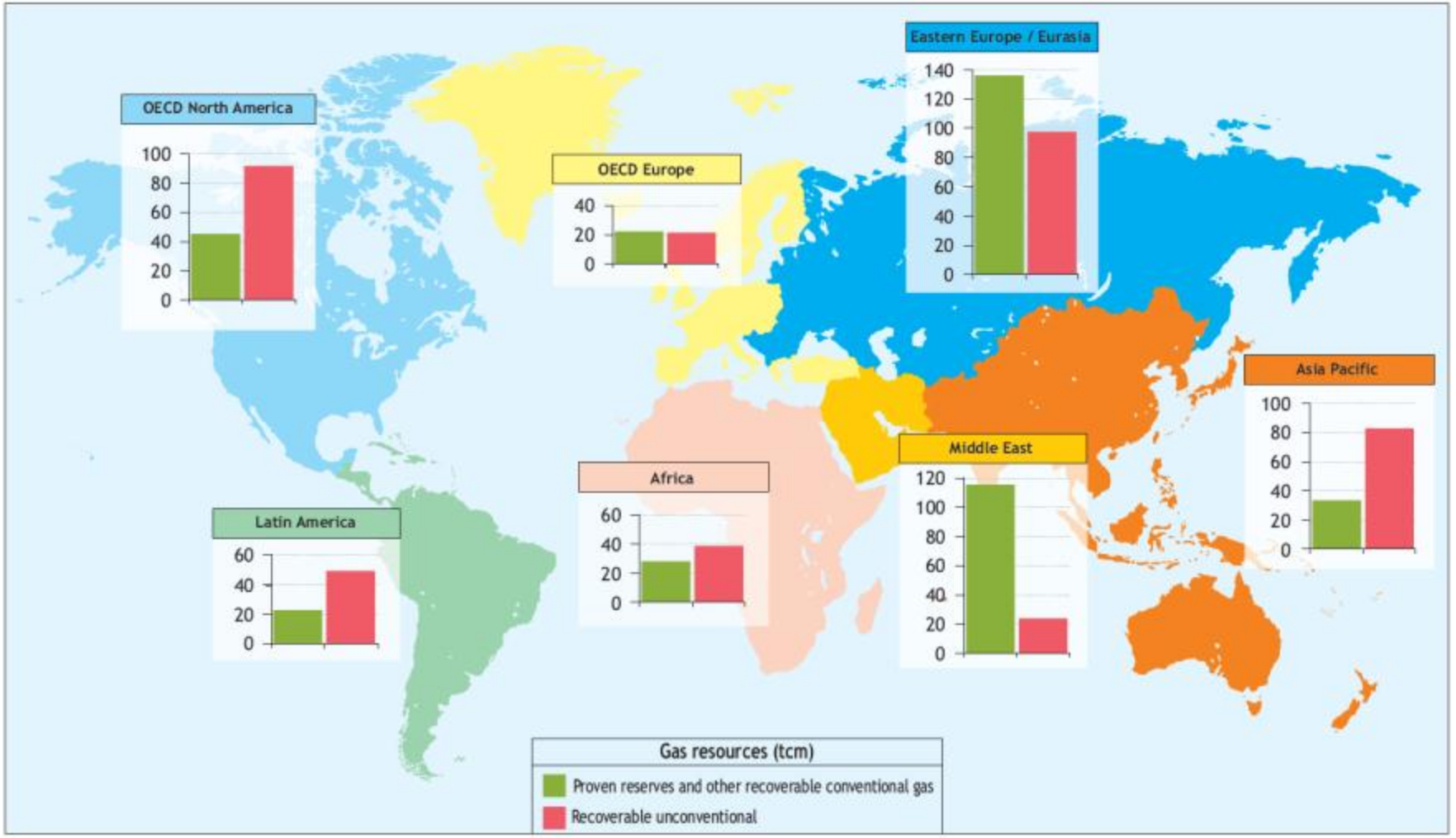
Source: EIA, Annual Energy Outlook 2012

Issue	Obama	Romney
LNG Exports	Under study; likely approval with volumetric/economic considerations	Under study; likely approval with volumetric/economic considerations
CAFE Standards	Increase mileage requirements (54.5 mpg by 2025)	Oppose mandates, could roll back
Nuclear	Supportive, economic/safety challenges	Improve NRC process, Yucca?*
Renewables	Supports tax credit extension*	Opposes tax credits
Climate	Continue GHG regulation by sector	Stop EPA regulations; repeal CAA requirements*
Alternative Fuel Vehicles	Continue to support credits*	"Not picking winners"
Energy Taxes	Favors reallocation of $/credits*	Thought to retain preferences though debate notion of all on the table?*
Oil Exports	Products permitted; no decision on crude	Opposes crude exports
Oil and Gas Access and Transport	GOM and Alaska, no ANWR. Stringent OCS permit rules. Likely approval of Keystone XL with conditions.	Streamline permits, relax rules, open more (federal) areas, increase states' role. Approval of Keystone XL.

*requires Congressional action

Extra Slides

Unconventional Resources are Distributed Globally



IEA Estimate of Global Natural Gas Resources

Prospects for Shale Gas Development in China

- Shale gas development among government priorities.
- Shale resource estimates vary. Knowledge of the geology is limited.
- Desire to develop as indigenously as possible. The role of foreign companies uncertain.
- Access to technologies a key driver behind Chinese investments in N. America.
- Bottlenecks to the Development include:
  Lack of geological data; Technologies and Expertise; Fiscal regimes; Pricing regimes; Infrastructure; and Water.
- Chinese shale gas production may not eliminate import needs, but may serve as a bargaining leverage with gas exporters on price.
- Successful shale gas development in Asia may eventually affect global gas trade, primarily as LNG, but its scale may largely depend on the future trajectory of overall energy demand in China and India.