



US Coal: A Stranded Asset Ready for Export?

IEA Outlook for Coal Industry and Markets

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Agenda



- **Part 1:** Cheap gas and environmental regulation constrain coal's growth in the US
- **Part 2:** Possible major expansion of US exports from the Powder River Basin

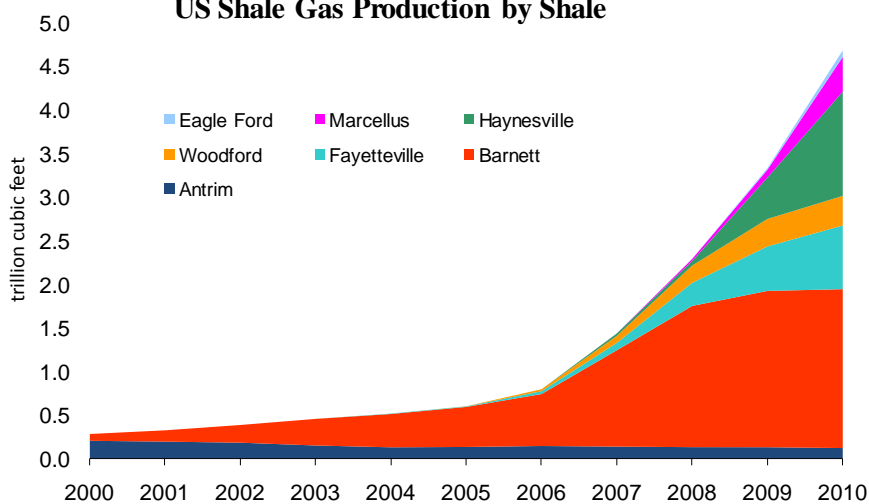
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- **Part 1:** Cheap gas and environmental regulation constrain coal's growth in the US

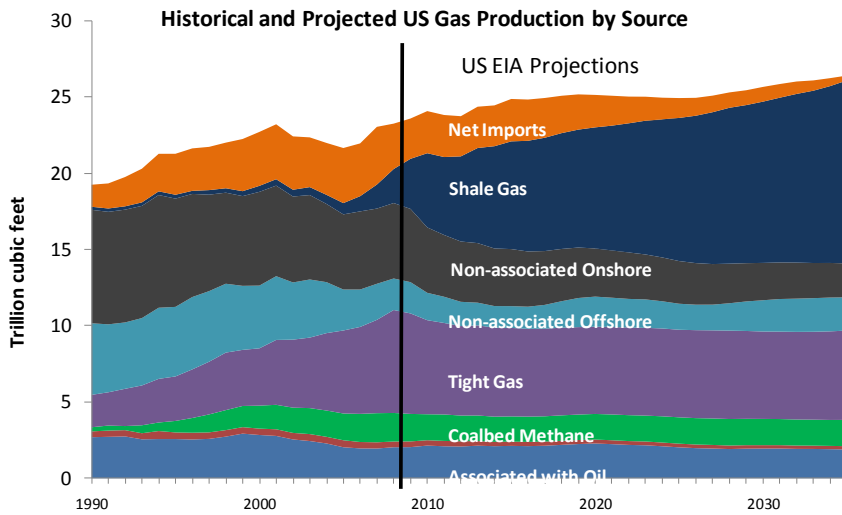
US Shale Gas Production is Expanding Rapidly

US Shale Gas Production by Shale



Source: EIA, Howard Gruenspecht, Lippman Consulting

US Gas Production Will Continue to Grow

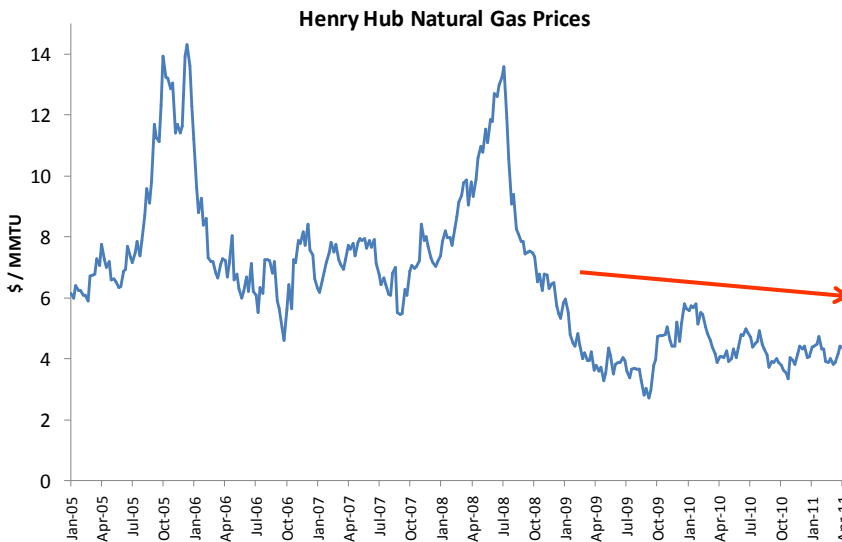


Source: US EIA, Annual Energy Outlook 2011.

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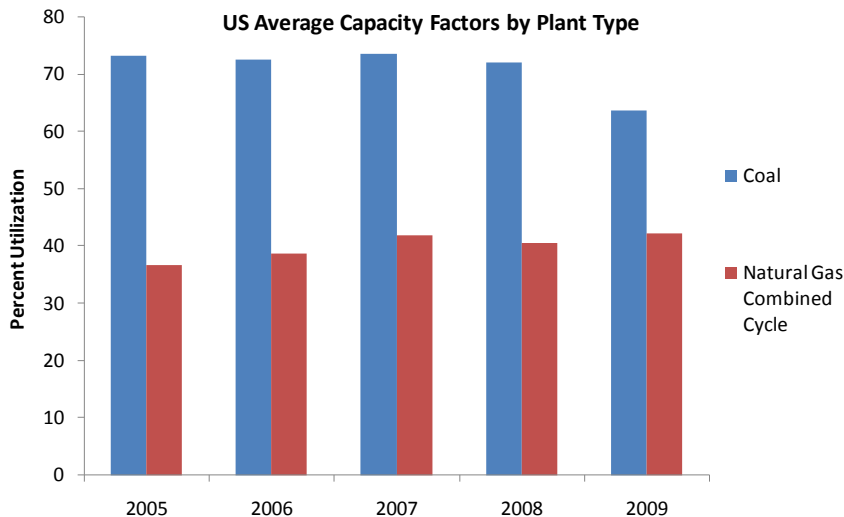
Gas Production Growth Drives Lower Gas Prices



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The Merit Order is Shifting: coal is losing market share to gas



Source: US EIA.

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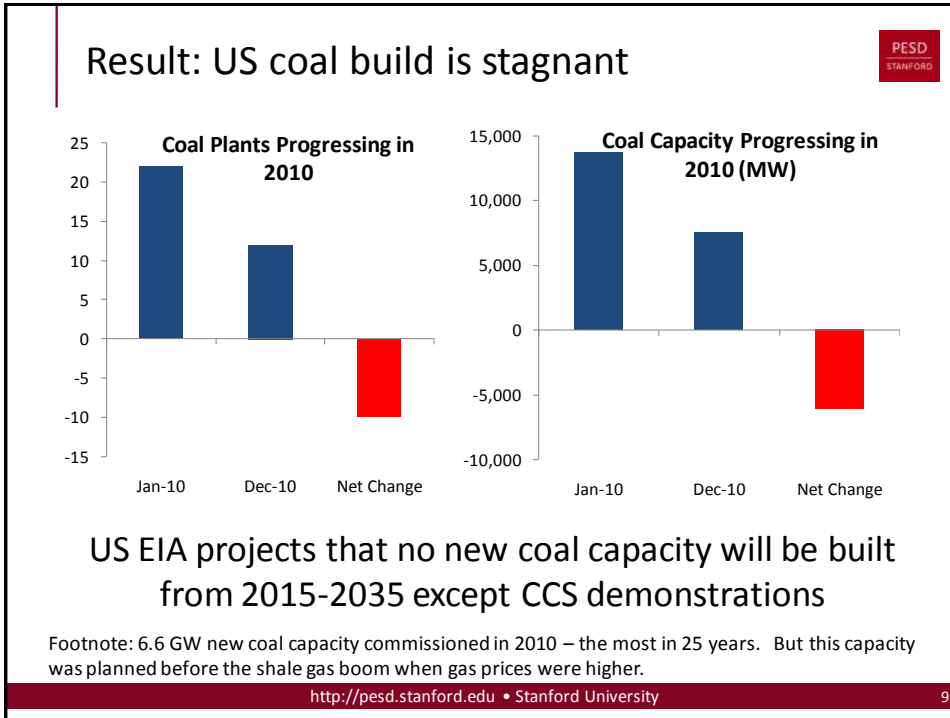
Regulatory Challenges Further Impede New Coal Build



- **Key non-GHG regulations add prohibitive costs**
 - Clean air transport rule
 - Title 3 mercury rules
 - Ash disposal requirements
- **New EPA regulation of GHGs under Clean Air Act**
 - Massachusetts v. EPA defined GHGs as an “air pollutant”, giving EPA authority to regulate carbon in 2007
 - New GHG rules for large emitters phase-in starting Jan. 2011
 - But Republicans in Congress are attempting to repeal EPA GHG authority

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- **Part 2:** Possible major expansion of US exports from the Powder River Basin

Major New Plans for PRB Exports

Arch and Peabody have proposed new ports to export up to 84 mt of coal from the US west coast



- Powder River Basin produced 455 million short tons in 2009
- Abundant, cheap reserves
- New ports could supply Asia with cheap, low-sulfur coal

Stanford Coal Trade Model: PRB Export Scenarios



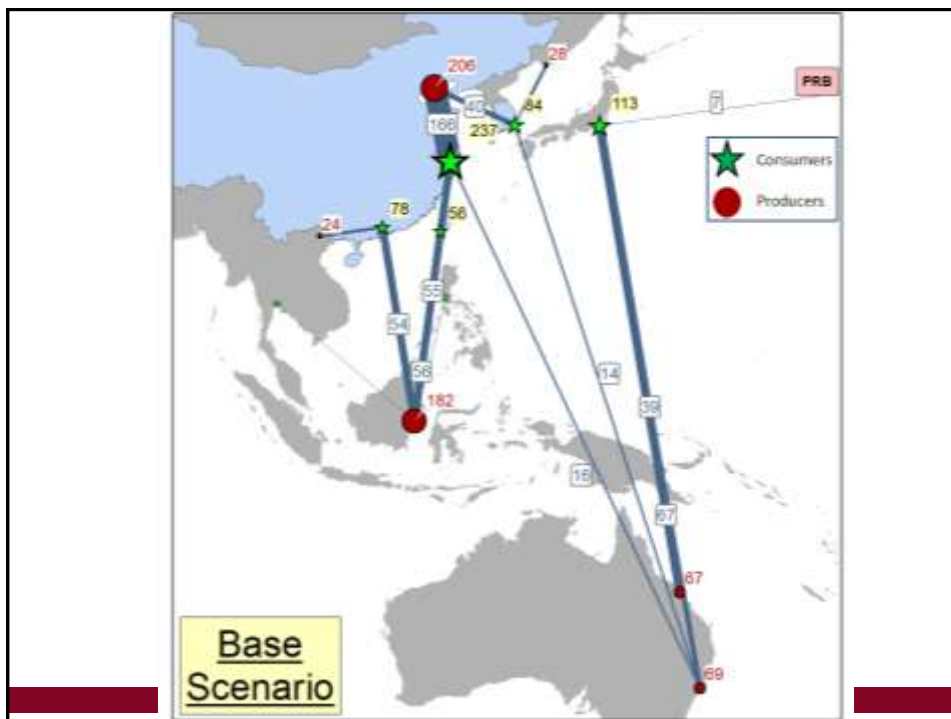
- Stanford PESD has developed an economic model of the world steam coal trade
 - Key features:
 - 2009 data represents global demand, production, and infrastructure
 - Results show energy adjusted global trade flows and prices

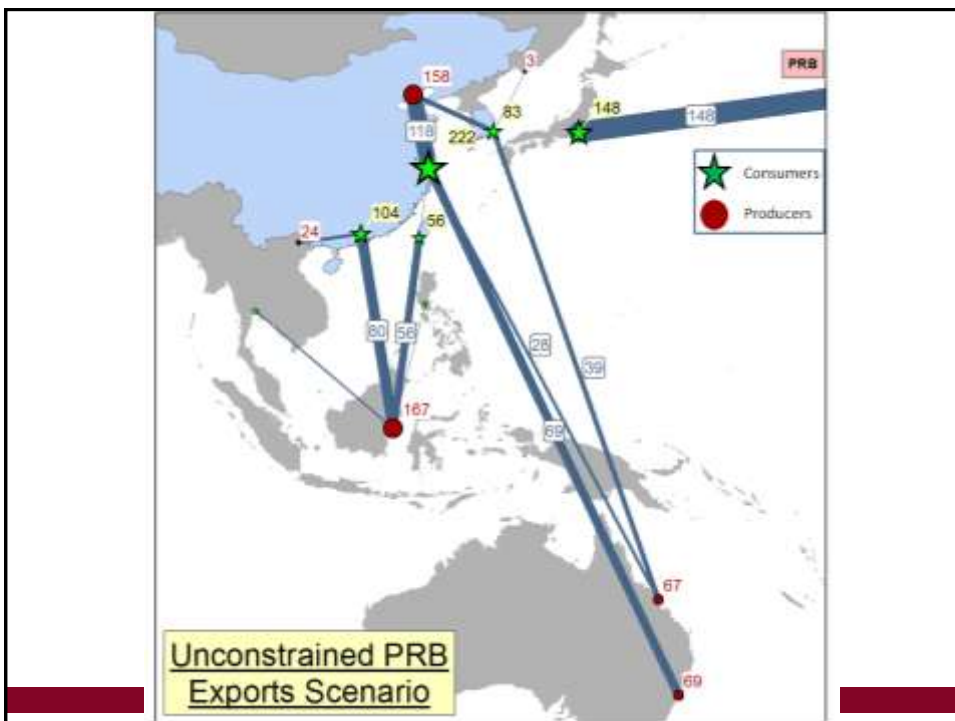
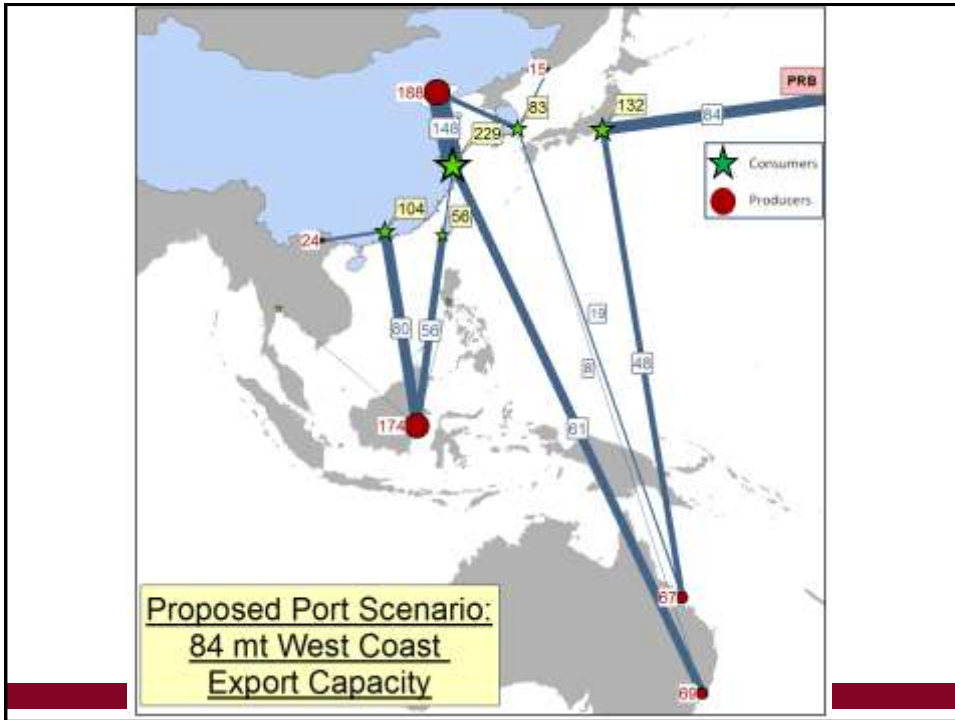
- **3 PRB Export Scenarios**
 - **Base Scenario:** models 2009 market conditions
 - **Proposed Port Scenario:** models impact of PRB exports with 84 mt new export port capacity
 - **Unconstrained PRB Exports Scenario:** models PRB exports with no port constraints

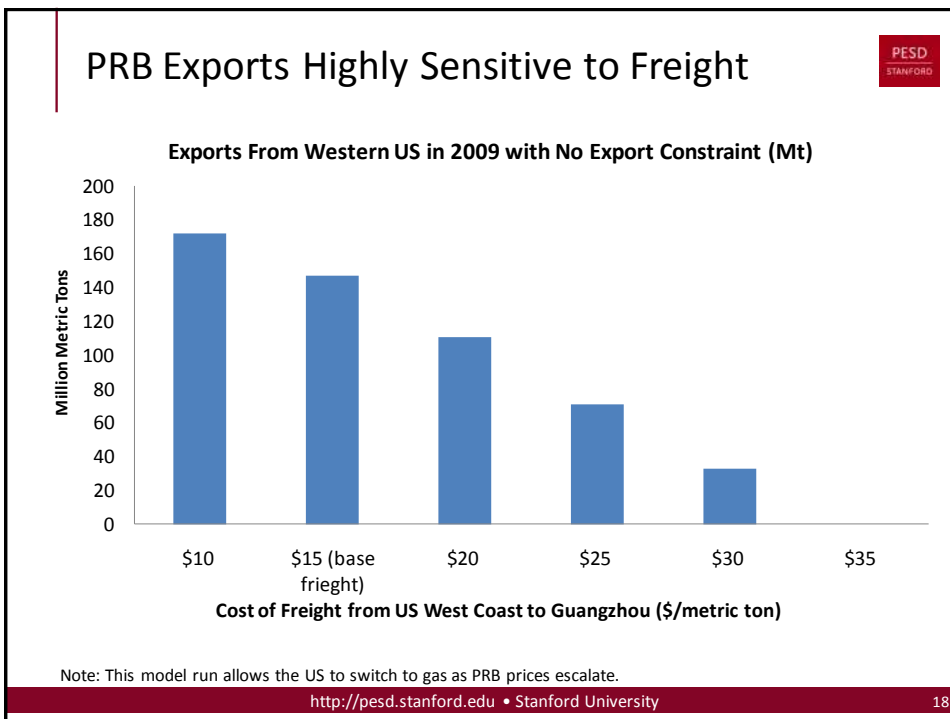
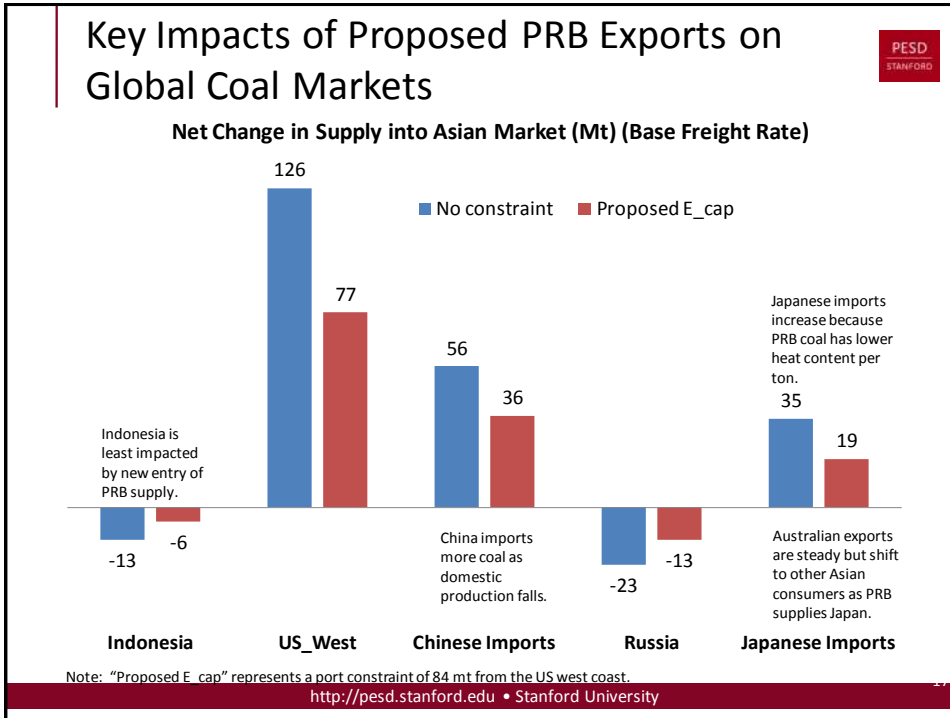
Note: Legal and permitting challenges may constrain port development below 84 mt. The first version of the model developed in collaboration with DIW Berlin.

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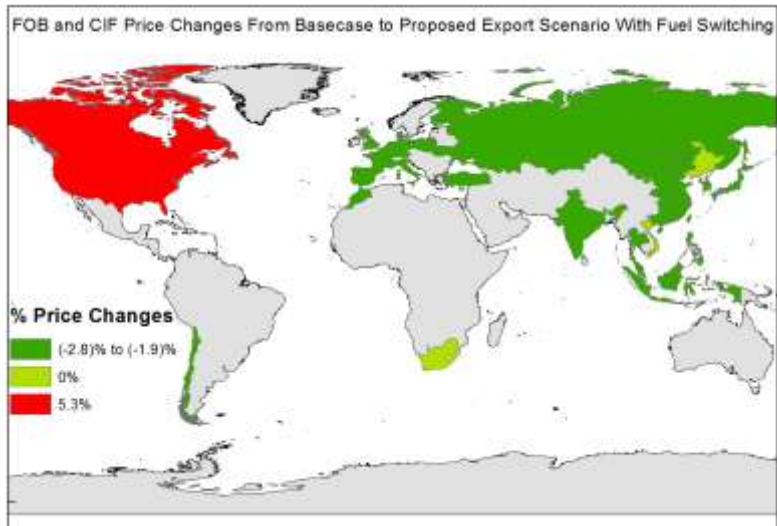
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US Prices Increase and Asian Prices Decrease



Thank you



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Stanford's modeling team Michael Miller and Zhe Zhang also contributed to this presentation.