Replacement of Coal by Fracgas in the Production of Electric Power

Yale Graduates Energy Study Group

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USAEE Houston Chapter
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Gas Production and Electricity

Gas (trillion cubic feet)

- Gas - Electric Sector Only
- Shale Gas - All Production

Graph showing trends in gas production from 1990 to 2020.
Coal Production in Electricity

Coal (million st)
Coal and Gas Delivered Prices

Coal - Delivered Prices - Electric Power Sector (nominal $'s per short ton in logs)

Gas - Delivered Prices - Electric Power Sector (nominal $'s per thousand cubic feet in logs)
Cross Elasticity Estimates

Sereletis (cross elasticity): 0.064 for 1973 to 2007

Sereletis (Morishima elasticity of substitution): 0.201 for 1973 to 2007

Sereletis & Shahmoradi (Morishima): 0.307 to 0.480 (1996 to 2004)

Jones (linear logit coal to gas): 0.027 to 0.210
YGESG Elasticity Data

[Graph showing elasticity data for various years with trends in NL Coal Quantity (Tons), NL Coal Price (Tons), and NL Gas Price (Cubic Feet).]
YGESG estimate

Regression equation:

$$NL(\text{coal q}) = a + b \, NL(\text{gas P}) + U$$

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<th>$s$</th>
<th>$t$-stat</th>
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<tbody>
<tr>
<td>Intercept:</td>
<td>21.19</td>
<td>117.17</td>
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<tr>
<td>NL coal price:</td>
<td>-0.26</td>
<td>-4.71</td>
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<tr>
<td>NL gas price:</td>
<td>0.20</td>
<td>8.83</td>
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How much?

YGESG estimate: 0.20 X 50% equal to 10% and not to exceed 20%.

Credit Suisse estimates 15% to 30%. This requires new supplies of gas in the range of 1.8 TCF to 3.7 TCF per year and the infrastructure to move that new gas to market.
Challenges—Pipelines

National pipeline infrastructure and storage is geared to seasonal fills and draws for heating and cooling.
Challenges—Pipelines

Figure 11. Economic value added (EVA) for selected pipeline companies by region (Source: Calculations based on Compustat financial statements of the pipelines. See note 3 for calculation of EVA.)
Challenges—Regulations

EPA regulatory resolve appears to be weakening during 2012 campaign

Coal plants are a sunk cost for utilities
In the real world

New coal plants are being canceled—in coal country

Why are coal plants being proposed in Texas?

Why is the US gearing up to export gas?
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