

SHALE FORECAST

PRESENTED TO:

TO THE AMERICAN ASSOCIATION OF DRILLING ENGINEERS

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OVERVIEW

- Low natural gas prices
- Gas price volatility
- Lack of access to global markets
- Slow adoption of natural gas as fleet transportation fuel
- Infrastructure conversion costs for general fuel use
- Manufacturing's massive existing investment in coal-fired facilities
- Plastics production cost – Catch 22
- Environmental and community opposition to shale development

LOW NATURAL GAS PRICES

- Prices have fallen from over \$10 per MMBTU in 2008 to less than \$3 in 2012
- Acts as a constraint on investment and capital expenditure
- Expected to remain low unless market access improves
- ExxonMobil expects shale gas to be #2 energy source (behind crude) by 2025 with a shift from net importer to net exporter in that year

GAS PRICE VOLATILITY

- Shale has grown to about 25% of natural gas production
- Shale production quadrupled from 2007-2010 from 1.3 TCF to 5.3 TCF
- Projected to be 46% of US natural gas production by 2035
- Shale production pivotal to any forecast for natural gas production
- Lack of stability further discourages investment
- Reduces ability of producers to make long-term plans

LACK OF ACCESS TO GLOBAL MARKETS

- Large energy consumer companies in the UK and Japan are planning to have access to US natural gas liquids exports
- Other high levels of international demand inaccessible due to current legislative export constraints
- Without high demand, US producers unable to exploit any price upsides

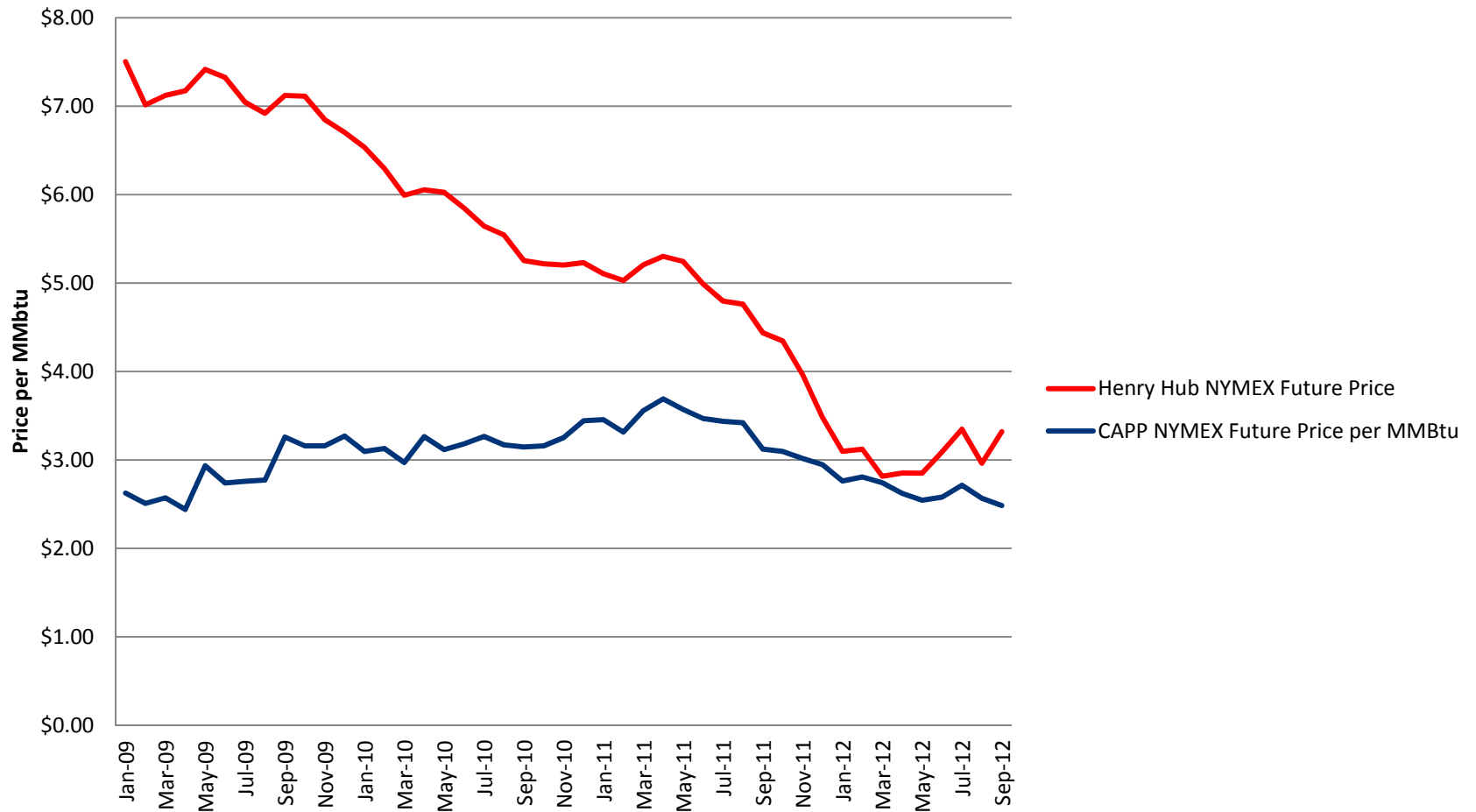
SLOW ADOPTION OF NATURAL GAS AS FLEET TRANSPORTATION FUEL

- Widespread adoption of low-cost natural gas could be advantageous to companies with large fleets
- Fleet managers unable to realize undoubted cost benefits because infrastructure experiencing “chicken and egg” quandary
- Further unknowns exist given the state-by-state variances in adoption rates and availability at gas stations

INFRASTRUCTURE CONVERSION COSTS FOR GENERAL FUEL USE

- Cost of energy production for use in electric cars a critical factor, but requires massive changes in infrastructure
- Electric car adoption is years away until range and charging options improve
- Cars powered by natural gas are increasing in number, but production remains cost prohibitive since investment in associated technologies remains low

PRICE PER MMBTU OF GAS VS. COAL



MANUFACTURING'S MASSIVE EXISTING INVESTMENT IN COAL-FIRED FACILITIES

- US is historically a coal generation nation
- Coal accounted for 34% of production in May 2012
- Capital cost for conventional coal is over 3X that of conventional combined cycle natural gas
- Despite increased coal-focused environmental regulations, only 10% plan improvement upgrades
- Tentative upgrades due to heavy investment in coal-fired facilities and previous experiences with gas price volatility

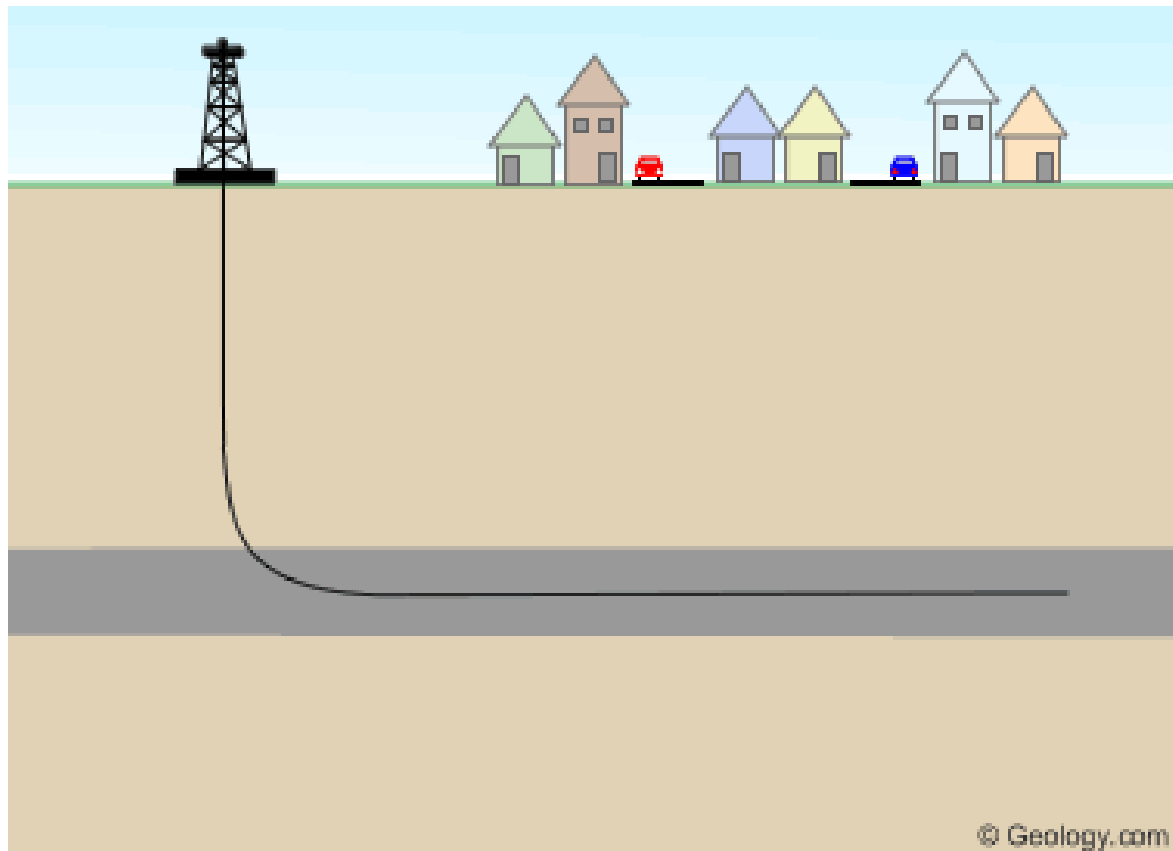
PLASTICS PRODUCTION COST – CATCH 22

- Natural gas as feedstock for chemicals and plastics
- Forecasted 30+% increase in ethylene
- Downstream industries include everything from clothing and textile mills to beverages and pharmaceuticals
- Impact of lower plastic prices is widespread
- Potential future impacts of plastic alternatives to wood or metal manufacturing
- As demand for gas increases, its current benefit as a low cost feedstock in manufacturing will be reduced/eliminated

ENVIRONMENTAL AND COMMUNITY OPPOSITION TO SHALE DEVELOPMENT

- Compared with coal, initially shale was seen as the panacea for environmental challenges faced by the energy industry
- Despite studies to the contrary, there is continued opposition and increased efforts for more regulations or legal actions to delay shale production
- Increased cost of neighborhoods and complicated royalty regimes.
- Marketable Condition

NEIGHBORHOOD ISSUES



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POLITICAL MIND GAMES

Quotes from two articles on the same day:

“Currently, there aren’t any projects that we know of where shale gas production would be profitable.”

(Aleksey Miller, CEO Gazprom)

Trading firms in Japan “are expected to start importing shale gas from the U.S. as early as 2017 if Washington approves exports to Japan in the first half of the year.”

(Japan Times article: “Traders gear up for U.S. shale gas”)