



August 2014


CHEMISTRY & SHALE GAS: FUELING A U.S. MANUFACTURING RENAISSANCE

Potential cooling impact of 111 (d)

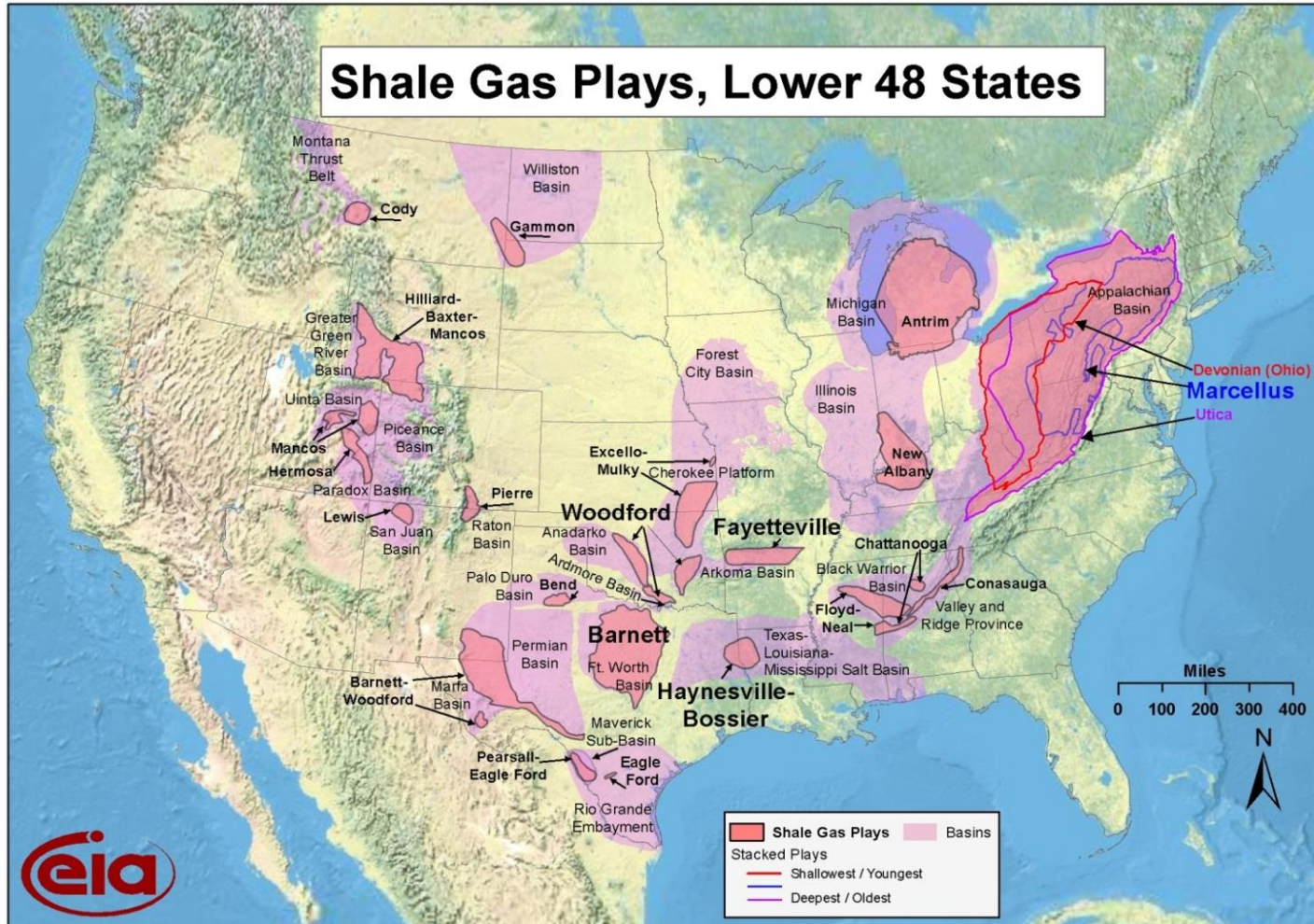


What is Natural Gas?



- Mixture of small hydrocarbon molecules that are all gasses at normal temperatures
 - Methane is the most abundant constituent of natural gas, while ethane, propane, and helium are also present
 - Dry gas is almost all methane and is usually used for energy
 - Ethane, propane and other molecules are removed from wet gas to make it dry
 - Ethane is the primarily molecule for chemical production
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Shale Gas

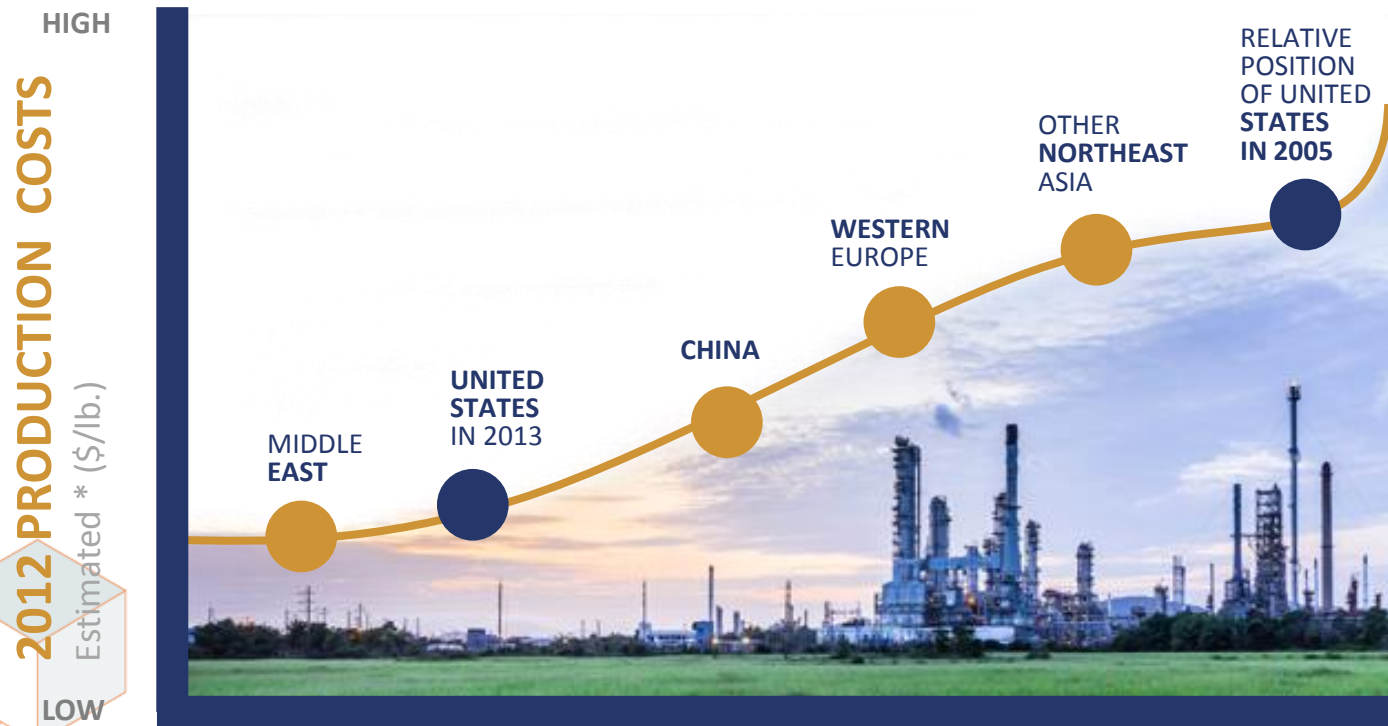


ETHYLENE CHAIN



U.S. Chemical Industry Global Cost Advantage


Relative Position of U.S. (2005-2013)
(Petrochemical Production Costs)



GLOBAL SUPPLY
(billion lbs.)

*Based on estimates from best available data

U.S. Shale Gas



Manufacturing renaissance due to increased access to natural gas from shale

Downstream partners are more competitive than ever

Chemical Investment



166 projects and \$107 billion in potential capital investment announced as of April 2014

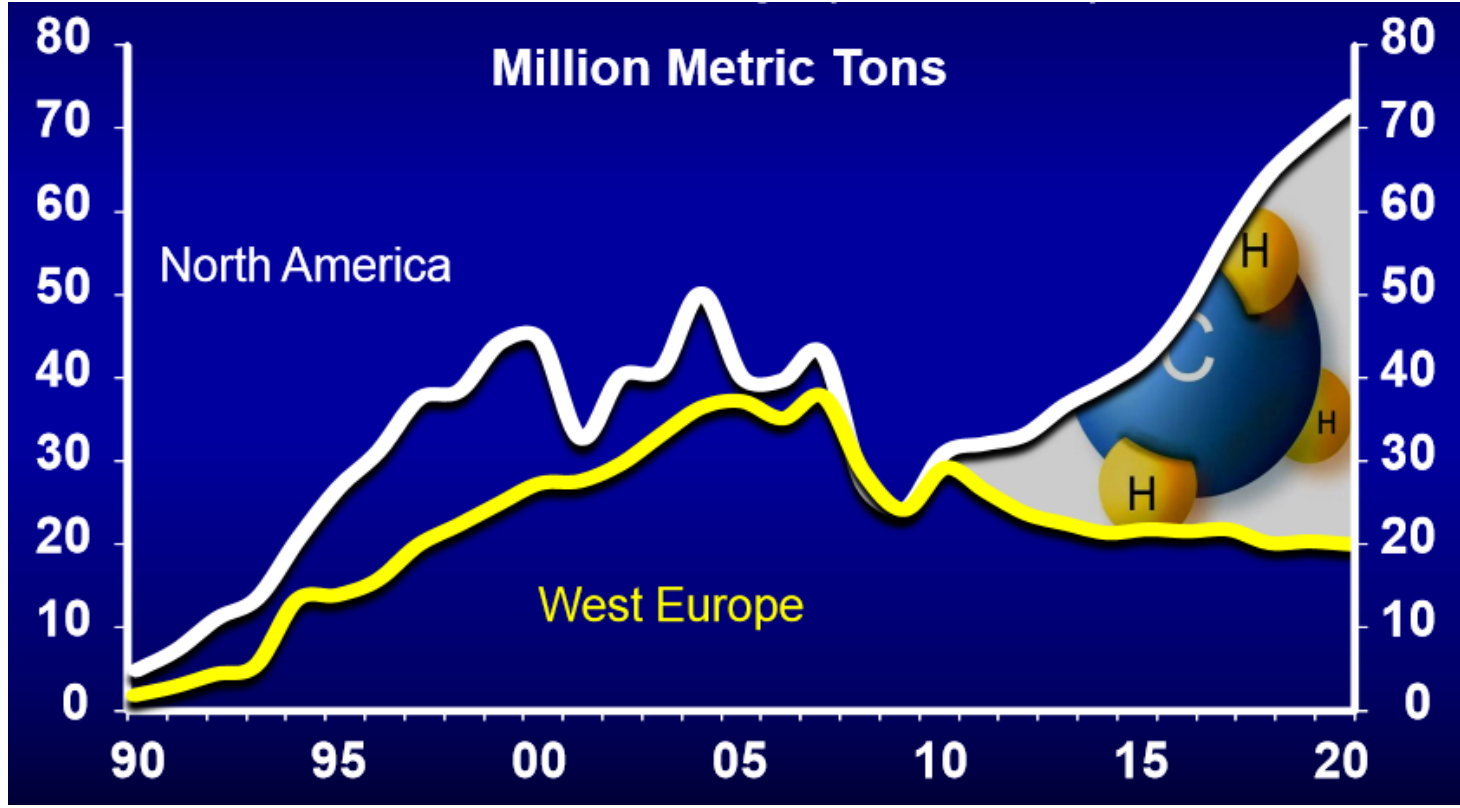
...Up from 97 projects and \$72 billion as of March 2013

62% is by firms based outside the U.S.

Global Chemical Production:

Growing Competitive Advantage for the United States

(N. America and Western Europe Production of Basic Chemicals /Plastics; 1990 base)



Data provided with permission from IHS Global Insight



Chemical Industry is Energy Intensive

Use both natural gas and electricity as a feedstock

- Crack the natural gas molecule to make stuff
- Use electrical electrolysis processes

Use both natural gas and electricity as an energy source

- Many of our processes require heat to begin the reaction
- Motors and electronic controls require electricity

Proposed 111 (d) changes potentially will cause price pressure on natural gas due to utility fuel switching

- Cool economic expansion
- Reduce competitiveness

Winter Arctic Vortex



Natural gas spot prices (Henry Hub)

\$/MMBtu

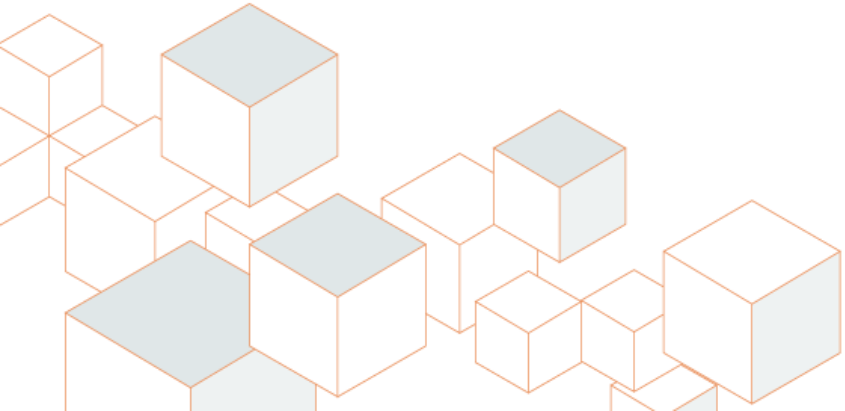


Source: Natural Gas Intelligence

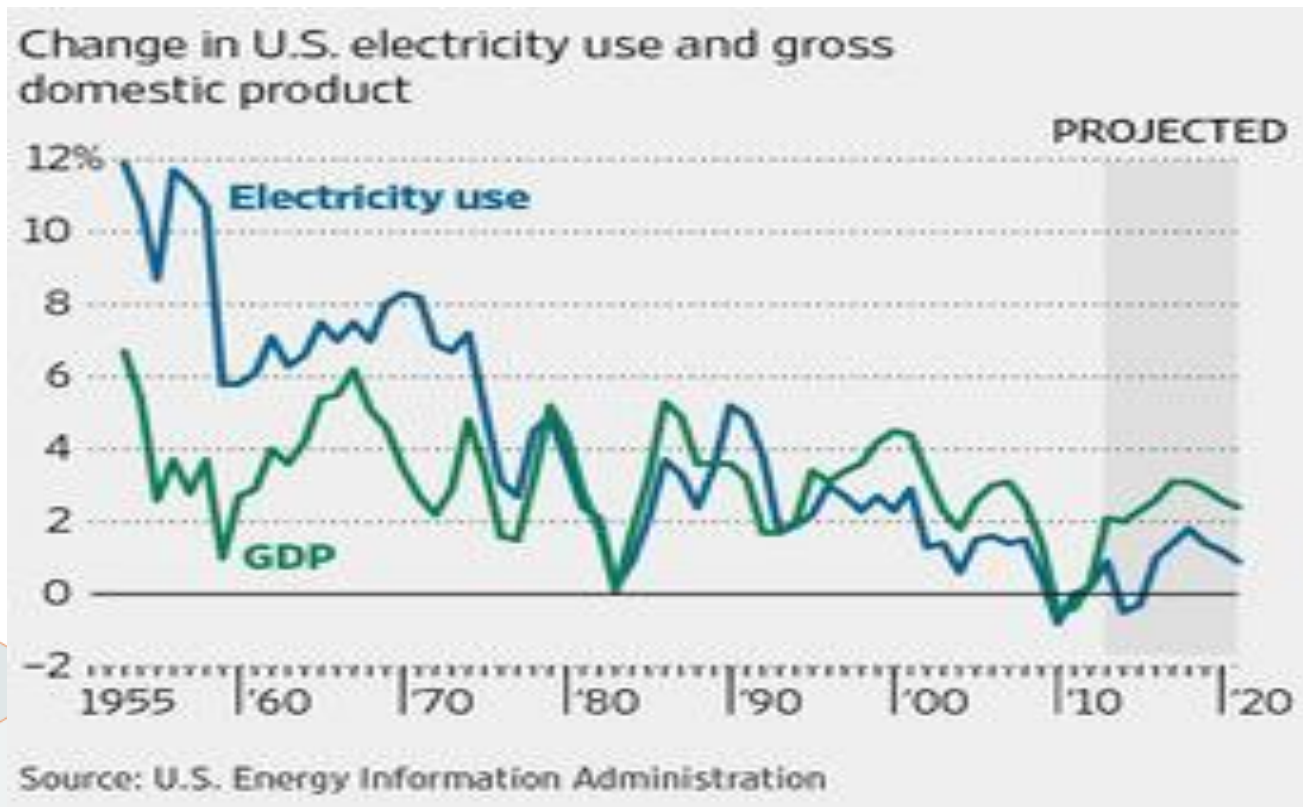
Benefits of Proposed 111(d)



Energy Efficiency Focus

- Lowest cost to increase energy supply
 - Products of chemistry create energy efficient homes and buildings
 - Better more updated Model Energy Building Codes and combined heat and power systems key to energy conservation
 - IECC 2012 is 30 more efficient than IECC 2006
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Energy Efficiency Reduces Demand





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