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# Yale Alumni in Energy 2012

## Economic Implications of Unconventional Liquids



PINE BROOK

# Resurgence of Domestic Production

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- From 1970 to 2008, U.S. production of crude oil and natural gas liquids declined every year. Production fell from 11.3 million barrels per day in 1970 to 7.6 million barrels per day in 2008.
- In 2009, this long term decline ended. Since then, U.S. liquids production increased by over 1.3 million barrels per day - more than in any country in the world.
- This increase came about just when “peak oil” was the consensus view in the press and the concern of many politicians and investors

# Why Has This Occurred?

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- The combination of high real prices and the development of new technologies turned low-grade resources into commercially viable oil fields
  
- More than one type of “new play”
  - Tight oil from shale reservoirs
  - Other “challenged conventional” reservoirs
  - Production of “liquids rich” natural gas
  - Ultra Deep Water (pre-Macondo)
  - Oil shale is next

# How Much More Production Can There Be?

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- IHS/CERA forecasts U.S. production will increase by 3 million barrels per day by 2020
- Bentek sees US production increasing by nearly 2.2 million barrels per day by 2017 and Canadian production increasing by 1 million barrels per day during the same time frame
- Pine Brook estimates that an increase in horizontal drilling of 10% a year from 2010 levels would increase U.S. production by nearly 4 million barrels per day by 2017

## Suppose We Are right?

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- Every 1 million barrel per day increase in domestic oil production means a \$30-40 billion dollar increase in domestic GDP at current prices
- At the upper end of the production estimates, increasing domestic production could increase U.S. GDP by \$150-\$200 billion within five years

# What Does This Mean for Jobs?

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- The U.S. economy produces about one job for every \$115,000 of GDP
- The increase in the oil production could thus lead to 2 million more jobs – about 1/3 of the jobs lost in the Great Recession

# What Kind of Jobs?

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- Oilfield service jobs
- Infrastructure and other civil construction jobs
- Regulatory and other government jobs
- Manufacturing jobs
  - Intermediate products for economy as a whole
  - Redevelopment of domestic petrochemical industry based on cheap gas and natural gas liquids

# How Much Will It Cost?

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- Increasing production by 1 million barrels per day will require about 20,000 new oil wells
- With wells costing \$5 million each, the capital requirement is about \$100 billion
- Given the production profile of these wells, about 1/3 of this will be financed with equity, 1/3 with debt and 1/3 internally
- Good news for bankers and other investors



# New Picture of the U.S. Energy Independence

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- The resurgence of U.S. liquids production means that the U.S.'s reliance on imported oil may have seen its peak
- U.S. oil imports could fall by 5 million barrels per day within 5 years. The majority of the remaining imports would come from Canada.
- Implications for geopolitics are interesting

# Another Path to Energy Independence

(Million barrels per day)	Current Sources of Oil	
U.S. Production	5.7	
Canada	2.5	
Other Imports	9.2	\$287B annual
Mexico	1.3	
Saudi Arabia	1.1	
Nigeria	1.0	
Venezuela	1.0	
Others	4.8	
Total	17.4	

Potential Sources of Oil 2020	
U.S. Production	10.1
Canada	5.0
Other Imports	2.0
Total	17.1

Source: U.S. Energy Information Administration and U.S. Census Bureau.

(1) Based on extrapolated ratio of volume of cost.

# Global Implications

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- Size of the unconventional resource which can be commercialized at current prices is enormous
- Concern that the demands of the developing world will drive oil prices to \$200 are unlikely to be realized
- Development of these resources provides a better market for the world's excess savings than the financing of another housing boom
- Shifting pattern of global hydrocarbon flows is inevitable