

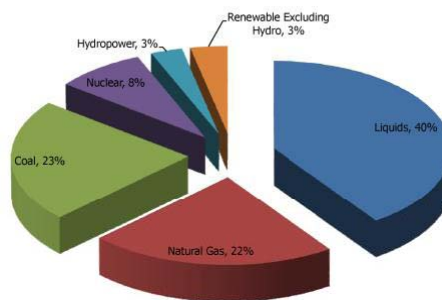
# Shale Play Environmental Issues

Presentation at Offshore E&P, and  
Shale Gas Development Conference  
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## Why is shale development a big deal? - a quick primer on natural gas

- Natural gas provides 22% of U.S. energy demands



Source: EIA, 2008.

## Why is shale development a big deal?

### - a quick primer on natural gas

- Natural gas is affordable
  - 1 barrel of oil = \$85.24 (Nov. 29, 2010; NYMEX Crude Future)
  - 1 MMBtu of gas = \$4.22 (Nov. 29, 2010; NYMEX Henry Hub Future)
  - 1 barrel of oil equivalent (BOE) = 5.8 MMBTU
  - Price of 1 BOE of natural gas = \$24.48



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## Why is shale development a big deal?

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- Natural gas is clean

**Combustion Emissions**  
(lbs / Billion Btu Energy Input)

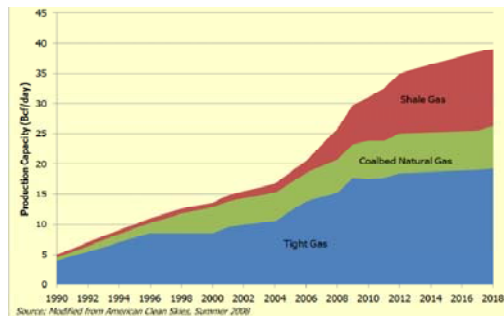
Air Pollutant	Natural Gas	Oil	Coal
Carbon dioxide (CO <sub>2</sub> )	117,000	164,000	208,000
Carbon monoxide (CO)	40	33	208
Nitrogen oxides (NO <sub>x</sub> )	92	448	457
Sulfur dioxide (SO <sub>2</sub> )	0.6	1,122	2,591
Particulates (PM)	7	84	2,744

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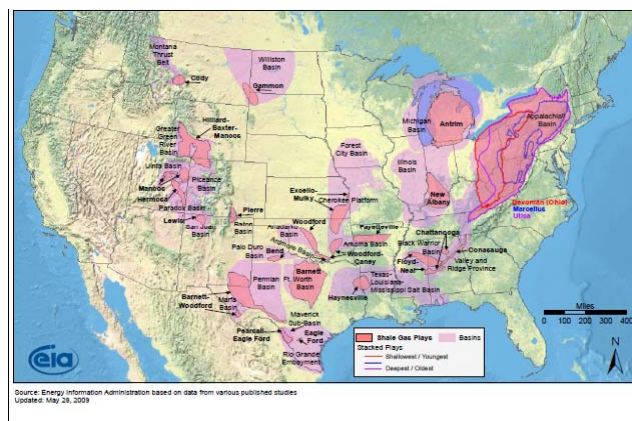
- Natural gas is plentiful
  - Unconventional sources have dramatically increased U.S. reserves.
  - EIA estimates that U.S. has more than 1,744 trillion cubic feet (tcf) of technically recoverable natural gas, a 120 year supply.
  - Deloitte estimates that unconventional natural gas (shale and coal-bed methane) will grow from 17% of U.S. production to 34% by 2030.



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## Increasing prominence of shale gas

- Wide distribution of organic shales with vast resources of natural gas are found in lower 48 states



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