

Benoit Delaveau, MS, BEAP, CEM (aka Prof. Ben)
benoit.delaveau@sjsu.edu
Office hours sign-up here: calendly.com/benoit-delaveau

ENVS 119 - Energy & the Environment

06 - Natural Gas Energy

Today

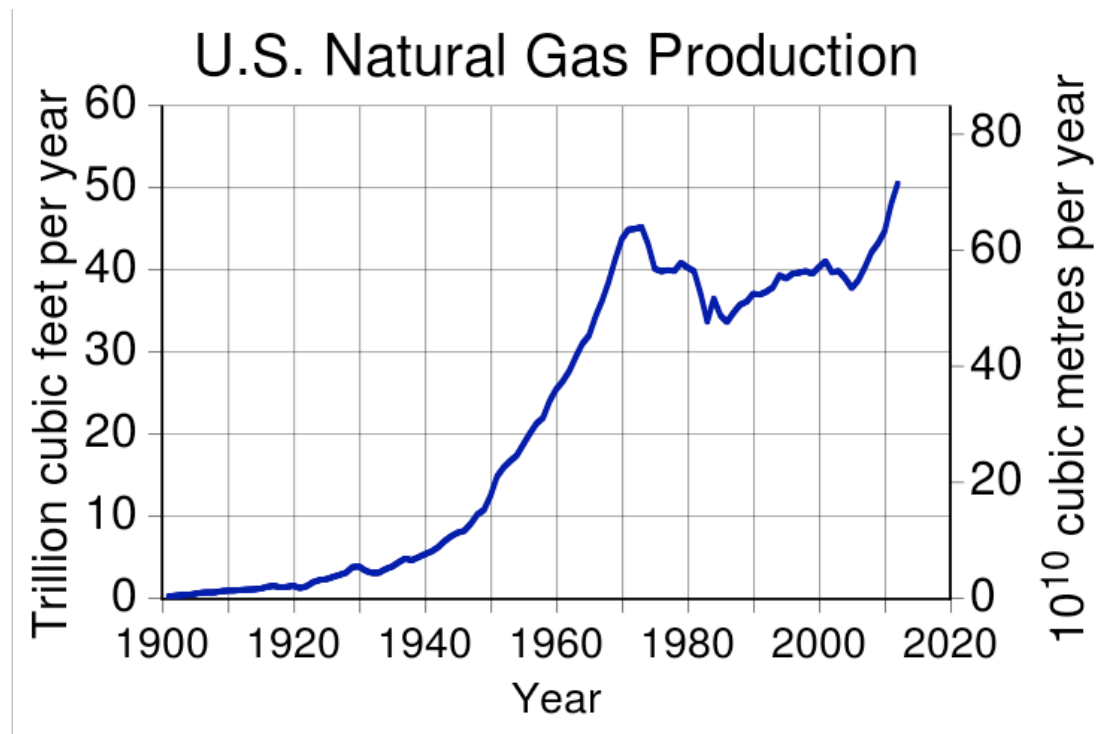
- Nat. Gas is booming!
- Used in energy, agriculture, plastic...
- Fracking = a technological miracle?
- Nat. Gas environmental impacts
- Final words
- Q/A - Wrap-up



© Photo/Adobe stock - US drilling platform

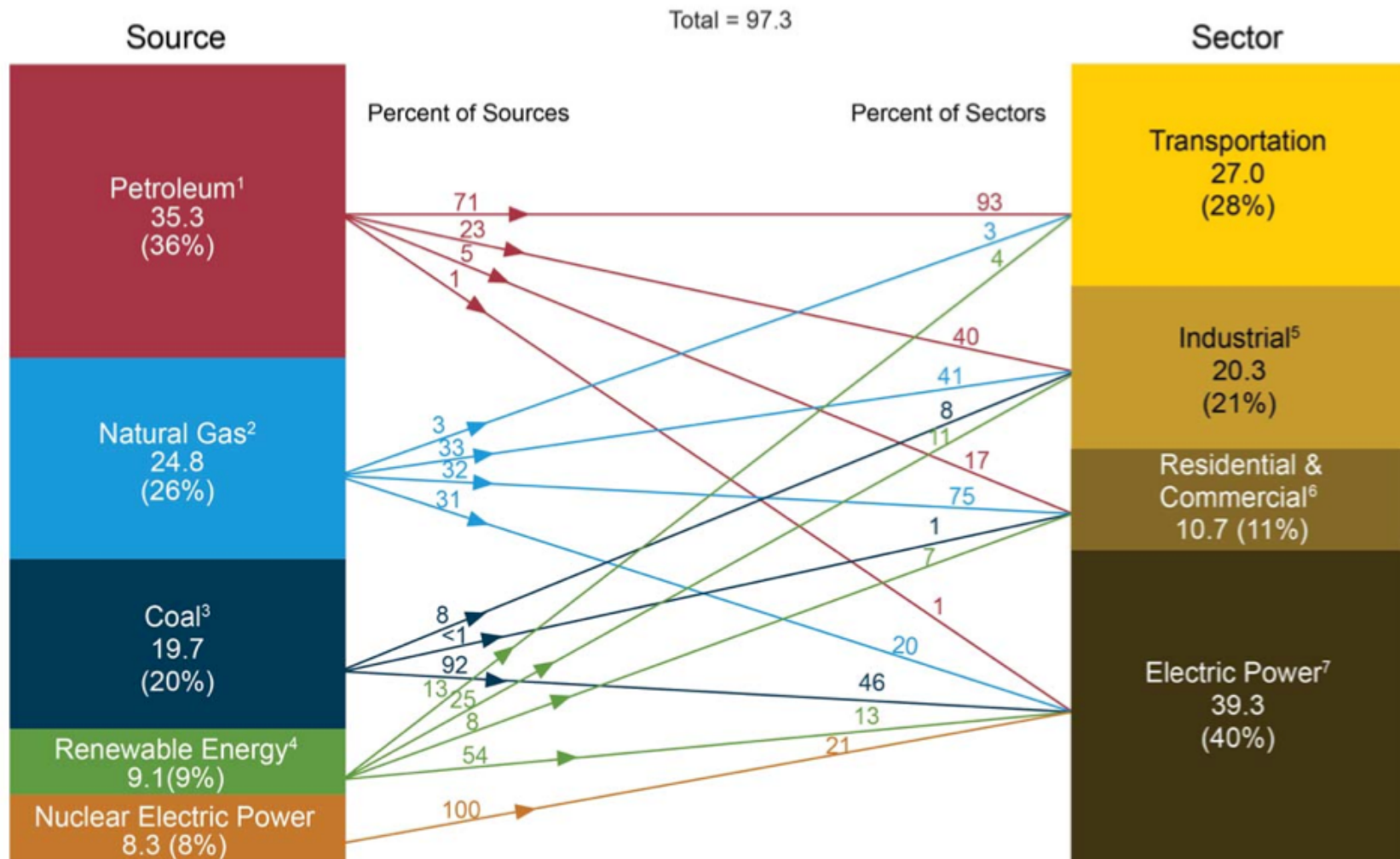
U.S Natural Gas Production - a boom!

1. Natural gas is still a fossil fuel but its stock eventually ran out....
2. Declines in 80s led to speculation that we would run out
3. From 2003, natural gas advocates for a sea of “unlimited” natural gas thanks to a new drilling technology - Hydraulic Fracking.



How do we use Natural Gas energy?

Only 31 % used by the electricity sector, 32% is buildings...



Natural Gas is also KEY in other activities

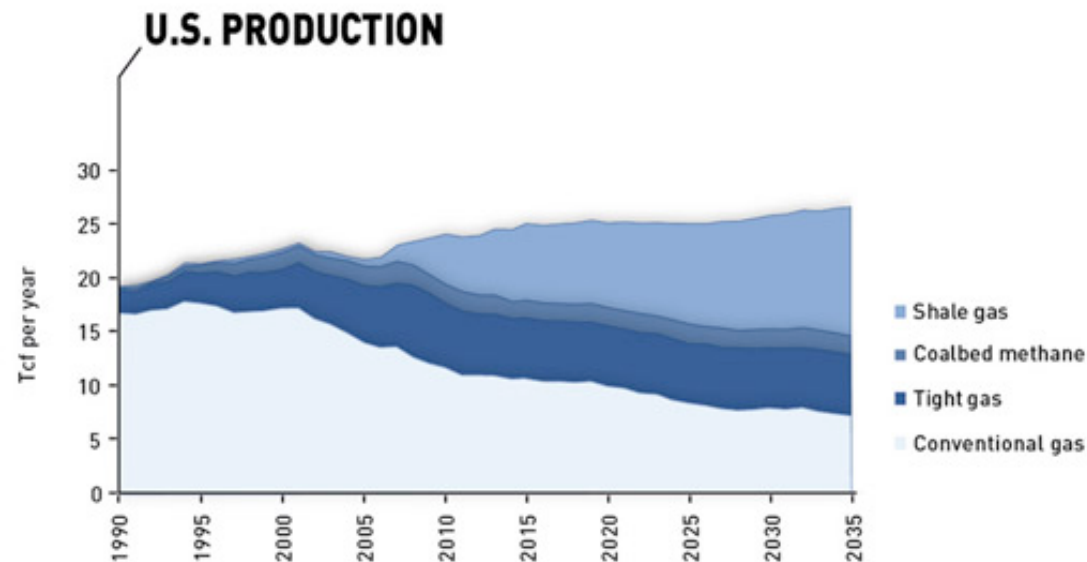
1. Natural gas is #1 component in many plastic based product. (Polyethylene is made from ethane by companies like Exxon, Royal Dutch Shell, and Dow Chemical)
2. Natural gas is a key component in many syntactic Ammonia based fertilizers (5% of total natural gas production is used for agricultural use)



Shale Natural Gas or Fracking gas potential

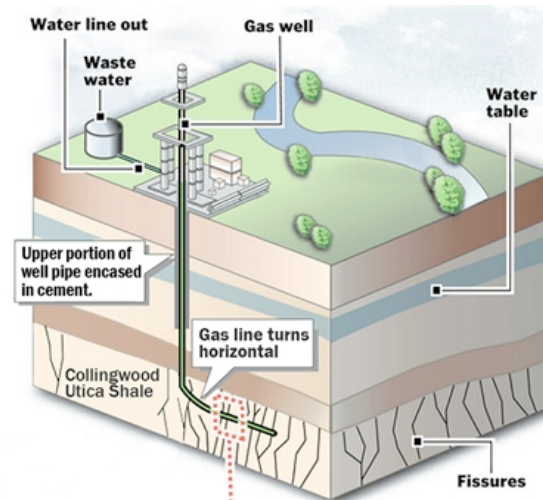
Shale gas is expected to be the largest source of natural gas in the next ten years.

Natural Gas is seen as the perfect « transition » fuel to the ramp-up 100% renewable energy made of electricity from Sun and Wind.



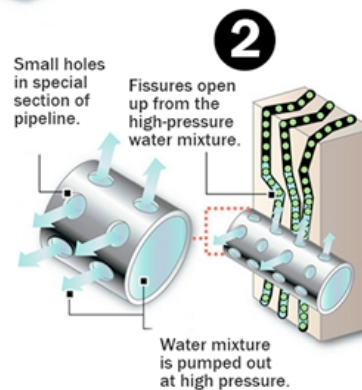
Source: EIA, Annual Energy Outlook 2011

Hydraulic Fracking - Hi-Tech drilling



Hydraulic Fracturing

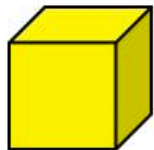
A new way of drilling for natural gas



Natural gas and fracking Env. Impacts

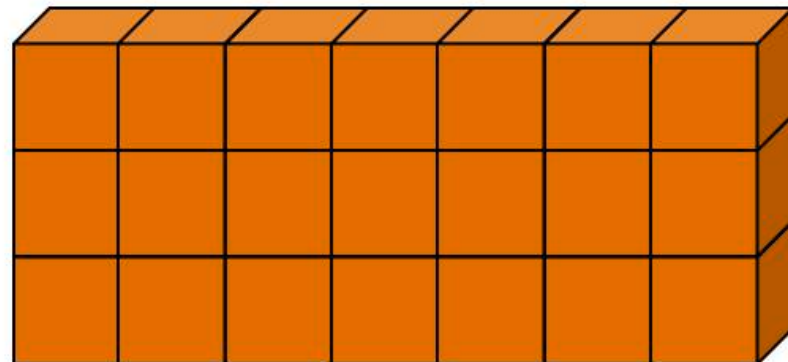
1. Blue water Fresh water used onsite that is not available anymore for human consumption.
2. Grey water Spoiled/polluted water that comes back from the fracked well and has to be handled as hazardous material.
3. Methane leaks Methane CH_4 is x21 times more harmful than CO_2 on climate change.
4. Transportation is dangerous.

1 pound of CH_4



=

21 pounds of CO_2



Natural Gas Leaks = San Bruno, CA

1. 2010 San Bruno pipeline explosion occurred at 6:11 pm PDT on September 9, 2010,
2. 8,000 families displaced
3. 107,000 metric tons of Natural Gas released



Week 3 (Nat. Gas) Key Points

1. Since 2000, thanks to Hydraulic Fracking NG is on the rise in the US.
2. From ~20% up to 40% of total US energy use.
3. Often replacing Coal use in Electricity power plants
(300+ coal power plant retired)
4. Climate change = less carbon intensive way to produce electricity
(~50% less than Coal)
5. But... still a limited, fossil fuel based and still carbon emitting source.
6. Methane leaks, may end-up be worse for climate change than coal, if the gas infrastructure is not fixed and repaired in time.

ENVS/ENGR 119 - Lecture 06

Q/A

End