Greenhouse Gases, a Carbon Constrained Regulatory Environment, and the Oil and Gas Industry: How Will We Maintain Our License to Operate?

C. Suarez[1], L. Battalora[1], R. Graves[1]

[1]Colorado School of Mines, Golden CO

csuarez@mymail.mines.edu

Abstract

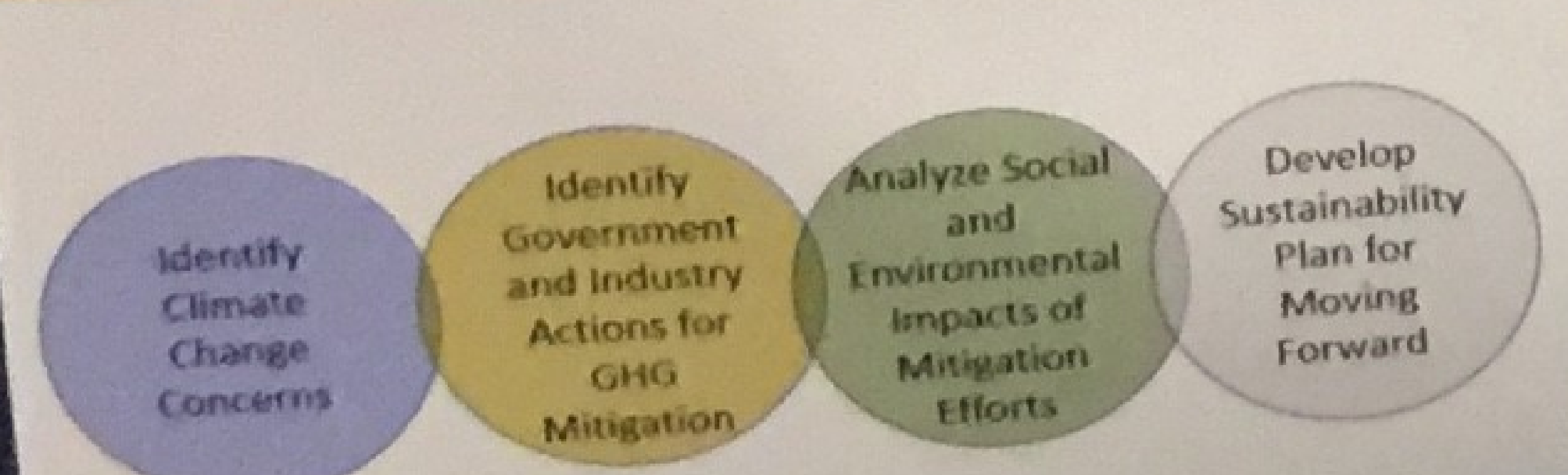
- The burning of fossil fuel is a major contributor to Climate Change, which can have major impacts on the environment.
- **Objective 1:** Identify the actions taken by Oil and Gas Industry to decrease environmental impact of production.
- **Objective 2**: Analyze effectiveness government environmental regulations.
- **Objective 3**: Develop ideas to improve government and industry environmental regulations and practices.

Background

GHGs and Climate Change

- Greenhouse Gases (GHGs) trap thermal energy from the planet in the atmosphere.
- Trapped thermal energy is responsible for the Earth's changing climate.
- Carbon dioxide (CO2) and Methane are two strong GHGs, capable of trapping large amounts of energy.
- Natural and human sources increase levels of CO2 and methane in the atmosphere.
- Fossil fuels and agriculture are contributors to increased GHG emissions.

Methods



Need for Climate Change Mitigation

Climate Change leads to:

- Increases in global temperature
- Changes in agricultural patterns
- Rises in sea level
- Increased wildfire frequency
- Higher levels of pollution from emissions

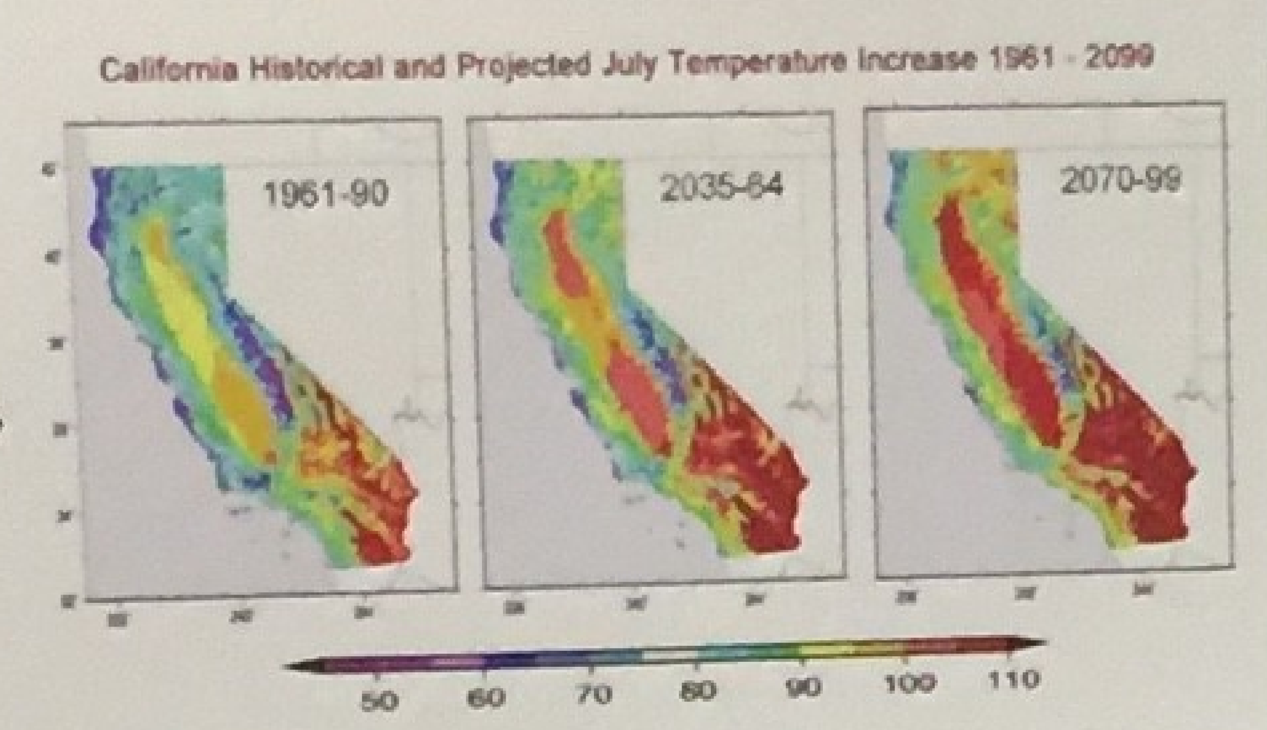


Figure 1: Predicted Temperature Increase in California due to Climate Change.

Source: US Environmental Protection Agency, 2016.

Policies in Place

Paris Agreement

- Created in Paris, 2015 during 21st Conference of the Parties (COP21).
- International goal to maintain global temperature from rising 2˚C.
- Countries agree to individual Nationally Determined Contributions (NDCs)

Clean Air Act

- Goal to decrease pollutant emissions in U.S.
- Each state required to set regulations to decrease pollution.

Source: www.epa.gov, 2017

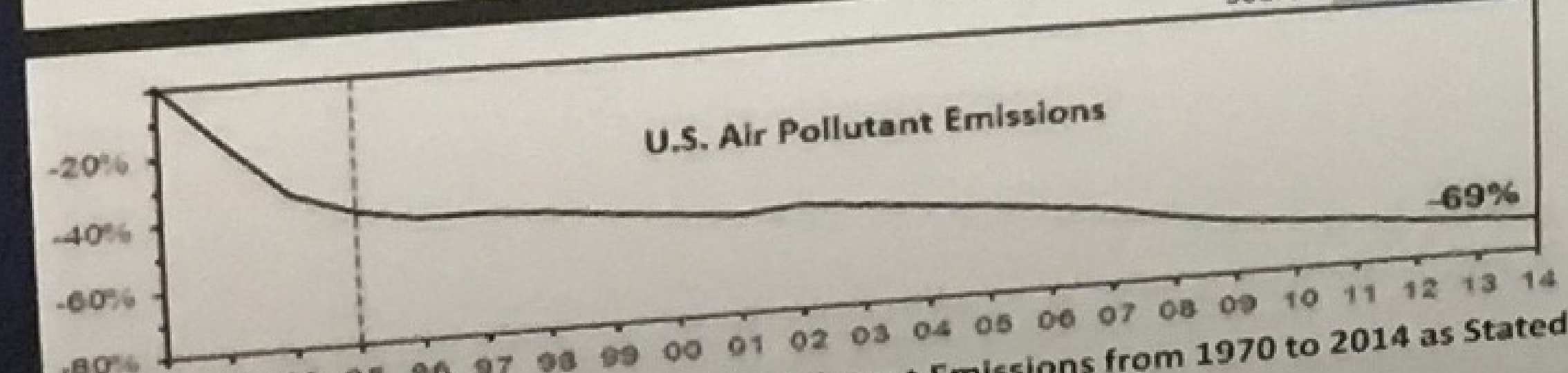


Figure 2: Decrease in United States Air Pollutant Emissions from 1970 to 2014 as Stated by the EPA.

Industry Approach and Mitigation Technologies

CO2 Capture and Sequestration

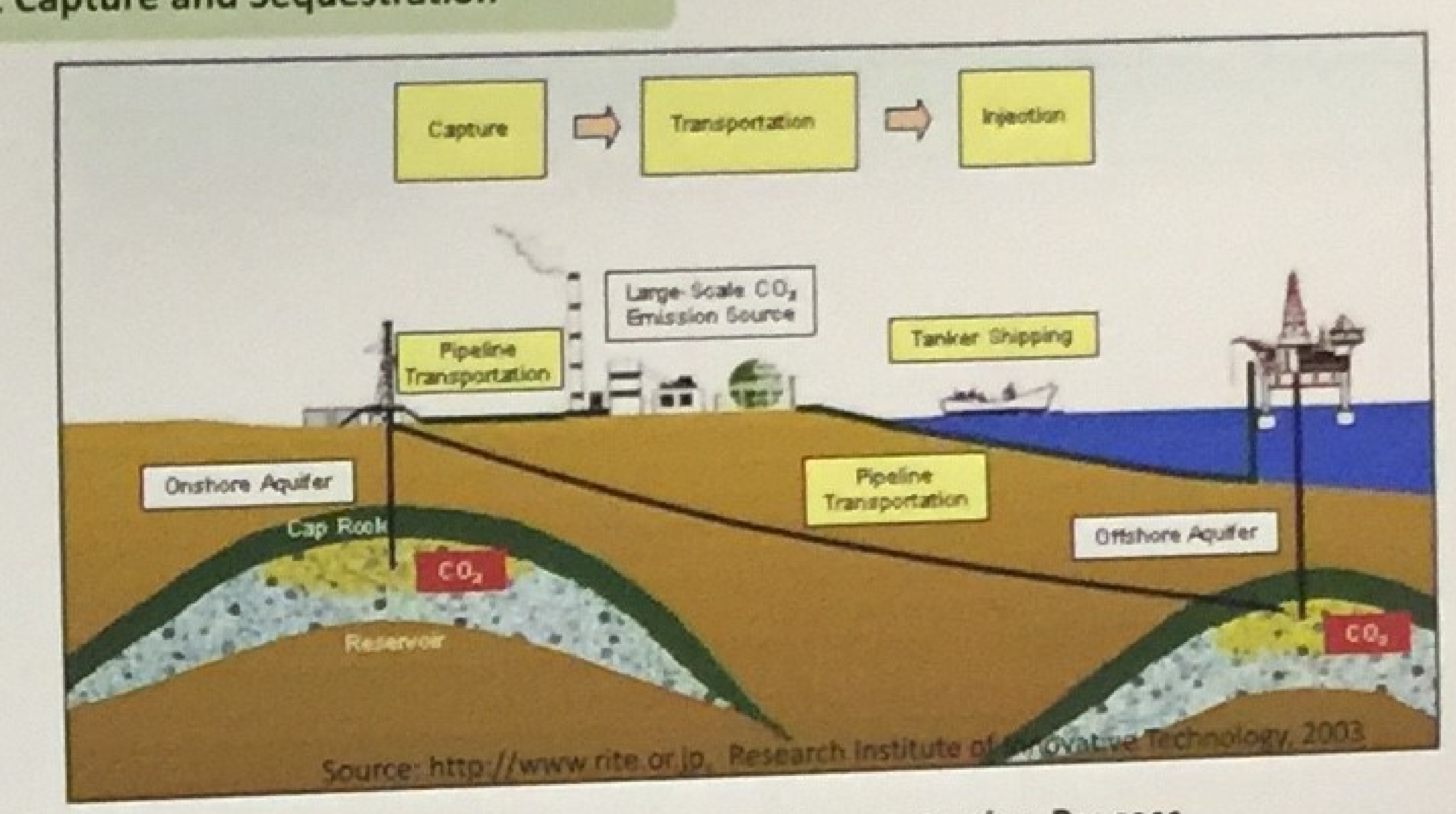


Figure 3: Diagram of CO2 Sequestration Process.

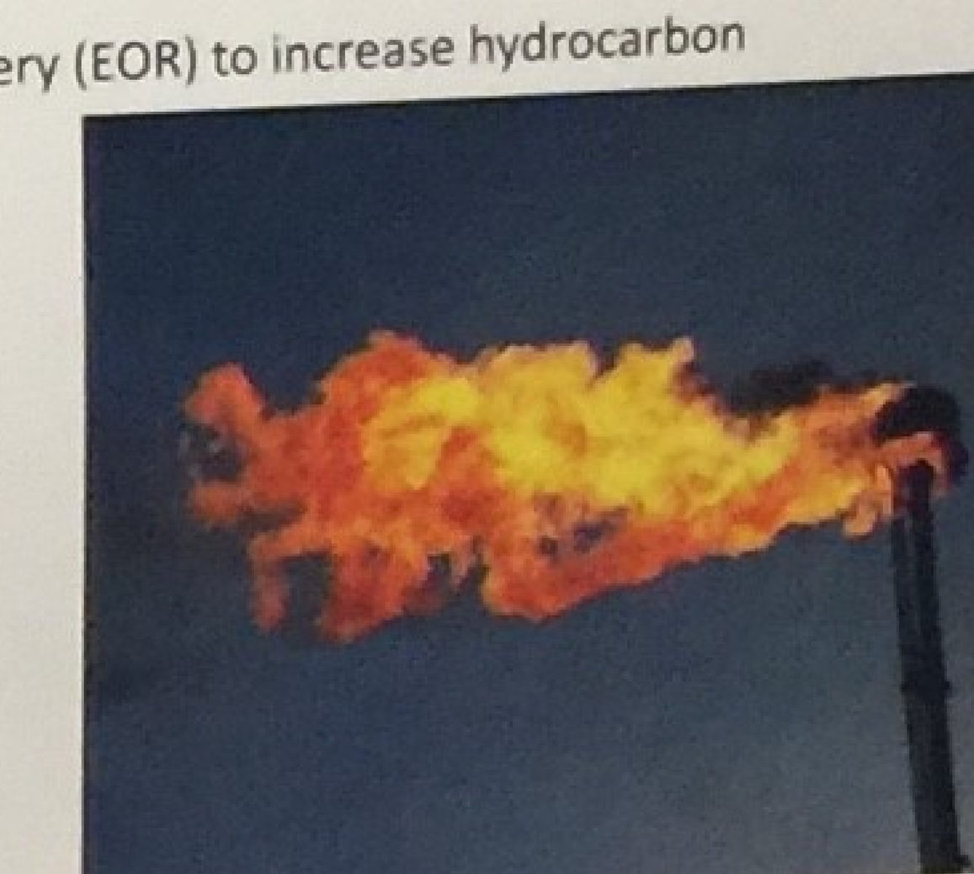
- Captured CO2 is injected into ground for storage.
- CO2 can also be recycled for Enhanced Oil Recovery (EOR) to increase hydrocarbon production.

Flaring Reduction

- Process of burning off excess gas during operations.
- Industry committed to reducing flaring to decrease GHG emissions.

Increased Natural Gas Production

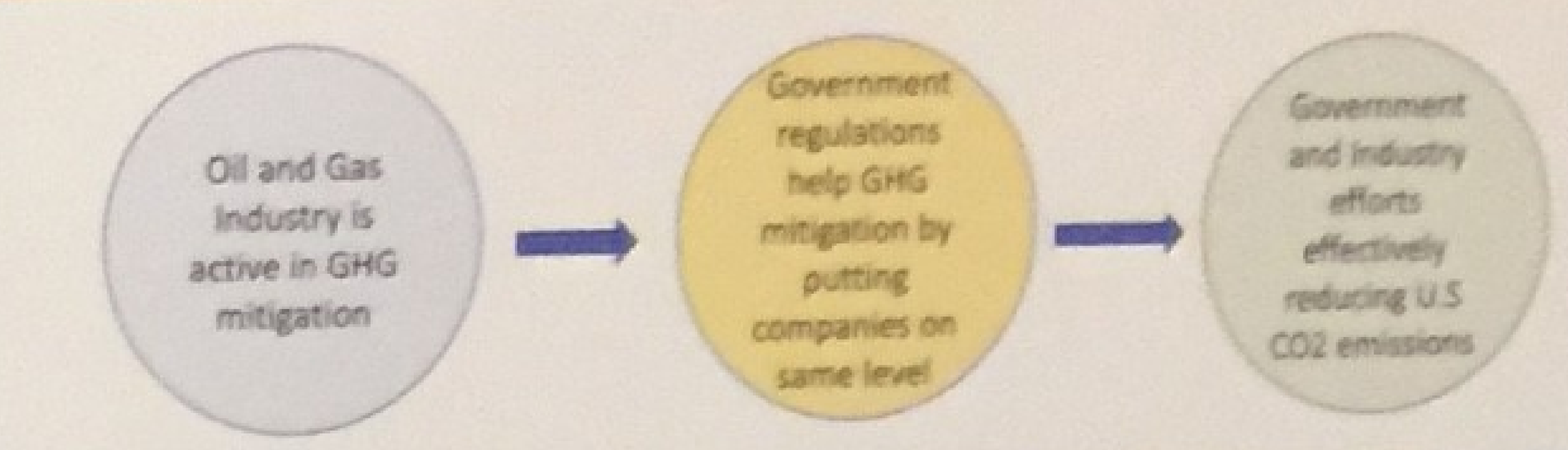
- Natural gas is the cleanest burning fossil fuel
- Industry increasing production of natural gas



Source: http://www.pennenergy.com, 2015

Figure 4: Flare During Production.

Conclusions



Source: www.energyindepth.org, 2016

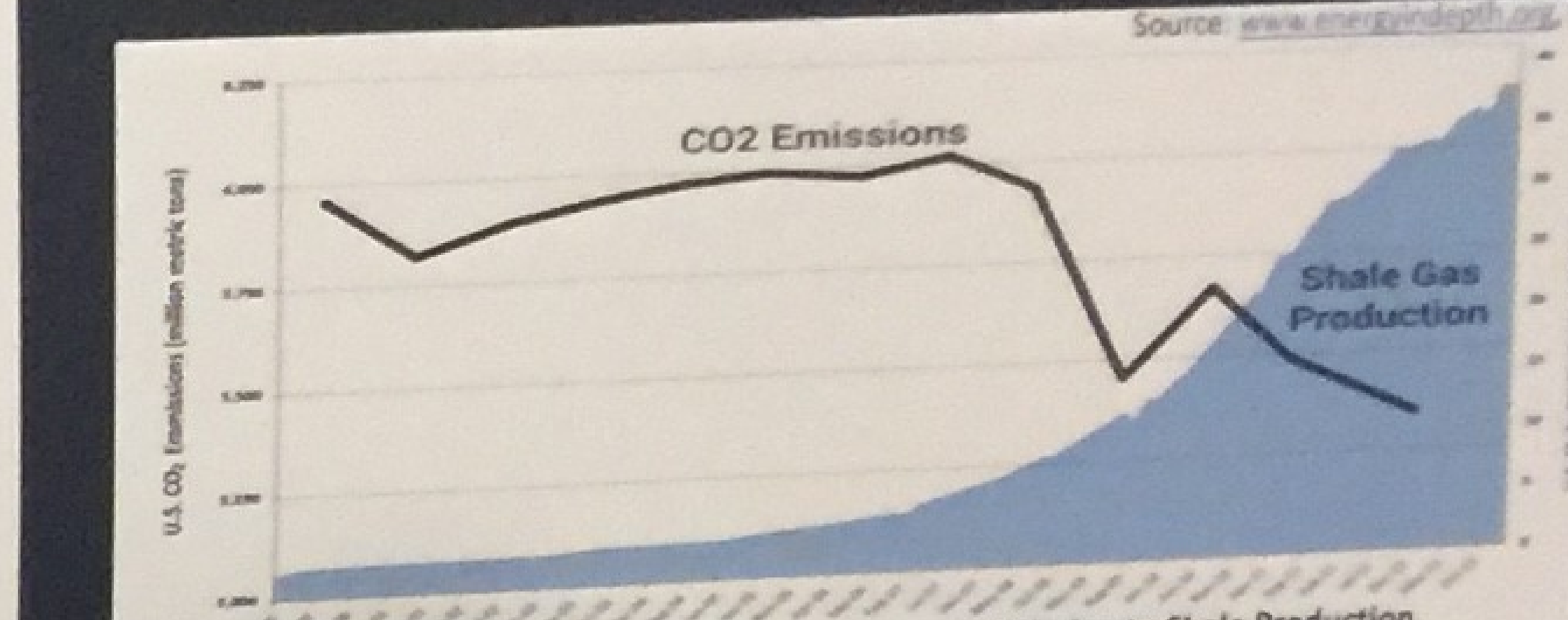


Figure 5: Decreases in CO2 Emissions in Relation to Shale Production.

Limitations

- Analysis conducted on most recognized climate change regulations
- Regulatory analysis based on seven major oil and gas companies
- Research span of six months

Moving Forward

- Consistency in government regulations
- Continuation of CO2 storage and reduction of flaring
- Increase research for sustainable production technology

References

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