Environmental disputes over the differential opportunity-threat impacts of unconventional natural gas development and hydraulic fracturing (“fracking”) have increased dramatically in U.S. shale communities since 2010 (Ladd 2013, 2014). While energy industry proponents have touted the “climate-friendly” benefits of shale gas reserves over oil or coal, a growing body of research suggests that the hidden methane and carbon footprint of natural gas fracking is likely to incease, rather than reduce, the growing threats from climate change. Moreover, the increasing extraction of unconventional fossil fuels from remote locations (e.g. global shale formations, tar sands, heavy crude, coal seams, deep offshore wells, & the Arctic) through fracking portends the dawn of a new Third Carbon Era, an epoch that will not only lead to further climate destabilization, but also continue our dependency on hydrocarbons into the next century. It is suggested that these trends represent a “New Species of Trouble” (Erikson 1994) for shale communities, the nation, and the planet’s atmosphere.

INTRODUCTION

- Environmental controversy over unconventional natural gas development utilizing horizontal drilling and hydraulic fracturing (“fracking”) has been on the rise since 2010.
- Issue given national visibility in part by Josh Fox’s 2010 academy award-nominated documentary Gasland, followed by Gasland II (2013).
- Fracking = a controversial drilling/well stimulation technique where millions of gallons of water, sand, & chemicals are injected into deep underground shale gas deposits to fracture the rock & release the gas trapped in the seams.
- Fracking used today in over 90% of all unconventional oil/gas extraction; a half-million shale gas wells drilled in 30 states since 2008; 25,000 gas wells fracked each year.
- Fracked shale gas = 1/3 of current natural gas produced; will be 1/2 by 2030.

RESEARCH QUESTION

Is the natural gas/fracking boom...

- an economic opportunity and energy game changer?
- a climate-friendly alternative to oil & coal?
- a bridge fuel to a clean energy future?
- OR
- a “New Species of Trouble” with greater pollution hazards & technological risks?
- the last gasp of a dying fossil fuel era?
- a gangplank to a more destabilized environment and climate?

RESEARCH ON OPPORTUNITY-THREAT IMPACTS

NATURAL GAS AS A “BRIDGE FUEL” TO A CLEAN ENERGY FUTURE

Opportunities/Benefits Argued by Proponents:
- Clean, abundant, domestic energy source
- Produce jobs/economic growth
- Reduce U.S. dependency on foreign oil
- LNG exports/shale development overseas = new foreign policy tool in China/Eastern Europe to reduce Russian power & influence
- Reduce CO2 emissions

NATURAL GAS AS A GANGPLANK TO A DESTABILIZED CLIMATE & ENVIRONMENT

Threats/Disadvantages Argued by Opponents:
- Potential contamination of groundwater supplies/depletion of aquifers
- Creates hazardous wastewaters (flowback) from fract fluids/methane/propping agents
- Air pollution from methane emissions/petroleum byproducts/VOCs/NOx/diesel fumes
- Industrialization of rural communities
- Increased truck traffic/road damage/accidents/noise/crime/stress
- Surface disruptions posed by drilling rigs & pipelines on rural/metro landscapes
- Differential signing bonuses & royalties paid to landowners for mineral rights
- Harm to farm animals/wildlife/tourism/human health
- Limited job creation/unsustainable boomtown impacts on local economies
- Keeps U.S. on the treadmill of fossil fuel production, dependency, and climate impacts

THE HIDDEN CLIMATE FOOTPRINT OF NATURAL GAS

1) A More Potent and Growing Greenhouse Gas
- Natural gas produces only 1/2 the CO2 of coal and 1/3 that of oil—but is 86-105X more potent than CO2 as a greenhouse gas over a 20 yr. timeframe.
- Natural gas currently accounts for 21% of global fossil fuel-generated CO2.
- Methane accounts for 9% of U.S. greenhouse gas emissions; 1/3 comes from the production & transportation of oil and gas
- Methane from oil/gas is the fastest-growing source of greenhouse gas in the U.S. & is projected to grow 25% by 2025 at current rates
- EIA data estimates that U.S. output of shale gas will increase by 164% and shale oil by 221% in the next 15 yrs.

2) Methane Loss to the Environment:
- Between 1-3% of all U.S. natural gas production is lost to leakage
- As much as 8% of the methane in shale gas wells leak—up to 2X more than escapes from conventional natural gas production

SOURCES:
- Well heads/abandoned wells
- Cement casing/gaskets
- Trucks
- Waste pits
- Pipelines
- Compressor stations
- Processing stations
- Storage units
- Export facilities
- Flaring from shale oil wells (added CH4 & CO2 emissions)

3) Life-Cycle Impacts:
- Well-to-consumer lifecycle greenhouse-gas footprint of shale gas is worse than coal or oil over 20 yrs. & = to coal/oil over 100 yrs. (Howarth & Ingraffea 2011).
- Life-cycle emissions of natural gas are particularly high when the added climate impacts of liquidized gas/condensates being shipped abroad are included—which the U.S. State Dept. under Clinton & Kerry have been aggressively supporting in dozens of countries where clean air regulations are already low.
- Despite the bridge cliché, there’s been almost no effort to model a natural gas bridge in a climate scenario that stabilizes CO2 between 450-550 ppm and includes a temporary rise and subsequent decline in natural gas consumption (Levi 2013).

CONCLUSIONS

- “Bridge Fuel” concept created by American Gas Association in 1988 to counter the emerging environmental concerns over the Greenhouse Effect.
- Unconventional natural gas (and oil) development via hydraulic fracturing represents A New Species of Trouble (Erikson 1994) for communities and the atmosphere in terms of the hidden climate footprint of increased and more intensive methane/carbone emissions.
- Big Oil & Gas are pouring their record profits into fracking for unconventional fossil fuels—NOT alternative energy sources—by a 3/1 ratio (e.g. shale, tight sands, heavy crude, coal seams, offshore deepwater wells, arctic drilling).
- Portends the dawn of a Third Carbon Era of continued dependency on hydrocarbons into the next century and the derailing of a real clean energy future; 75-80% of projected global energy supply will still come from fossil fuels by 2040 (Klare 2013).
- The global carbon/methane bubble of stranded fossil fuel assets will also take the planet beyond the +2 degree C. warming threshold in 16 yrs. if burned (Klein 2014).

SUPPORTING NARRATIVES:

- “From a climate perspective, the shale gas revolution is essentially irrelevant—and arguably a massive diversion of resources and money that could have gone into deploying carbon-free sources.”
  —Joe Romm, 2013
- “The gas extracted from shale deposits is not a ‘bridge’ to a renewable energy future—it’s a gangplank to more warming and away from clean energy investments.”
  —Anthony Ingraffea, 2013
- “Far from building a bridge, the big investments in natural gas may be erecting a breakwater that holds back a wave of truly clean energy.”
  —Bill McKibben, 2014
- “We are standing at an energy crossroads. One signpost points to a future powered by digging fossil fuels from the ground and lighting them on fire. The other points to renewable energy. You cannot go in both directions at once. Subsidizing the infrastructure for one creates disincentives for the other.”
  —Sandra Steingraber, 2014

SELECTED REFERENCES


ACKNOWLEDGEMENTS

I wish to thank the Loyola University Environment Program for sponsoring this research presentation, as well as Teri Gallaway of the Loyola Monroe Library for her expertise in helping me construct this poster.