Southern Oregon Climate Action Now
SOCAN
Confronting Climate Change

Thoughts on
Natural Gas as the 'the clean fossil fuel'

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on behalf of SOCAN

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Preamble:

Climate change is about Inter-generational Justice. Very few of us would argue that we do not want to provide future generations with a livable planet. Regrettably, however, many of us are living and behaving as though we think considering the future is inappropriate.

In relation to Senator Wyden's position on Natural Gas issue, we have several concerns. In particular, we think the evidence undermines the claim that natural gas is 'the clean fossil fuel.' The following are my concerns about this issue:

1) **Fugitive Methane Emissions**

When burned, methane (natural gas) releases about half the carbon dioxide that is released when other fossil fuels are burned. The natural gas industry would like us to think this is the end of the story, but in reality it is only half (or less) of the story:

While we focus on carbon dioxide when discussing climate change, we understand that we only do this because the combination of carbon dioxide concentration and its radiative forcing (warming) potential is currently greatest. It is also true that carbon dioxide has reached 400 ppm, a level probably never seen while humans have inhabited the planet.

While 400 ppm carbon dioxide alone is disturbing, a more sophisticated and meaningful measure of the induced warming in our atmosphere is the carbon dioxide equivalent (CO_2e) of all contributing gases. This value incorporates a relative measure of carbon dioxide and the additional greenhouse gases in our atmosphere – mainly methane and oxides of nitrogen, but also chlorofluorocarbons. When considering these other contributing gases, it is noteworthy that methane has some 23 times the warming potential of carbon dioxide (possible approaching even 100x over a short time span), while for oxides of nitrogen the figure is 295 times as much. CFCs, meanwhile, are many thousands of times more destructive than carbon dioxide at promoting warming.

Because of its greater potential warming effect, not much methane leakage during processing and transportation is necessary before the benefit seen at combustion is totally negated. Analyses suggest that only some 1% or so leakage will be enough for

methane to reach or exceed other fossil fuels in its contribution to global warming. Unfortunately, analysis has suggested leakage could reach 15% in some situations (item b). In such situations, the advantage of methane over other fossil fuels is completely negated. Before natural gas is promoted, we should insist that fugitive leaks from mining and shipping are controlled such that the gas is a clear improvement over alternative fossil fuels as proponents claim.

Burning methane and reducing the carbon pollution of coal and oil by half is an improvement, but only by 50%. When we add into the equation the higher forcing of leaked methane, it is a compromised fuel at best. Investing in natural gas as a 'transition fuel' to cleaner and renewable sources such as solar, wind, wave, and geothermal might actually delay the development and adoption of such superior sources. Natural gas lessens carbon pollution but permits and perpetuates it as well.

Introductions to this concern can be found at:

a) http://www.edf.org/blog/2013/11/14/new-study-measures-methane-leaks-natural-gas-industry
b) http://www.wri.org/blog/new-study-raises-big-questions-us-fugitive-methane-emissions
   Miller et al 2013 Anthropogenic Emissions of Methane in the United States, *Proceedings of the National Academy of Science*.
c) http://thinkprogress.org/climate/2013/11/25/2988801/study-methane-emissions-natural-gas-production/
d) http://www.sciencemag.org/content/343/6172/733 Brandt et al 2014 Methane Leaks from North American Natural Gas Systems, Science 343 (6172): 733-735.
e) Summary of above: http://esciencenews.com/articles/2014/02/14/americas.natural.gas.system.leaky.and.need.a.fix.new.study.finds

2) The Halliburton Loophole.

Claims about sickness breaking out around fracking sites and the ability of residents to ignite the gas from their faucets may be purely anecdotal and unsubstantiated. However, the Halliburton Loophole introduced into the 2005 Federal Energy Policy Act by former Vice-President Dick Cheney cannot be ignored. As a result of this loophole, fracking companies are exempt from the environmental and health regulations that control releases of potentially toxic materials into our air and water. Consequently, there are many companies that insert into our ground under pressure a cocktail of toxic and carcinogenic chemicals. An additional concern is that the nature of these chemicals is not public knowledge since courts have upheld the industry argument that their content is a trade secret and should not be made public. It seems to us, *prima facie,* that this is a bad idea and the loophole should be closed. If fracking is genuinely safe, let's

make it transparent and conform to accepted environmental safety principles.

It is worth noting that at no depth is groundwater static, although deeply inserted chemicals may be far less hazardous than those inserted higher in the profile. However, such claims of safety presuppose an absence of leaks, a likelihood that history throws into question. Yet, should any leakage occur, clearly human health is at risk. Additionally, chemicals that are toxic or carcinogenic to humans are very likely to have a similar impact on other wildlife. As a result, we are placing not just ourselves at risk, but entire ecosystems. If fracking is to be allowed anywhere, it should be under the same strict regulations that apply to all other activities: the Halliburton Loophole should be closed.

Introductory comments on this can be found at:
http://www.sourcewatch.org/index.php/Fracking

3) Energy Returned on Energy Invested (ERoEI)

If we accept the argument that formed the basis of the Copenhagen Agreement and is endorsed by The World Bank, we absolutely must hold global temperature increase to below 2^{o}C (3.6^{o}F). Exactly what concentration CO_2e this represents is unclear, but probably this means maximally 450 ppm. Since we are already at 400 ppm, having started before the industrial revolution at 275/285 ppm, the math tells us we are 70% of the way there. A consideration of the global temperature increase to date and inevitable as a consequence of what we have already emitted leads to similar conclusions. Calculations on what this means in terms of how much more carbon pollution we can allow indicate that to keep below the target, we must leave between 2/3rd and 4/5th of the known fossil fuel reserves in the ground.
There are two reasonable criteria that we might apply to deciding which reserves should be left enexploited:

i) ERoEI measures how much energy we spend for each unit of energy we extract. When this drops to 1:1, the resource is energetically exhausted; sanity demands, even if government subsidies seem to make it economical, we don't extract that fuel. Fuel extracted by fracking exhibits among the lowest ERoEI values available. Furthermore, the energy used to extract the fuel is almost certainly generated from carbon emitting fossil fuels.

ii) The second criterion we should apply involves the potential human and environmental health threat posed by extracting the resource. The argument above in (2), I submit, suggests fracked natural gas fails this test.

This argument suggests we should evaluate cautiously the net benefit of natural gas generated by fracking before endorsing it, even as a 'bridge to the future.'

Introductory comments on this can be found at:
http://www.westernresourceadvocates.org/land/oseroi.php

http://8020vision.com/2011/10/17/energy-return-on-investment-eroi-for-u-s-oil-and-gas-discovery-and-production/

4) **Use of water:**
Whether the technique employed for extracting natural gas via fracking relies on the chemical cocktail (discussed above – Item 2) or not, the process requires vast amounts of water. In an age when heat waves, water shortages, and droughts are gripping much of the nation, and are only expected to get worse as a result of climate change, promoting a technology that consumes so much water is questionable at best.

Introductory comments on this issue can be found at:
http://www.sourcewatch.org/index.php/Fracking_and_water_consumption

5) **Exports of fossil fuels:**
The major contributor to the climate crisis is human combustion of fossil fuels. Since climate change is a global phenomenon, we will not protect ourselves by shipping our fossil fuels overseas. Internationally, we only solve the problem if we work together. In terms of fossil fuels, this means we must acknowledge that wherever fossil fuels are shipped and burned the problem is the same. Thus, exporting our fossil fuels overseas contributes as much to the problem as burning them here – in some respects it is worse because of the carbon dioxide cost of transportation and the reality that combustion elsewhere may be worse than in the U.S.

We suggest that one reason we should be evaluating critically the export of fossil fuels is to protect ourselves from future climate chaos. We should export fossil fuels only to those situations where they would burn at U.S. or better pollution standards.

Conclusion:

If climate change is, as we think the science tells us, the defining threat of our era, then we absolutely must address it. The science is not a partisan political issue. However, deciding how best to address climate change is, we acknowledge, a political issue which can become partisan. The need, however, is to try to keep the discussion as non-partisan as possible; we all breathe the same air. This problem is so large and lasting that it will take trans-partisan and

international cooperation to solve it. All sides are needed in this gargantuan human effort so compromises must acknowledge the science and reality of the issues.

As indicated above, our concern about climate change stems from the concept of Inter-generational Justice.

Before endorsing natural gas as a solution to the climate crisis, we must evaluate the totality of issues surrounding its extraction and use. If the issues that undermine the cleanliness and dangers of natural gas can be addressed, then reason suggests promoting it. However, if these cannot be addressed, it is time to re-think our endorsement of natural gas and focus our financial resources on promoting cleaner energy sources.

We urge all politicians to consider future generations when taking actions relating to fossil fuel extraction, use, and export. We cannot, individually, save the planet, but we can do the best we can. At the Federal level, the best we can do involves reducing greenhouse gas emissions wherever they occur; this could have a dramatic and beneficial impact. Failing to do our best will likely have exactly the opposite and equally profound impact. Once the tipping point has been reached, it really is 'game over;' those of us who understand the dimensions of the problem have a responsibility and duty to do whatever we can to avert that impending eventuality.

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