

Cheap, clean and risky

Natural gas has a key role in our energy future, but it must be handled with care.

Hal Harvey, Los Angeles Times, 1-3-11

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Political leaders from both parties argue that natural gas could save our economy, the environment and promote our national security. Is this so? Or is it just a dream?

It turns out that the way one develops natural gas will determine whether it is a serious help to our energy and climate problems, or a dangerous extension of bad habits.

On the face of it, natural gas looks terrific. The United States — and many other countries — have abundant domestic supplies. The cost, per delivered unit of energy, is about a third of that of oil. It is cheap and fast to build power plants fueled by natural gas. And when burned, it emits only half as much carbon as coal. So what's not to like?

Well, things are not so simple. Under the best conditions, we may enjoy those benefits, but under more adverse conditions, gas can be a worse generator of greenhouse gas than coal, can wreak massive local environmental destruction and can undermine energy efficiency and renewable energy. And without a strong set of policies to guide natural gas development, the worst case is far more likely.

Start with climate change: Generating a kilowatt-hour's worth of electricity with a natural gas turbine emits only about half as much CO₂ as generating the same electricity at a coal plant. Half-off is pretty good. But unburned natural gas turns out to be a very powerful greenhouse gas: One molecule of leaked gas contributes as much to global warming as 25 molecules of burned gas. That means that if the system for the exploration, extraction, compression, piping and burning of natural gas leaks by even 2.5%, it is as bad as coal.

So, how much does the gas system leak? No one knows: Estimates range from 1.5% to as high as 8%. Even near the low end of that range, gas can be as bad as coal. And whatever the leaks in the U.S. system, it is likely to be far worse in, say, Russia.

This gives us Rule One for smart natural gas development: No leaks in the system. We have to know, for certain, that the whole process is tight, and stays that way.

There's more we need to ensure, because of the economics of energy systems, and how that drives the choice of options in the electricity system. It starts with a basic economic truth: Once a coal-fired plant is built, it is incredibly cheap to run. Once built, our coal plants run forever. The median age of a coal plant in the United States is 44 years, and fully a third of them were built during or before the Eisenhower administration.

What this means is that when we add new natural gas power plants to the electricity system, it does not, through pure market forces displace coal. Instead, it displaces other new alternatives, which generally means new renewable energy. If half-CO₂ gas is displacing zero-CO₂ renewables, well, that's hardly a victory. So, Rule Two: Use gas to shut down old coal. Make this an explicit condition.

The final three rules have to do with local environmental conditions. We have all seen the films of people's tap water catching fire after a nearby gas well was put in. That's because of lousy construction quality: Bad well casings allow gas to leak into the aquifer. They can also allow in fluids from hydraulic fracturing (fracking) when that method is used to tap

a new gas well. Rule Three: Strong standards for wells, with effective monitoring and enforcement.

Then there is the damage that wells can do to the gas site. Many wells extract brackish water and other nasty byproducts, like benzene and toluene from deep underground, and spill the mixture onto nearby farmlands — literally salting the earth. The water is a large-scale byproduct of the gas extraction, and, at the request of then-Vice President Dick Cheney's energy task force, it is exempted from any regulations under the Clean Water Act. Rule Four: Don't allow these toxic streams to poison the land.

Finally, choosing where and how to drill is important. Many of the new natural gas technologies entail massive surface disturbance. Roads, drilling rigs, compressors, pipelines, drainage ponds and large amounts of heavy equipment are required for each well. And wells are densely placed, sometimes one for every 10 acres. This means that many natural gas fields are industrial wastelands. After drilling, cattle ranches in the West have been left unsuitable even for cows, never mind wildlife.

We need to zone the natural gas development so that it is kept out of ecologically important areas, and we need strong drilling, operating and reclamation standards so that gas doesn't become a scorched-earth energy strategy.

Gas can do a great deal for our energy future. But if it is mishandled, it can instead serve up great problems — in land destruction, water quality and climate change. Five rules get it right: Don't allow leaky systems; use gas to phase out coal; have sound well drilling and casing standards; don't pollute the landscape with brackish water; and drill only where it is sensible. Let's do this right.