

Cheap Oil: Innovation's Open Invitation

"Innovation is change that unlocks new value." J. Notter

A critical lesson that we have learned, and seem to re-learn, is the pivotal role that innovation plays in economic development. From changing axes of stone to steel to the advent of the digital age, we have seen time after time how innovation impacts economic development. The same holds true for the energy industry. The effects of hydraulic fracking, for instance, are still not yet fully appreciated as the strategic national energy reserves have exploded exponentially since that innovation. Strangely, while we recognize the indispensable role of innovation, we still live in a culture that is on the whole hesitant to innovate. For most the old adage, *"if it ain't broke don't fix it"* governs much of their daily life. However, when crises hit, like the \$50 drop in crude oil these past 4 months, opportunities arise for creative and innovative persons to showcase solutions that previously were not considered. At first these crises threaten the economic status quo but then innovations come forward unlocking new value, resulting in a building of economic strength wherein each plateau is higher than the previous.



A stable economic system struck by crisis then resolves itself through innovation resulting in a new, higher level

By understanding this cycle, it becomes even more evident why creating a culture of innovation is so important within business and industry. This culture must not only accept change, but set both an active expectation for innovation and a model that can adopt those innovations through a *"positively critical"* atmosphere of study, adaptation and implementation. There are certain organizations and departments within corporations that create that culture of innovation, but they often prove to be the exception to the rule.

Let's look briefly at the dramatic fall in crude oil prices and the subsequent fall in natural gas prices. Businesses can no longer coast along with the status quo of \$100 bbl oil or \$4 MMBTU natural gas. To remain competitive they must cut costs and reallocate resources. Regretfully, this often means layoffs because it is the fastest way to drop costs in a crisis. However, losing a pool of skilled workers that will only have to be built back up when the economy bounces can be much more costly than just numbers on a spreadsheet. Layoffs not only create hardship and hard feelings, they could mean permanent loss of skilled, regional labor that then takes time to put back together again. This then underlines the

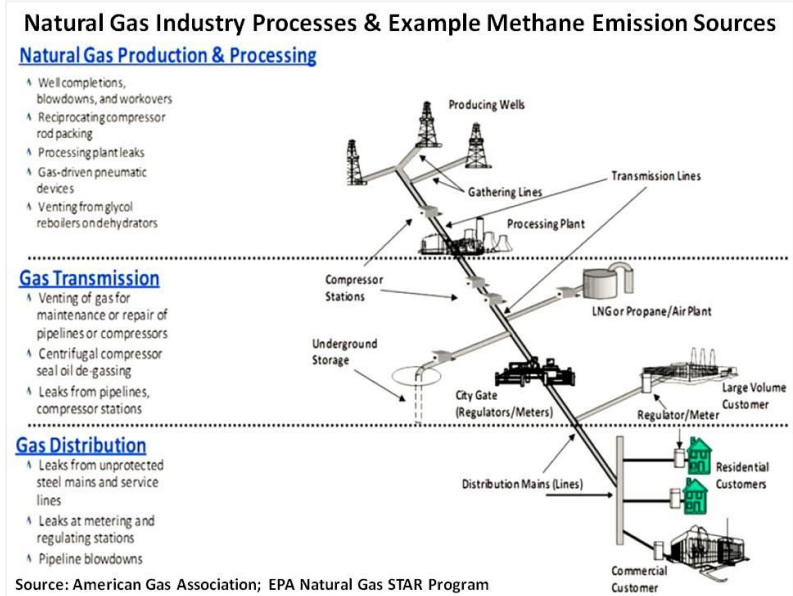
importance of actual innovation within the process, allowing for a much further reaching cost savings to be implemented. These innovations can express themselves in many forms, but I'd like to highlight one that addresses the cost of fugitive emissions and safety.

Fugitive emissions are the unplanned loss of methane from pipes, valves, flanges, and other types of equipment. Fugitive emissions from reciprocating compressors, compressor stations (transmission, storage, and gathering), and wells, are the largest combined category of emissions, accounting for over 30% of losses. Leak Detection and Repair (LDAR) is the common term for the process of locating and repairing these fugitive leaks. There are a variety of techniques and types of equipment that can be used to locate and quantify these fugitive emissions. Research cited by both the State of Colorado and EPA indicates that more frequent inspections result in greater reductions, summarized as approximately:

- Annual inspection = 40% reduction
- Quarterly inspection = 60% reduction
- Monthly inspection = 80% reduction¹

Estimates vary on how much natural gas is lost within the supply chain. The US produces nearly 31 TCF of natural gas and fugitive emissions are estimated from anywhere of 1.3% to 3%²; part of the problem is that many fugitive emissions are not even measured to provide a hard number. The result is that anywhere from 402 BCF to 930 BCF is being lost as fugitive emissions, which at the present Henry Hub low price of \$2.63 MMBTU, is an astronomical annual loss of \$1-\$2.5 billion. This cost is multiplied even further if the cost of carbon due to greenhouse gases is taken into consideration. It should be obvious that this is a significant sector that the industry can address to improve the bottom line. Putting the gas downstream instead into the jet stream is good for the company, good for the environment and good for future generations. As noted above, more frequent inspections dramatically reduce losses.

However, what gets lost in the debate of greenhouse gases (GHG), fracking, and every other industry argument is that along with methane emissions are conventional pollutants, volatile organic compounds (VOCs) and hazardous air pollutants (HAPs). The levels of these pollutants can quickly cause serious medical conditions for the worker and the public both in the near and long term. Imagine the physical toll that 402-930 BCF of fugitive gases mixed with pollutants can have upon multiple



thousands of men and women working hard in the fields. Good safety procedures are put into place to protect workers, but just how many stumble across a leak or work in unknown conditions because the job must be done? And the gas detectors that many carry on their person only work to -8°F (-20°C), whereas much of the natural gas produced in North America is in regions where -8°F is considered a balmy day. At lower temperatures, the devices become sluggish or don't work at all. By the time the monitor emits a warning, a worker may have been working in dangerous conditions anywhere from 5-15 minutes – which at some gas levels can be fatal.

Which brings us back to innovation. The problem? Fugitive emissions at a level that threaten not only the financial bottom line of companies and their subsequent employees, but the health and safety of our workforce in regions that are consistently below -8°F. The innovation? The Aegis 400, a single-system, low-power detection platform that works with gas and non-gas sensors capable of 24/7 real-time coverage at -40°F that can automatically shut down operations if conditions deteriorate below a level defined by the client. It not only monitors in real-time with nearly any sensor on the market, it permits workers to “*know before they go*” increasing their safety and providing a means to remotely shut down operations if circumstances warrant. The ability to automatically shut down operations at levels defined by the client can prevent significant losses (i.e. profit), avoid fines and protect employees.

As is the case for most innovations, “*necessity is the mother of invention.*” The Aegis 400 was not created in a university laboratory, but in the field by people who every day asked themselves what was on the other side of the door of a confined space. And that's both the beauty and beast of innovations, working men and women who discover real solutions to real problems in the field but must then work upwards within a culture hesitant to accept and embrace change. Normally, the corporate culture chooses to stay with what has proven to work, but crises challenge the status quo and open invitations to possible innovations.

While the drop in the price of oil has created much hardship, it is equally an occasion for the industry to cast about looking for means to lower costs and increase safety and stewardship. Like the Aegis 400's beginnings, there are more than likely many other working men and women who have ideas that could make the workplace safer and more productive. In the end, Notter's belief that “*innovation is change that unlocks new value*” bears out to be true and a valuable lesson for all of us. Crisis leads to innovation which leads to economic development to a new and higher level with new challenges.

1. Source: *Economic Analysis of Methane Emission Reduction Opportunities in the U.S. Onshore Oil and Natural Gas Industries*; March 2014
2. Source: *American Gas Association, British Columbia Ministry of the Environment and the U.S. National Oceanic and Atmospheric Administration*