

# **Perspectives on Canada's Energy Future – With a Focus on the Role of Natural Gas**

## **Speech to the Industrial Application of Gas Turbines Symposium**

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### **The Policy Conundrum**

The energy debate this season seems to be dominated by two factors.

One is the climate change file where progress on policy continues to elude most governments.

The second is the rapidly evolving perceptions of natural gas

Lying behind these but not exactly a topic of hot debate is the broader concern about energy and sustainability

Today, I want to bring these three topics together and try to bring some fresh thinking on both climate change and the future role of natural gas in the North American energy system.

Policy makers in Canada, North America and around the world find themselves in an increasingly difficult conundrum:

- how to meet growing energy demand,
- how to ensure energy security and reliability,
- how to ensure that energy is affordable and
- how to solve the climate change problem while also respecting other environmental imperatives

The conversation tends to be dominated by climate change most of the time. And policy tends to be single-minded in pursuit of GHG reduction. But the other energy issues – security, reliability and affordability - are always there, often lying just below the surface.

In my view climate change policy that proceeds while ignoring these other energy issues is doomed to fail.

A provincial deputy minister of energy once described the energy policy challenge as akin to solving a series of simultaneous equations. I asked him how his government was doing at managing that and he allowed ruefully that they could solve one at a time, and that was only on a good day. I am sure he was not alone among his energy DM colleagues

So, how do we think about complex challenges like energy, sustainability, and climate change in a world where:

- Debate is dominated by simplistic and instantaneous communications including the emerging social media
- Decisions are driven by short term electoral cycles when we need to take long-term views beyond the lifetimes of many voters.
- The policy system is less and less able to deal with complexity

It is easy to despair but there are some ways of thinking that can be constructive and that is what I want to talk about this morning.

I think the problem and possible solutions have two very broad dimensions:

- the need to frame a plausible vision of the medium to long term future;
- the need to put in place governing measures that are efficient and of sufficient weight to drive change.

## **Framing the Future**

Let's start with what we want the future to be about.

In my estimation too much of the discussion is about low carbon and not enough about sustainability. A consequence of this is that we will most likely continue to underperform on efforts to manage carbon.

When the idea of sustainable development came out of the Brundtland Commission in the late 80's it was received with widespread acclaim and has since become embedded in most policy discourse. Whether it has really taken root at an operational level in policy is much less obvious.

Policy makers tend to pay lip service to sustainability and its three dimensions, but quickly fall back on a single dimension when they design programs or regulations.

We see this all the time as shifting circumstances and public opinion variously focus on climate change, or air quality or competitiveness or low income consumers or reliability but very rarely hold the other dimensions in mind as the focus shifts from one to the other.

The result, in my experience, is often unintended consequences and the undermining of progress in one area by contradictory actions in another.

Let me give you some examples:

- If we meet concerns about competitiveness or impacts on low income consumers by reducing energy prices we create a disincentive to energy efficiency
  - If we drive aggressively toward reducing the carbon in the energy system without equally aggressive reductions in end use energy intensity we risk creating an increasingly energy intensive economy with negative consequences for both the economy and the environment.
- If we drive renewable energy sources in to the system without being mindful of their environmental consequences for land, water and habitat we simply replace one environmental problem with another.
- If we focus on temporarily popular but possibly ill conceived technology solutions we risk environmental and social consequences that cause a backlash against the whole effort.

So, how do we address the challenge of wanting to – and needing to – make policy progress on carbon management over the medium to long term without setting us back in other areas of equal importance?

We need to think of energy as a system and policy needs to be framed mindful of the connections in that system.

A systems perspective leads you to see energy in very different terms than we traditionally do.

It focuses on the purpose of energy – to deliver a variety of specific energy services. It is the services we value and if those services can be delivered while reducing the quantum of energy input – in other words with higher system-wide efficiency – then we are better off not only in environmental terms but economically and socially as well.

But not all energy sources are created equal in respect to their ability to deliver services.

- Mobility requires energy in forms that are highly portable and have high energy density – traditionally liquid fuels although natural gas and electricity appear set to take market share in the future.
- Over 40% of the energy we use in the economy is heat. A systems perspective should lead you to think about what is the most efficient way to deliver heat especially since the largest component, space heat, requires very low quality energy.
- Electricity is the highest quality form of energy and for many electrical applications electricity is the only option, therefore the first claim on electricity should be applications where it is the only option or the most cost-effective option.

- A system perspective focuses on waste. Fully half of the primary energy that enters the energy system exits as waste, normally in the form of dissipated heat. By no means is all of that practically recoverable but a systems perspective would lead you to look at the potential to do so where it is cost-effective in comparison to further supplies of primary energy.
- The optimal way to deliver energy services at high efficiency, with low emissions performance and with high reliability increasingly involves hybrid and integrated systems that combine multiple fuels and technologies, waste management and local renewable sources. A supply perspective tends to obscure these possibilities.

Several recent commentators have talked about this systems perspective.

In his recently released book on *The End of Energy Obesity*<sup>1</sup> Peter Tertzakian looks at the potential massive leverage from increased end use energy efficiency due to the avoidance of multiple losses upstream in the energy system.

Ken Ogilvie and Bob Oliver in a recent paper for the Energy Framework Initiative<sup>2</sup> entitled “A Commitment to Sustainable Energy End Use” argues much the same case and the Energy framework Initiative itself is founded on the proposition that discussions of energy need to take a systems perspective and in order to do that, need to start at the demand end.

The QUEST<sup>3</sup> initiative – Quality Urban Energy Systems of Tomorrow - takes a systems view arguing for integrated approaches to energy service delivery in our communities where a focus on energy efficiency, system optimization and waste management as well as use of local renewable sources has the potential to completely transform our community energy systems.

In contrast, much, indeed most, of the climate change debate has focused on two things. One is reducing emissions from large industrial and resource industry sources. The second is eliminating the emissions from power generation. Both of these are necessary but limited in their potential.

What is needed is a much more fundamental transformation and that is mainly at the demand end of the system.

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<sup>1</sup> Peter Tertzakian with Keith Hollyhan, *The End of Energy Obesity: Breaking Today’s Energy Addiction for a prosperous and Secure Tomorrow* (Wiley, 2009)

<sup>2</sup> <http://www.energyframework.ca>

<sup>3</sup> <http://www.questcanada.org/>

## **The Role of Natural Gas**

So where does natural gas and the natural gas distribution industry come in to all of this?

The Canadian Gas Association Board of Directors has recently framed a new vision statement aimed at dealing with the shift to a low carbon future

We characterize gas as a foundation of a sustainable future – not a bridge. Because we believe that we will be using gas far into the future.

It is in abundant supply and its many attributes– affordable, clean, flexible, reliable, storable and inherently efficient - make it a first choice in many applications and will continue to do so even as carbon constraints start to bind.

I will frame it in two time horizons: medium and long term. For convenience let's define these around the 2020 and 2050 target dates that all governments are now using for GHG reduction goals.

The medium term supply picture is very strong, based in considerable measure on the recent emergence of economic supplies from shale. The success in shale over the past two years has completely transformed the North American gas supply and price picture.

In the longer term the supply picture is likely to be sustained by even more unconventional gas supplemented by imports of liquefied natural gas (LNG) and, with some luck, the north.

North American resources are thought to be in the order of 100 years of consumption at current rates. We are not going to run short.

Looking at the demand side over the medium term, gas is likely to play an important role in all sectors, even as governments push harder on GHG reduction.

With the sorts of carbon prices that most governments seem to be prepared to tolerate and provided they impose those prices even-handedly, gas comes out well against its competitors.

Combined with its many other positive attributes gas will be a very good value proposition relative to competing sources under most scenarios for the next decade.

The biggest source of gas demand in Canada is the residential/commercial/institutional sector (45%). After that is the industrial sector (40%). Power generation is a small part (less than 15%) and transportation is almost nothing.

These proportions are set to shift in important respects.

In the medium term we see modest growth in the R/C/I sector based on continuing customer additions offset somewhat by steady improvements in efficiency.

In fact there is lots of potential in efficiency given the age of heating equipment and building stock. To put it in perspective, of the 6.4 million natural gas furnaces in Canada only 20% (1.3 million) are high efficiency and nearly half are low.

Gas utilities are working with policy makers and regulators to facilitate the change-out of that capital stock. Smart use of gas in more or less traditional applications remains the most cost-effective way to get environmental gains over the medium term.

In the industrial sector it is harder to discern the future but gas demand growth is likely to be considerably slower than in recent history.

The current recession has in all likelihood set in train permanent changes to the North American industrial sector and how it will change looking forward is hard to predict. On the other hand gas has every prospect of being the fuel of choice in all current applications based on its fundamental attributes and value even when carbon price burdened.

Power generation is a wild card.

Recent history has not been kind to gas. Investors got caught with power plant investments that made no sense when gas was heading north of \$10 and where price volatility was scaring consumers and politicians alike.

But the new supply picture combined with harder than expected slogging for carbon capture, nuclear and renewables have changed a lot of people's views.

All indications are that gas will take a growing share of power generation demand in all segments from base load through to small scale distributed generation with positive effects on emissions performance, system efficiency and reliability.

The wildest card is the transportation sector where gas will likely have a growing role. We may well be on the cusp of a radical transformation of the heavy duty segment - both return to base urban vehicles and long haul transport which together make up over 20 % of total transportation fuel demand.

In short the question in the medium term is not whether we will be using gas but how we will use it and how efficiently we will use it.

The question in the longer term is the same but the solutions are likely more interesting, and diverse and greener.

No-one can predict in detail what the world looks like past 2020 but let me give you a snapshot of what we see as the role of gas and gas utilities delivering smart energy solutions and underpinning sustainable communities.

As I mentioned earlier, over 40% of the energy we use is for heat – space, water, industrial process heat - where the most efficient source of energy is most often direct combustion of gaseous fuels. That means most heat will be delivered by pipes: to move the fuels or to move heat directly.

We believe that piped energy will be one of the foundations on which a sustainable energy system will be built over the long term. But it will look very different than today. Depending on local circumstances:

- It may carry natural gas or renewable gas from waste or heat generated centrally from gaseous fuels.
- It may be a partner in hybrid systems with local renewables such as solar and geothermal that achieve high levels of both environmental performance and reliability
- The core unit of physical organization may be communities or neighbourhoods rather than individual buildings.
- It will deliver an important share of the primary energy for the power system including in distributed applications and the two systems will be increasingly integrated.
- It will be contributing to the delivery of energy services at levels of whole system efficiency much higher than today.

CGA has been one of the drivers behind the QUEST initiative that I referred to earlier. The QUEST vision for Canadian communities incorporates all of these sorts of ideas and inherent in them is a piped energy system built on the established foundation of Canada's gas delivery industry.

### **Some Directions for Policy**

So, what does this mean for how policy needs to be shaped to deliver the sorts of changes that we need to achieve?

We have to start treating targets seriously, much more seriously than any debate so far in Canada. To date the political process has tended to kick out targets far out of proportion to the politically or economically acceptable weight of effort needed to meet them.

The goals being set by governments involve the biggest transformation of the energy system since electrification and the advent of the internal combustion engine over a century ago but this time driven primarily by government policy.

It will be hard to do even if the benefit at the end of the process is positive because for real world consumers and investors it's the transition that matters not the end point.

Given all of that here are some of the propositions that policy makers might usefully take into consideration:

We need to design policy that is as efficient as possible. The transformation is too big, too costly and too difficult for us to have the luxury of dissipating resources on unnecessarily complex or wasteful approaches

We need to recognize that nothing is "sustainable" politically or economically if we compromise the security, reliability or safety of our energy systems.

Policy needs to recognize that the core attribute of sustainability – something we should learn from the study of ecology - is diversity because diversity promotes adaptability and resilience in the face of change. This means not picking winners. A clear, understandable and predictably escalating carbon price will allow the market to find low carbon solutions

Not only does carbon pricing need to be clear and understandable, sooner rather than later it has to extend across all energy use.

Carbon pricing systems need to be even-handed in their application and avoid measures that are unnecessarily intrusive, especially mandates and subsidies which are no longer needed once carbon is actually priced.

Some government assistance is warranted where there are other market failures. The most obvious is the need for some direct government support for the development, demonstration and deployment of new technologies – because much of that investment takes the form of a public good. This needs to be done as even handedly as possible and across the whole energy system.

Policy needs to mitigate impacts on vulnerable consumers but do so without blunting the price signal

Finally, policy needs to engage citizens in a dialogue about the need for a fundamental transformation of our energy using habits and that includes the shape and fabric of our communities.



## Summing Up

We need to frame a vision of the energy future where the perfect is not the enemy of the good. Perfect probably doesn't even exist. But there are lots of possibilities out there that are good and natural gas is one of them.

We should be realistic about what people want – a reliable affordable energy system that meets their environmental aspirations. One can't trump the other and that means policy has to comprehend multiple dimensions

We should be realistic about what people need to know. Fundamental transformations don't occur without something driving them and in this case it needs to be energy prices – all energy, all in, including carbon, and there is no way to hide from that.

For twenty years we have been beating our heads against the problem of climate change and getting little but headaches for our troubles. By treating climate change as an energy policy issue and rooting solutions in sound sustainability principles we can in all likelihood make much faster progress.