Gas Pipelines - R.I.P.

At the present point in time there are many natural gas pipelines that are undergoing scrutiny, including:

* the Energy East pipeline
* fracked shale gas in BC
* US shale gas for Ontario
* gas for tar sands extraction

Potentially these pipelines could make a lot of money for the fossil fuel companies, for governments that collect royalties, fees and taxes, and for the owners of the pipelines, but ultimately most of that money will come straight out of the pockets of ordinary Canadians. The cost of utilizing natural resources, whether they be natural gas from the ground or heat from the air, is determined mainly by the cost of the infrastructure for delivering the energy so once we have made a commitment to build the infrastructure we are stuck with that choice for decades to come. If we continue to use fossil fuels for heating and power generation it will be impossible to achieve the GHG reduction targets that our governments have set. Although this not widely understood, we will also be making a commitment to spend tens of billions of dollars per year in unnecessary costs because fossil fuels (and nuclear power) are not in fact cost competitive energy sources in Canada. To top it off, such a choice will also cost many lives: people are frequently killed by gas and fumes from heating systems, and by gas fires and explosions.

Reports in the last several months' issues of Sustainability-Journal.ca summarize how we could use the local sources of energy that surround our homes to provide all of the energy we need for static applications (buildings and power generation). Unfortunately, our government planners are so totally convinced that these local sources cannot compete with fossil fuels and nuclear power that they will not even make the effort to read the articles so perhaps the argument should be framed in a different way:

We do not need natural gas pipelines, even if we wanted to continue to use natural gas for heating and power generation.

We already have a fully built out network that can distribute the energy from the gas (at night, and under the control of the electricity supplier). Essentially every city and hamlet in North America is already connected to all of the other cities and hamlets via our power grid, and that grid already has sufficient capacity to distribute the energy from natural gas without requiring any modifications to the grid size, capacity or connections. The distance between the supply source and the consumer is not a significant factor. If that distance is large there will be some energy lost in the transmission but as things stand 100% of the potential is being lost.

If we take Ontario as an example its grid is designed to handle well over 30,000 MW of power but at night the grid is distributing only 10,000 to 15,000 MW, leaving 15,000 to 20,000 MW of unused capacity. Exergy stores are controlled by the power generation stations (which are managed by the IESO in Ontario) so if exergy stores are distributed throughout the Province the grid could handle that amount of extra power, and since the exergy stores are capable of storing the energy for later use they could deliver the energy at whatever times it is needed. As explained in the previous articles exergy stores magnify their electric input by whatever factor they have been designed for. If that factor is 5 then the amount of thermal power that could be delivered would be 75,000 to 100,000 MW, which is far more than the amount of energy needed to heat all of the buildings in Ontario.

One of the available options would be to use natural gas to generate the electricity that would be distributed at night. In that case about 60% of the energy of the natural gas would be lost in the conversion but even so the amount of energy that would be stored would still be much greater than what is needed for space heating and DHW. Note that in spite of the loss at the generation stage the amount of natural gas that would be needed would be substantially less than what we are currently burning, thanks to the energy gain of the exergy stores.

A substantial part of the electricity that we consume is used for thermal applications such as air conditioning, space heating and DHW. The exergy stores meet those needs by using stored energy from the local thermal sources so they free up that part of the electricity delivery. They do not need to convert the stored heat back into electrical form. Note that such systems result in both electricity demand reduction and demand displacement (shifting the transmission from peak demand periods to valley periods), both of which are very useful properties.

The result is that the existing power grid could handle the distribution of energy from natural gas and it would still be capable of meeting the combined demands for heating, DHW and power generation (see the November issue of SJ for a more detailed analysis).

The exergy storage system is scalable from a single building to all of the buildings in Canada so it could be progressively installed without disrupting the existing distribution system. It would be theoretically possible to continue to use natural gas on an interim basis but since exergy storage also makes it possible to make more efficient use of Canada's hydro generation system to completely displace both the use of natural gas (and other fossil and combustible fuels) and nuclear power as well it would be more rational (and much cheaper) to integrate these capabilities from the outset. The point to be made is that the existing power grid is capable of distributing the energy that we need for our buildings regardless of whether that energy comes from fossil fuels or some other energy source.

We should not be wasting any more time, money or lives on natural gas pipelines.

A dual function energy store (from the journal ***Sustainability***)

How to make much more efficient use of Ontario's hydro power

How to phase out both fossil fuals AND nuclear power

Exporting energy

Matching the power output and the river flow

How many billions could be saved? (a very preliminary outline)

Presentations made at Simon Fraser University, University of Ontario Institute of Technology, University of Toronto, Waterloo University, McMaster University, St. Lawrence College, Hydro Ottawa, UK Ministry of Energy and Climate Change and Natural Resources Canada