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Physicist, 62 years'experience

Graduation - Dalhousie University (physics) 1953

Nova Scotia Research Foundation - Geophysicist

Atomic Energy of Canada Ltd. - Physicist
Section head, Measurement and Instrumentation
Program leader, Industrial Metrology

INAX instruments Ltd. - President

IRAD Corporation - General Manager

Independent physicist (current)

Relevant experience

After graduating from Dalhousie I spent two years with NSRF (concurrent with graduate studies) as a geophysical surveyor, using gravimeters, magnetometers and resistance instruments for surveys in many parts of Nova Scotia, including a notable seismic survey (with Pat Wilmore, later head of the UK Seismic Survey) that outlined the oil and gas deposits off the coast of Sable Island, which have since been developed.

I then joined AECL, where for 15 years I was engaged in R&D on a wide variety of measurements, developing the leading edge instruments that were needed. One of these was an X-Ray emission spectrometer that made it possible to do almost instant and non-destructive elemental analysis of rocks, metals, pigments, chemicals, etc. Under an agreement with AECL I founded INAX instruments to develop that technology. It was used for surveys, mine control, mill analysis, analysis of fine art pigments (for the National Gallery), by the auto industry, by customs, and for many other applications. Most of Canada's largest copper mills used INAX on-stream anylysers for continuously analysing their heads, middlings and concentrates, achieving automated control of their milling operations.

In 1985 I became interested in the potential for using large molten salt storage systems for storing energy in electrical power grids, under a contract with the National Research Council. While that approach is now widely used for concentrating solar collector fields I eventually realized that the same heat of fusion storage technolgy could be employed on a much larger scale and at a much lower cost if the storage temperature is much lower. In such systems the heat is stored in the ground in a configuration that prevents the escape of the energy and that maximizes the exergy storage (the ability to do work). Exergy storage systems draw no power at all during the daytime, when the power demand and costs are at their maximum, and since they can store energy for many months they can also be used for storing energy collected during one season for use in the opposite season. For example, the Enwave system collects cold in the winter and uses it to air condition many of Toronto's largest buildings in the

summer. The Drake Landing and UOIT systems do the opposite - they collect heat in the summer and use it to heat buildings in the winter. Exergy storage systems have now evolved so that they could increase Ontario's power generation by up to 15,000 MW by putting currently unutilized off-peak power capacity to work, and at the same time they also reduce the peak power demand by a comparable factor. If employed on a large scale exergy stores could completely displace the use of natural gas for both space heating and power generation.

One direct consequence is that Ontario's existing power generation fleet will not need to be expanded for many decades, leading to large reductions in capital expenditures on both electricity and gas production and distribution systems. Another consequence is that the GHG emissions from natural gas are permanently eliminated. A third consquence is that both the capital and operating costs for heating and power generation can be drastically reduced by avoiding the unneccessary waste of money on projects like the NEXUS pipleline. This would immediately reverse the rising trend for the cost of power in Ontario.

The OEB is not the appropriate forum for discussing the merits of the various R&D technologies for energy systems (others are developing programs for nuclear, geothermal. solar PV, wind turbines, etc. that could conceptually be even less expensive). However, in considering long term proposals, such as the NEXUS pipeline proposal, it is essential that the OEB should understand that there are readily available supply alternatives that offer lower costs, greater sustainability and freedom from environmental consequences.

Whether or not exergy storage is the technology that eventually wins the battle is not the point. Exergy storage demonstrates that there is at least one technology available that would be cheaper, more sustainable and much safer and cleaner than natural gas (or nuclear power, for that matter). In this case the Board did not permit me to file the reports (most of which are the government's own reports) that make the case for making much better use of the available energy resources, but hopefully the Board will realize that there is a need to consider the science of energy supply - that it is not just an matter of extending the status quo and dealing with legal details.