conferenceseries.com

Ron Tolmie, Trends in Green chem 2017, 3:3
DOI: 10.21767/2471-9889-C1-004

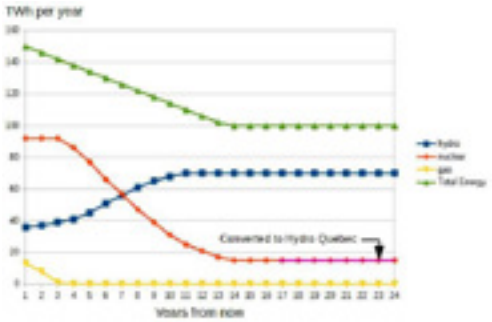
3rd Annual Congress on
Pollution and Global Warming
&
4th International Conference on
Past and Present Research Systems of Green Chemistry
October 16-18, 2017 Atlanta, USA

Ron Tolmie

HEAT networks, Canada

Concurrent storage of heat and electricity

Buildings can store summer heat in the ground for use in the winter, and if a heat pump is used to bring the storage temperature to the value needed for HVAC systems then the system can be designed to store electricity as well as heat. The heat pump can be operated at times when power is most available, achieving a grid demand shift that is equivalent to using batteries to store the electricity. Moreover, the ability to store electricity makes it possible to utilize the excess hydro power that can be produced during the spring runoff, it can reduce the total grid demand, it can reduce the electricity loss related to distribution, and it enables the ponding storage capacity of run-of-river hydro stations to be repurposed so that the system returns the stored energy in the form of electricity. The thermal storage can store cold as well as heat so it works for both cooling and heating (and for domestic hot water). Because we use a lot of energy for heating and cooling the secondary storage of electricity can be implemented on a large scale. In jurisdictions where hydro power is a significant contributor to the grid power supply the result can be the elimination of the use of fossil fuels for both baseload and peaking applications and the reduction or elimination of expensive alternatives like nuclear power. The ground store uses two concentric rings of borehole heat exchangers plus a heat pump that draws heat out of the outer ring and moves it to the inner zone. Because the outer ring is below the ambient ground temperature the direction of the net flow of heat is into the store so it does not lose heat. It provides both long term (inter-seasonal) and short term storage. Conceptually the use of thermal storage instead of fossil fuels for heating and cooling in Ontario could reduce the electricity demand by about 50%, would increase the generation from the existing hydro stations, could eliminate the use of natural gas for both heating and power generation and could reduce or eliminate the need for nuclear power in Ontario.



Biography

Ron Tolmie is a Physicist who has been examining the practical applications of exergy storage to accumulate heat and electricity at the times when they are individually abundant and to return the stored energy at times when the energy demand is high. That has required the development of physical systems that can concurrently store energy in both forms and the analysis of the impact of such systems for energy applications that are highly interactive but that are commonly treated as if they were independent issues

tolmie129@rogers.com