

AE-Street Storage

The energy storage capacity of AE-Street systems can be used to almost completely eliminate the GHG production related to the generation of electricity. There are three primary mechanisms:

- (1) Storing energy during the overnight period makes it possible to greatly increase the production of electricity by nuclear or renewable energy sources. Such increases would otherwise be limited because the present power grid has no capacity to absorb any excess production.
- (2) Storing waste heat from ICT (information and communications technology) buildings eliminates both that energy waste and the “heat island” effect in cities. Roughly half of our electricity consumption is used by commercial and institutional buildings.
- (3) Using the ground as the heat sink for AC systems greatly improves the COP of the air conditioning systems, reducing their power and energy requirements. That demand commonly creates the largest annual demand peak in Ontario.

The summer air has a virtually unlimited capacity to provide energy, and it is free, available everywhere and easy to extract so there is not much economic incentive to use recovered heat instead of atmospheric energy, but there is a major social benefit in employing these measures. If fossil fuel energy were taxed then that would create the needed incentive, but most Canadian governments have been unwilling to implement such a tax or to create cap & trade policies that might serve as a substitute in this application.

There are however some significant ancillary benefits. A year round supply of energy that replenishes the heat store every night [for (1)] or every day [for (2)] reduces the cost and improves the performance of the storage sites, and makes it possible to locate such stores at sites where ground water flow might compromise the ability to achieve long term storage

Groundwater flow AE-Street stores will have much greater capacities than those used for individual homes so they will be much deeper, usually in bedrock, and will consequently be less subject to the effects of groundwater flow. However there is no guarantee that the groundwater problem will be eliminated.

Where there is groundwater flow throughout the storage volume that is an asset on the whole. While that prevents storage at that particular site the groundwater continuously brings heat to the boreholes so they will be

better than the normal AE-Street stores for both heating and cooling. Such sites can be freely connected but they will not require the summer heat injection. In some cases there may be water flowing at a single stratum. In that case that stratum will still deliver heat brought in by the water while the rest of the borehole will deliver stored heat, so again there is no major problem.

The worst case occurs when there is a general water flow that is too weak to meet the power demand but strong enough to at least partly compromise the long term storage. In that particular case it may be useful to concentrate the “recovery” sources [(1) and (2)] on those particular storage sites.

Social and economic benefits AE-Street systems will generate a large amount of wealth in Canada by providing us with a new source of energy that is sustainable, stable and clean, and that can make our existing power grid work better. Such systems can be deployed quickly and are expandable from a single building to all of the buildings in a city (or in a rural application). They would create thousands of immediate jobs, and by solving one of our biggest challenges they will create opportunities in other sectors

AE-Street systems do not generate any electricity, they just make it possible to match supply and demand with any of the clean power generation alternatives. However, they do provide energy for heating, which is a much larger source of GHG than electricity.

Transportation If Canada is to meet its objective to reduce its production of GHG by 80% then it will need to eliminate the production from the buildings sector (which is readily achievable) and it will also need to make large reductions in the transportation sector, which will be much more difficult. We can use high speed rail instead of airplanes. We can make more use of electrically powered public transit. We can switch to electric cars, but all of those changes will increase the demand for electricity. The AE-Street option provides a general way to boost power generation and it has the capacity that will be needed to handle both of the two primary demand sectors, buildings and transportation.

Actions required Individuals can install AE systems to heat their own homes, but they would not provide the advantages listed above. A more general approach under which cities would install and manage the storage and distribution components of the AE-Street systems is more logical, and that approach would be needed for both the nighttime storage and the ICT mechanisms. This is a new idea so it will require public education and it will require that suitable public policies be developed.