



disconnected from the systems of its neighbours and to be operated as an island, and precludes opportunities for the export of electricity.

A further problem affecting frequency control is the Ukrainian approach to revolving reserves, that capacity held in standby for a sudden loss of the largest generating unit on the system. Revolving reserves of 1000 MW are required for the Ukrainian system; however, in actuality, little or no revolving reserve is maintained. Hence, in the event of the failure of a generating unit, the frequency is allowed to sag until the load matches the remaining generation.

The principal problem associated with frequency reductions is the loss of productivity and the reduction in product quality of anything made on a continuous process using electric motors (e.g., steel rolling, paper making).

Transmission upgrades associated with new and upgraded generating capacity, require additional upgrades to tie each nuclear unit to the electrical transmission grid. It is also necessary to complete construction of a new

750 kilovolt (KV) electricity line across North Ukraine.

Energy efficiency

Ukraine's economy is facing an increasingly serious crisis. The shortage of reliable generating capacity exacerbates the problem. Heavy industry consumes (about 70 percent) of electricity, due to reliance on low-efficiency technologies and practices.

Opportunities exist for achieving substantial energy efficiency improvements in heavy industry, particularly in the chemical and metallurgical industries.

The introduction of new technology and equipment can also improve the energy efficiency of industrial processes. Some fairly simple improvements could be made by installing variable speed motor drives, process controls, efficient anodes, and other related equipment, which could save approximately 950 MW.

The use of energy efficient lighting, in the residential, industrial, and commercial sectors, would yield additional significant savings in

energy consumption.

All of the benefits identified can be realized while actually reducing the cost of electricity; that is, while the capital investment is significant, the savings can more than compensate for the costs of benefits.

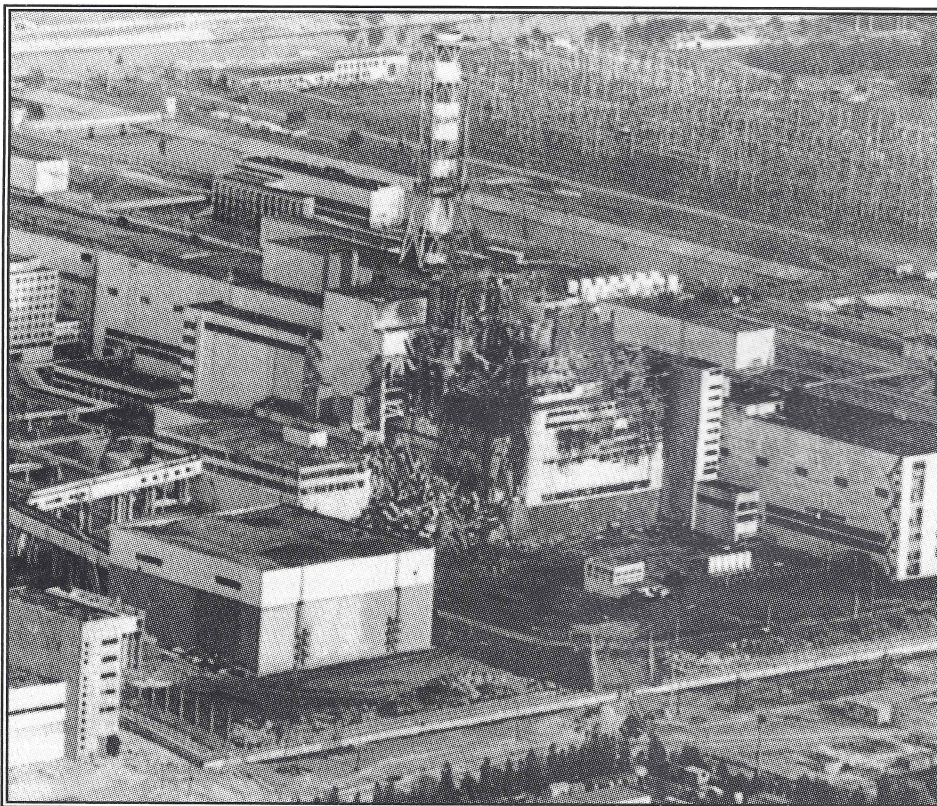
Conclusion and Recommendations

While the potential exists in Ukraine to achieve significant reductions in consumption through energy efficiency, there is little detailed information regarding specific equipment and practices that could be improved and the time and investment required.

- Canada could assist Ukraine in quickly carrying out energy efficiency assessments and, given the continuing decline in energy use in Ukraine, there is sufficient time to implement an energy efficiency programme and to reduce consumption further before demand for electricity begins to increase with economic growth.
- As a specific "quick-start" action, one or more industrial facilities could be selected to serve as demonstration plants for efficiency upgrades and for energy savings technology.
- Communicating the concept of energy savings is important for the extension of these ideas throughout Ukraine, hence it would be advisable to set up an international energy centre in Kyiv to showcase the latest technologies and training practices for energy efficiency.

The implementation of energy efficiency measures and technologies would help Ukraine's economy become more competitive. Experience in other countries has shown that energy efficiency results in a net increase in jobs, and similar results could be expected in Ukraine.

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Ukraine's Chernobyl reactor, in which an explosion in the early hours of April 26, 1986 spewed out deadly radiation and created the world's worst nuclear power accident. (Photo credit: CANAPRESS Photo Service)