Some Recent Analysis on Remedying Electricity Price Increases

In the last few weeks Gerbilnow has analysed electricity use by a large cold store in Sydney.

The results have a significant bearing on 3 issues:

1. Investment in electricity distribution infrastructure - and its impact on the price of electricity now and in the future,
2. The cost and ease with which intermittent renewable energy sources may be integrated into Australia's electricity grid, and
3. The amount being paid for electricity by Australia's cold store industry.

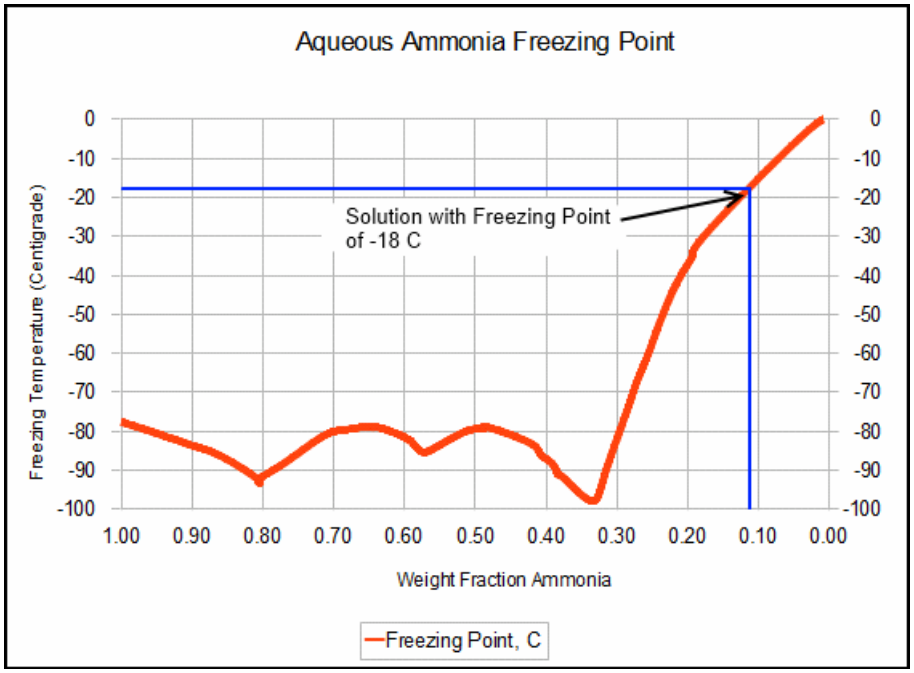
An overview is presented in the article Grid-Friendly Appliances.

The Sydney cold store has a large and relatively constant demand for electricity. It uses around 80 kilowatts, 24 hours a day, 7 days a week.
The electricity charges are approximately $84,000 per year.

Peak and Shoulder periods are charged at high tariffs relative to the much lower Off peak tariff. The Peak and Shoulder periods are 15 hours a day on week days. The Off peak periods are 9 hours a day on week days and 24 hours a day on weekends.

By storing in Off peak periods the energy required in Peak and Shoulder periods the total annual savings due to the different tariffs are about $40,000.

There is very simple and low-cost technology for storing Off peak energy to meet the needs of this business and all other cold stores in Australia and throughout the world; Energy can be stored during Off-peak hours by simply freezing a solution of water and any one of salt, ammonia, anti-freeze or other suitable agent to lower the freezing point to the cold store's operating temperature, say -18C. For instance a solution of water and a little over 10 percent by weight ammonia has a freezing point of -18C. See attached chart:



The cold store in Sydney uses electricity at the rate of 80 kilowatts for 15 hours a day during Peak and Shoulder periods on week days. This is a total of 1200 kilowatt-hours in this 15 hour period.

Approximately 16 - 25 cubic metres of "freezing solution" kept permanently at the cold store's operating temperature is sufficient for the desired load-shifting each day from Peak and Shoulder periods to Off peak periods. (The Sydney cold store is about 5,400 cubic metres. Retrofitting will be cheapest by placing the "freezing solution" containers inside the cold store.) The "freezing solution" is converted to ice during energy storage in Off peak periods and back to liquid during energy retrieval during Peak and Shoulder periods. Its temperature is virtually unchanged.

The cost of the capital equipment is likely to be recovered in under 12 months by the savings in electricity charges due to the low Off peak tariff available to this business located in Sydney. There is no other energy storage technology that provides a cost-benefit remotely near this. It is suitable here only because of unique characteristics of the cold store industry.

The investment also frees up 80 kilowatts of Peak and Shoulder period of power generation and distribution capacity, avoiding the need for further investment in electricity infrastructure.

It allows intermittent renewable energy to be stored whenever it is available and without requiring any backup.

A submission on behalf of the Refrigerated Warehouse and Transport Association of Australia for the National Energy Savings Initiative Issues Paper gives details on the magnitude of the cold store industry in Australia:

- Independent cold stores account for 11 million cubic metres of temperature controlled storage capacity,
- Average energy efficiency of these facilities is 81.5kWh/m³/year, and
- The cold storage industry annually uses 896.5GWh of electricity.

This industry alone has the potential to drastically lower or completely remove the need for further expansion in capacity of Australia's electricity infrastructure for some considerable time.

Yours sincerely,
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