

- Q. (a) Define the following terms:**
Incremental cost
Short-run marginal cost
Long-run marginal cost
Long run incremental cost
- (b) How is each calculated for an integrated electric utility?**
- (c) How should each of these costs be reflected in rate design?**
- A. (a) (i) Incremental cost is the change in cost for a finite change in quantity demanded.
- (ii) Short-run marginal cost is the change in cost for an infinitesimal change in quantity demanded, when the time frame of measurement does not allow for change in capital stock (equipment).
- (iii) Long-run marginal cost is the change in cost for an infinitesimal change in quantity demanded, when the change is considered persistent enough, and the time frame is long enough to allow changes in capital stock (equipment).
- (iv) Long-run incremental cost is the change in cost for a finite change in quantity demanded when the change is considered persistent enough, and the time frame is long enough to allow changes in capital stock (equipment).
- (b) (i) Incremental costs for an integrated utility are generally calculated by doing studies where a finite change in demand, energy, and/or number of customers is simulated and the changes in costs are divided by the incremental changes in demand, energy and/or customers to calculate the resultant incremental costs. It is usually more convenient to calculate incremental costs for a utility than marginal costs, since it is easier to see the effects on costs from a finite change in load, than an infinitesimal one.
- (ii) Short run marginal costs for an integrated utility are usually taken to be the fuel and operating costs of the generating unit that will supply the next kWh of load, when there isn't time or necessity to build new equipment because of a small increase in load. In Hydro's case, this is a blend of Holyrood, and very infrequently gas-turbines.

- (iii) Long run marginal cost for a utility are generally approximated by long-run incremental costs. The terms, long-run marginal costs and long-run incremental costs are therefore often used interchangeably when talking about electric utilities.

- (c) Short run marginal costs are usually incorporated into rate designs by ensuring the run-out energy blocks (consumption on the margin) are as close as possible to short run marginal costs as practical, given the other rate design criteria.

Long-run incremental costs are often compared to the rates derived from embedded cost-of-service studies to try to influence customer decisions about increasing load or installing more efficient equipment. In other words, we might try to set demand charges as close to the long-run incremental costs of demand as possible and the customer charges as close to long-run incremental costs as possible, while still satisfying all the other rate design criteria.

It is usually not possible to set energy tail blocks, demand charges and customer charges at incremental cost, because the corresponding revenues will not be correct, nor would everyone consider the results fair and reasonable. We must therefore often decide which of these is most important to us in the rate design goals.