

Abstract: We study the monopoly problem of a large-scale electricity storage unit that faces a periodic but uncertain demand over multiple cycles. Time is continuous and strategies are functions of time expressed in terms of power rates. Storage buys in periods of below-average demand and sells when demand exceeds the mean. We characterize the selling and buying strategies exactly as a pair of (time-varying) intensity and thresholds. When the capacity is not too large in a sense we make precise, the storage operator trades that capacity in full every cycle, even under rate (dis)charge constraints. For a large capacity, intertemporal (dynamic) linkages emerge across cycles. Depending on the demand realization, the storage operator may save some energy to mitigate the impact of her market power when selling now and buying again later, may then gamble over the next cycle and may even buy more at the very beginning than in the one-cycle optimum. Even then, buying is the constraining action.