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### ***The Obligation of a Grid Aggregator to Reduce Power Demand: Which Strategies Exist for Adapting Appliance Use During Peak Power Demand?***

In recent years in France, peak power demand has increased faster than electricity consumption. Around peak times, utilities may face production, transport and distribution problems while trying to ensure a constant supply. This leads to high costs and may cause network instabilities. In order to respond to these potential disequilibriums, utility providers can raise instantaneous production as well as adapt the consumption, such as by encouraging the shifting of appliances during critical times for example. Starting with a given power demand reduction target, the question becomes: what are the appropriate strategies needed in order to confront this challenge? We set up a stochastic algorithm so as to design strategies and assess their impact which realistically distributes the start times of the domestic appliances. This method constitutes the core of a load curve reconstitution model. It is a technically-explicit and bottom-up method applied to the residential sector. In this paper, we consider the flexibility such as power limitation, end-use shifting and dynamic time pricing as means of reaching the power demand reduction target. As a case study we consider the washing-machine during peak times. Different scenarios are investigated and assessed. First, each mean is considered exclusively. Then a mix of these strategies is tested. The per customer power demand reduction ratio, the number of customers and the customers' response level are calculated according to the power demand reduction target. The underlying question is therefore examined: is one strategy more effective than another in the power demand reduction challenge?