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**Paper ID:** 190

**Paper Title:** Integration of cloud computing and real-time simulation systems for validating energy management solutions

**Abstract:**

The challenge of operating extremely distributed energy systems has paved the way for the development of cloud based solutions, mainly oriented to monitor, coordinate and optimize their operation. In this framework, it is necessary to define feasible validation pathways to ensure the proper operation of such systems before being massively deployed. This paper showcases the use of real-time simulation and HIL tools as a bridge between cloud based solutions development and deployment in real energy systems, giving rise to a Cloud in the Loop (CIL) architecture. In this paper, the energy management of a residential district involving end-users, generation and storage has been selected as the case study. In this scenario, cloud computing-based energy management strategies are implemented to achieve an optimal use of energy storage devices. In the proposed architecture, the real grid, generators and consumers are simulated in real time while measurements are sent to the cloud, which determines the optimal schedule of the battery and makes real-time monitoring of the system's performance. This setup allows the separation of real data acquisition from the model, so the data sources for consumption, battery and weather can be seamlessly changed without affecting the model.