# AUTOMATED DEMAND RESPONSE FOR COMMERCIAL BUILDINGS IN NEW YORK UNDER DAY-AHEAD HOURLY PRICING

## Project Goal and Key Features

The goal of this project is to demonstrate end-to-end grid integration by automating customer response to reliability and energy pricing signals for large commercial buildings in New York.
The key features include followings.

- Provide continuous energy management solutions to commercial buildings by managing risks associated with day-ahead hourly pricing and demand charges.
- Increase customer choice by allowing opt-out options and control strategy modifications at anytime.
- Implement intelligent control algorithms that optimize energy consumption, demand usage, utility cost, and comfort loss.

## Mandatory Hourly Pricing Tariff in New York

Since 2005, utilities in New York State applied day-ahead hourly pricing as the default tariff to large customers - also known as Mandatory Hourly Pricing (MHP). Under MHP, the cost of energy is calculated based on the customer's actual hourly energy usage multiplied by day-ahead zonal locational based marginal price (LBMP) published by New York Independent System Operator. In addition, customers pay demand charges imposed on the maximum demand of each billing cycle.

Hence, to reduce the total electric bill, customers need to

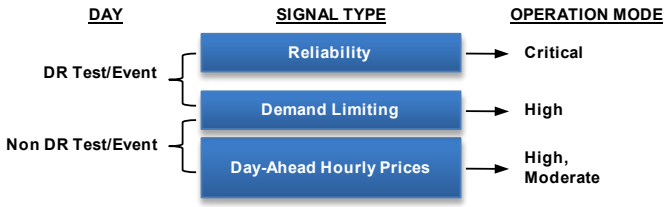
- control their electric consumption according to the hourly price variations and
- limit the building's electric demand during expensive hours.

## Communication Architecture

Open Automated Demand Response (OpenADR) version 1.0 is used to communicate MHP and Demand Response (DR) event notifications to large commercial buildings in New York. The price and DR event signals are sent over the Internet using the Secure Sockets Layer (SSL) protocol.

## Phase I: Simple Load Control

- The Demand Response Automation Server (DRAS) publishes simple operation modes (Normal, Moderate, High, Critical) based on day-ahead price and reliability signals.
- The controller activates pre-programmed control strategies linked to each operation mode via the facility's energy management control system (EMCS).
- DRAS logs the load data at 15-minute intervals via kyz pulses.
- All information exchange is accomplished through a secure Internet connection with 128-bit Secure Sockets Layer encryption.




## Phase II: Dynamic Load Control

Phase II focuses on developing a control algorithm that optimizes customer's energy use according to parameters that are important to the facility's operation goals. The control algorithm resides within the facility and uses the energy price and real-time building information as a feedback for the load optimization.

Min { Energy Price, Consumption, Peak Load, Cost of Comfort Loss }

## Acknowledgement

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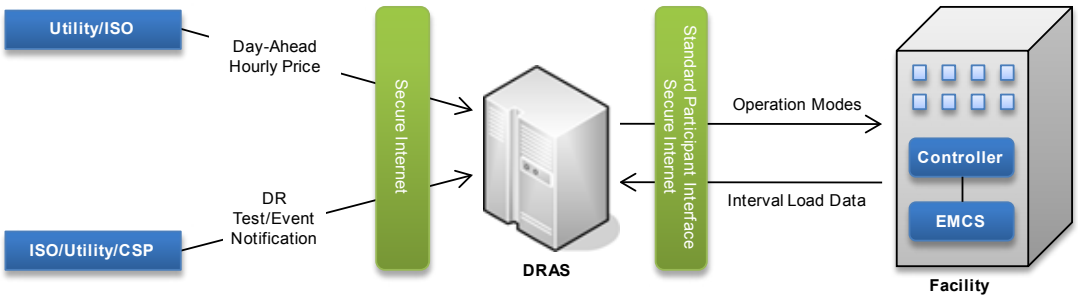


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