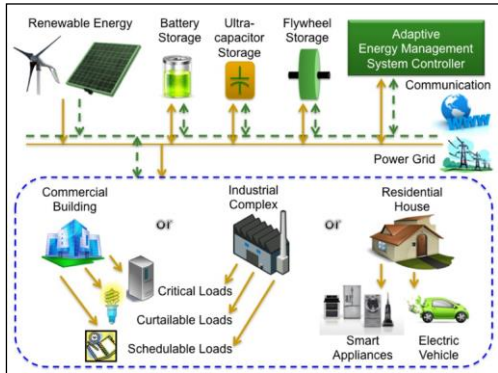


# Adaptive Energy Management Microgrid Control System



Overview of Adaptive Energy Management System.

## Abstract

Merging energy management system control with on-site battery storage and renewable energy sources can yield significant environmental and economic benefits via power flow control between a local microgrid and the external power grid. McMaster researchers have developed a robust rolling horizon controller using mixed-integer-linear-program optimization for electricity energy management control of grid-connected microgrids. A multi-objective optimization based controller was designed to enable both economic benefits, battery management properties, and grid signal shaping features. This design philosophy enables fast system control via a robust counterpart optimization formulation, variable time-step lengths in the prediction horizon, and relaxation of binary constraints. The control process can be embodied within a desktop computer or hardware based embedded system.

## Applications

Application areas include electric power industry, electrified automotive industry, and renewable energy industry. The technology can adaptively manage energy consumption/production in micro-grids involving residential, commercial, and industrial units with or without renewable energy sources. It helps reduce energy costs and the peak demand from the power grid. Moreover, utilities can integrate this technology with local energy storage at their substations to reduce the peak load of distribution transformers and increase the reliability of energy delivery to their customers.

## Advantages

A key of feature of the A-EMS is integration and control of on-site energy storage elements in the form of batteries, ultra-capacitors and flywheels. Our technology seamlessly integrates energy storage elements, renewable energy sources, plugged-in electric vehicles, and smart appliances in a micro-grid.

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13-018

## Inventors

A. Emadi, S. Sirouspour, and P. Malysz

## Patent Status

Issued patents in US and Canada.

US 9,489,701 B2

CA 2,809,011

## Stage of Research

Test data is available.

## Contact

Paul Grunthal, Business Development Manager

905-525-9140 Ext. 26548

grunth@mcmaster.ca