

November 2009

Case Study Intelligent Demand Control and Demand Response Platform from Emacx Systems, Inc.

Introduction

This paper describes how Credit Suisse, NYC is using the Emacx intelligent Peak Load Control (iPLC) System to curtail the energy costs of their Manhattan facility in a highly profitable manner. It will commence with a description of the Emacx iPLC system, followed by an overview of how it facilitates Credit Suisse's participation in Demand Response (DR) programs, including an analysis of the return on investment (ROI) it generates.

The Emacx intelligent Peak Load Control System (iPLC)

Emacx Systems, Inc. currently provides intelligent peak-load control (iPLC) systems to commercial facilities throughout the United States. This system is based on the highly efficient European approach to automatic energy curtailment, where the end-user rarely perceives that any curtailment is occurring. The Emacx iPLC system therefore helps facility managers minimize demand charges while maximizing revenues earned through demand-response programs. As a result, the Emacx iPLC system routinely delivers investment payback periods of less than two years.

The Emacx iPLC system curtails the peak power loads of a facility through a sophisticated feedback-control strategy that anticipates the demands of end-users and utilizes the building management system (BMS). Such popular American systems can be programmed to indirectly curtail power consumption by adjusting the environmental settings of a building, but that comes at the cost of end-user comfort. The Emacx iPLC system, when controlling the BMS system, directly controls the energy-consuming machinery to ensure that aggregate power demand remains below the desired threshold, based on live power input data, while constrained by end-users priorities. As a result, curtailment occurs without imposing new demands on the facility operators, discomfort to end-users, and degrading stress to machinery. By gradually changing the power flowing to individual components, such as air handlers, fans, motors, and pumps, the Emacx iPLC system also avoids the destructive mechanical stresses associated with on-off demand control that both manual operators and BMS systems can generate. The Emacx system thus appears to represent a paradox: it mitigates disproportionately expensive demand peaks, thus generating significant profit during DR events, while maintaining end-user operations and comfort.

Credit Suisse 11 Madison Ave, NYC

Project Background

In November 2008, Credit Suisse decided to install an Emacx intelligent Peak Load Control (iPLC) system at its 11 Madison Avenue (EMA) facility in New York City. A 3,000,000 square feet building with 28 floors, the annual power demand reaches 9,8MW during the summer months. The energy consumption is 68,000,000kWh p.a. The building is characterized by demand peaks, generated primarily by the HVAC Systems and its associated equipment. Two main loads exist:



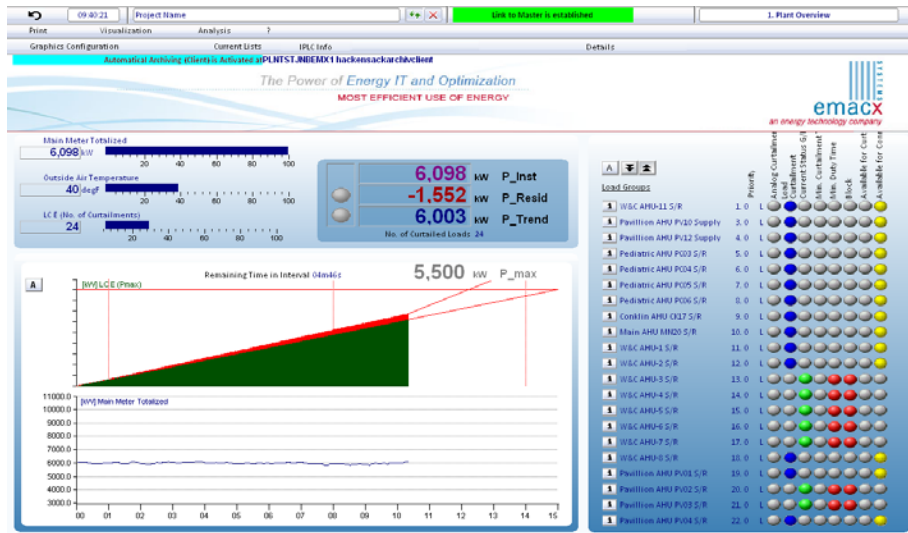
Base Loads: Lighting in common areas, the air-handling units (AHUs), the package units, and other basic infrastructure equipment contribute to the base load. Additionally, the chillers add to the base load.

Variable Loads: Lighting in offices, space conditioning of offices, electric heat of the AHUs and seasonal weather based peak loads from the chillers contribute to the variable kW demand load. The Automated Demand Control System targets the operation of both the base and variable demand loads in the facility to capture energy and demand savings.

The Credit Suisse Corporate facility is equipped with a Siemens Apogee Building Automation System.

Project Description and Purpose

The turnkey installation of an Intelligent Peak Load Control System for the 11 Madison Avenue Building provides a viable platform for both demand reduction and demand response strategies to optimize energy efficiency.



The basic approach of the demand management system involves leveling of the integrated power fluctuations inherent in the operation in any set of equipment, particularly systems that are poorly scheduled, or can work concurrently when that is unnecessary. The demand control efforts for the EMA building focuses on equipment that serves all common spaces.

Typical Power Trend Chart showing the 15min Utility Interval

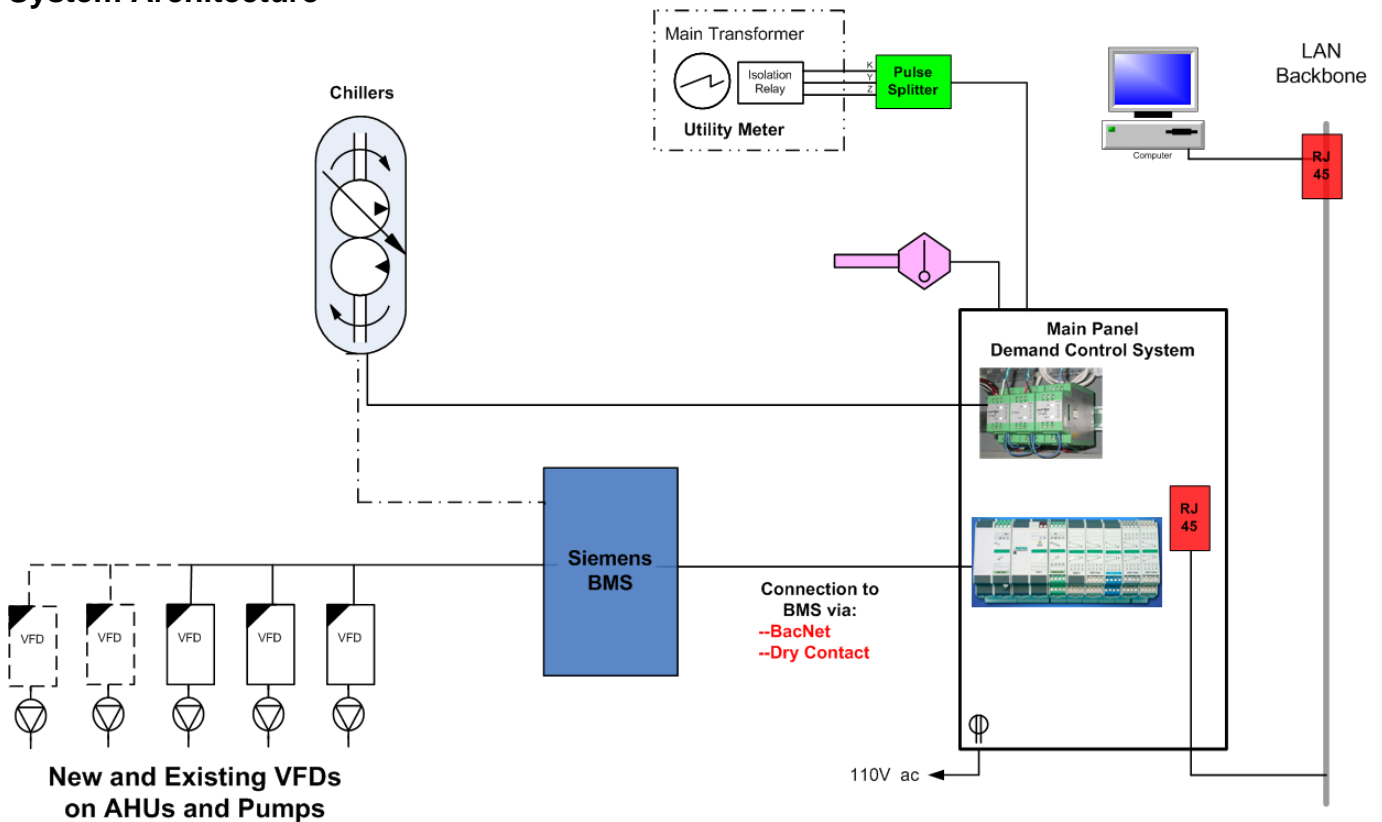
128 Points of Control are connected to the iPLC with a full integration into the existing Siemens BMS. The entire HVAC System and its associated equipment such as chill water and condenser water pumps, air handlers and chillers are controlled. The Emacx Load controller supplies the input interface to the BMS via individual dry contact closure signals. The BMS is programmed to ensure that a continuous input signal, for a given piece of equipment, leads to a curtailment or reduction measure which is graphically indicated on the BMS and the Emacx monitoring system.

Through an advanced scheduler, the system enables the facility manager to program and dictate with ease the sequence of events that are required to participate in DR-Events. Continuous synchronous scanning and load analysis ensures optimum operation without exceeding the preset kW value. The Result: A cost-effective technology to participate in Demand Response Programs without compromising the operations of end users.



The proposed system incorporates existing and newly installed variable speed drives VFDs. The combination of VFDs and Emacx's Automated Demand Control System results in a substantial contribution towards energy savings. For example, a 10% reduction of motor speed will yield 30% electrical power (kWh) savings. Also, such curtailment levels are possible without compromising occupant comfort, or unnecessarily interrupting day to day operations.

System Architecture



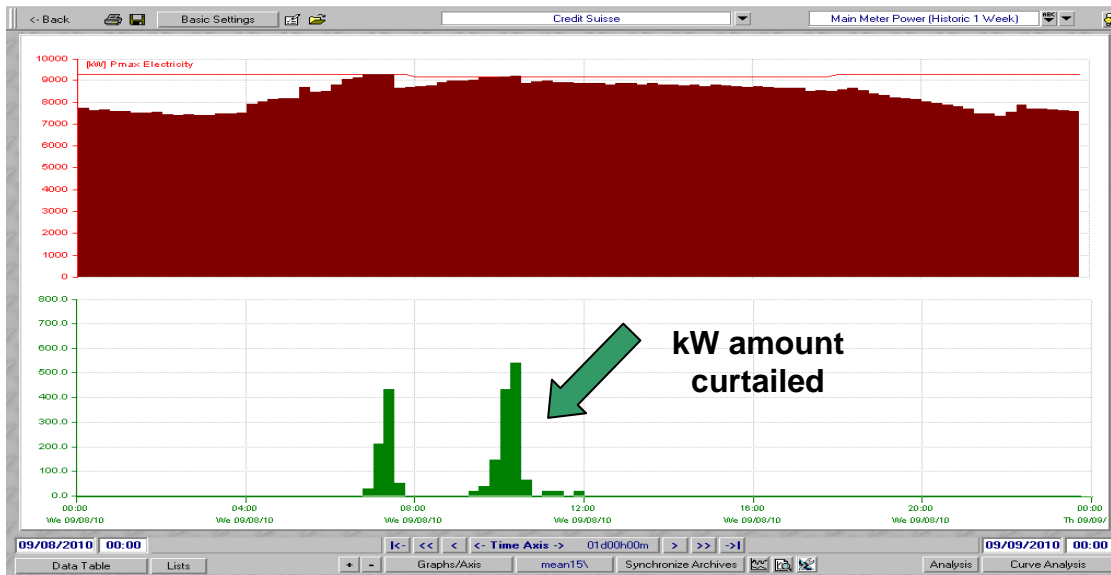
Benefits

The 11 Madison Avenue project yielded, since commissioning, over \$190,000 in savings with a maximum of 745kW peak reduction, 269,420kWh in energy reduction and 266,725lbs carbon foot print (CO₂) reduction. The pay back of the system was less then 1 year. The detailed numbers are as follows:

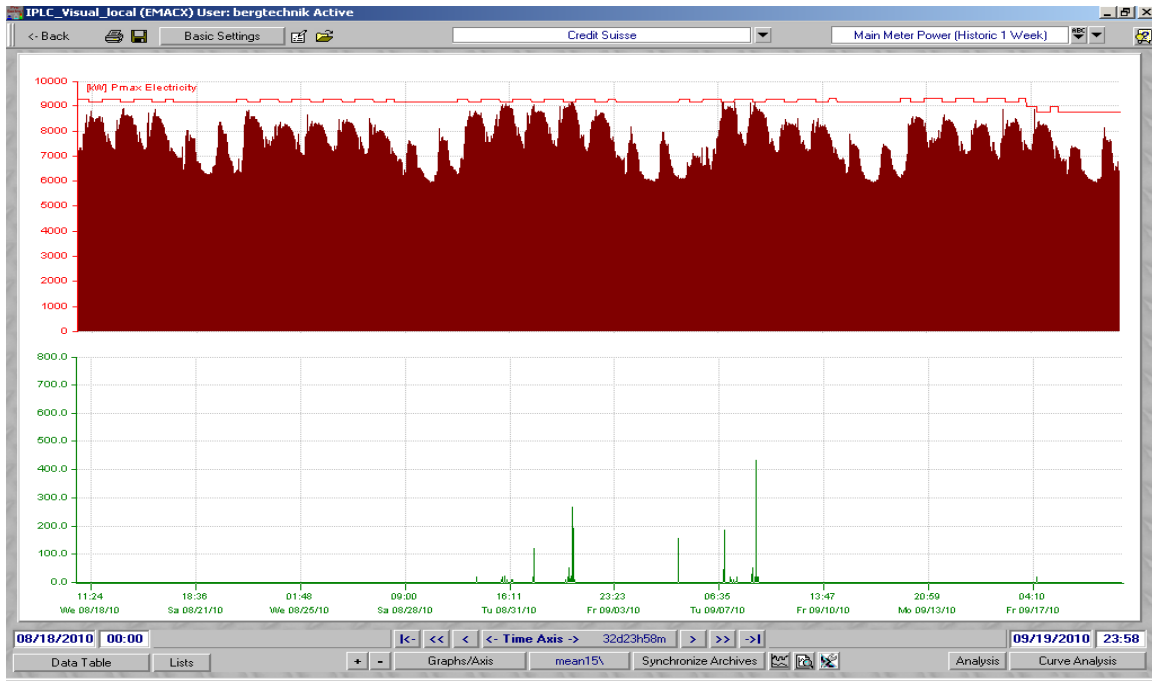
	Actual	Forecasted
Previous Demand Peak	9,500kW	
Peak Demand Reduction	745KW	745KW
NYSERDA Incentive	\$149,059	\$149,059
Demand Response Revenue	\$44,718	\$44,718
Annual kW Savings**	146,581kWh	132,820kWh
Annual CO ₂ Reduction**	145,115lbs	131,212lbs
Annual Savings**	\$109,129,	\$ 88,363
Simple Payback	0.53 years	0.78 years

Note:

** The month of Oct and Nov 2010 are estimated due to missing utilities bills.



Daily Load Curtailment Graph 11 Madison Avenue Building - Curtailed Load 531kW



5 Day Load Curtailment Graph 11 Madison Avenue Building



Pictures



Main Emacx Panel EMA



Main Emacx Panel EMA and Siemens I/O Panel