Background

• The New York State Public Service Commission (PSC) banned Electrical Submetering for residential buildings in 1955 due to landlord abuses.

• With the elimination of submetering as a viable option, Manhattan Plaza begins to explore Energy Management System (EMS) Technology during 1973 as a viable alternative to reduce residents’ energy usage.
Manhattan Plaza EMS Project

- Powerline Carrier (PLC) Technology was employed to control over 3,000 air cooled, through-the-wall, heat pump units and was installed in over 1,600 apartments between 1978 – 1980. EMS still operational to date.

Manhattan Plaza EMS Project Cont.

- Receivers are installed inside each heat pump unit to control unit “on-off” circuit and thermostatic circuit separately in order to maintain equipment warranty.
- Each unit has a “tenant override” to address tenant occupancy and regulatory issues.
- Heat pumps are turned off at various times during the day to provide EMS function.
In 1979 the New York State Public Service Commission (PSC), in order to facilitate energy conservation, reinstates electrical submetering for the following residential cooperatives and condominiums:

- Master Metered
- Directly Metered

And for Master Metered Rental residential buildings, subject to approval of individual application.

In 1996 the PSC amends the voting requirement to require the approval of only a majority of shareholder voters that participate in the vote in a master metered cooperative (or condominium) and 70% of the shareholder voters that participate in the vote in a directly metered cooperative (or condominium) providing that all shareholders have been given adequate prior written notification.
In 1980 the New York State Energy Research and Development Authority (NYSERDA) develops “Demonstration of New Submetering Technologies” Program.

Results of this study are:

- Savings from submetering quantified @ 18% to 26%
- Powerline Carrier (PLC) communications verified as a reliable method of transmitting submetering data.
- New York State adopts ANSI-C12 as a standard for submetering

- “Demonstration of New Submetering Technologies” published by NYSERDA in October, 1986 (Report 86-8)
Consolidated Edison develops Electronic Metering System employing PLC (1982-1986)

- Con Edison and NYSERDA participate in joint development and evaluation of PLC testing conducted at Park Ten and publish, “Automatic Remote Integration Metering Center”, NYSERDA Report 89-6.
New York State Energy Conservation Construction Code (NYSECCC)

This code, revised in 1991 by the State of New York to promote energy conservation, stipulates that whenever more than 50% of a residential master-metered building’s electrical system is renovated, each dwelling unit must be provided with a separate electric meter. Building metering options which conform to NYSECCC code requirements are:

- Direct Metering - No Building Master Meter & No Bulk Rate
- Submetering - Maintain Building Master Meter & Bulk Rate
Consolidated Edison Residential Submetering Program (1990-1995)

- Con Edison contractor provided free electrical submetering technical/economic feasibility studies, attended meetings with building owners, managers and residents and conducted educational workshops.

- Con Edison provided incentives of up to $200 per apartment to residential buildings which implemented electrical submetering.
Facilitating Submetering Implementation

- NYSERDA Program designed to identify and analyze barriers to submetering implementation and to offer recommendations to overcome these barriers.

- Types of barriers addressed included: Regulatory, Utility, Legal, Technology, End User Issues.

- Refer to NYSERDA Report, “Facilitating Submetering Implementation”, Report Number 96-7
Facilitating Submetering Implementation Continued

Recommendations implemented included:

1. Modification to PSC voting requirement for Cooperatives and Condominiums as previously cited.

Dual System (EMS & Submetering)

Installed at Waterside Plaza in New York City during 1997, an all electric, master metered 1,470 residential complex.

Owner wanted Electrical Submetering!
Regulatory Agency wanted EMS which does not require either rent adjustments or dispute resolutions!
Dual System Apartment Installation

- EMS controls relays for heat pumps wired on dedicated branch circuits.
- EMS and Submeter share same powerline carrier (PLC) communications.
- Submeter measures individual apartment kWh.
- EMS provided with tenant override.
Dual System Conclusions

- Wide variation in apartment electricity consumption for same size apartments.
- Submetering is the only FAIR method for allocating electric costs to residents.
- Submetering is likely a more effective energy conservation measure for master-metered buildings.
- Energy Management with overrides but without accountability not as effective.
- Use of Dual System concept effective to address regulatory barriers to submetering.
Results from monitoring Waterside Plaza tended to substantiate general findings from master metered buildings which participated in prior New York Submetering Programs:

- **Group A:** 70% of residents use 50% of total electricity
- **Group B:** 20% of residents use 25% of total electricity
- **Group C:** 10% of residents use 25% of total electricity
Waterside Plaza - Building 10
Range of Annual kWh Consumption by Apartment Size
Thousands

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NYSERDA Funded “Submetering in Multifamily Buildings” Program (1999)

• Provides Technical/Economic Feasibility Studies to residential buildings on a “cost shared” basis.

• Provides for Meetings with building owners, manager and residents in order to provide clarification regarding submetering issues on a “cost shared” basis.
Submetering in Multifamily Buildings
Continued

• Provides Technical Assistance on a “cost shared” basis to participating residential buildings during implementation.

• Provides access to other NYSERDA residential programs such as Cogeneration, Integrated Building Controls and Advanced Metering and Price Responsive Load Management.
Submetering in Multifamily Buildings Continued

- Provides access to “submeteronline.com” website which contains current information regarding both submetering technology and related NYSERDA programs and provides mechanism for buildings to sign up for program participation.
- “Submeteronline.com” is linked to NYSERDA, FNYHC, CNYC and “cogenerationonline.com” websites.
- “Submeteronline.com” receives between 300 to 1,000 requests for information per day.
- Submetering Manufacturers, Meter Reading/Billing Companies and related organizations can become co-sponsors of “submeteronline.com” website.
Factors which impact Submetering Implementation Cost:

- Location of dedicated apartment circuit breakers (C/Bs) or fuses
  - Submeters can be installed in groups if dedicated C/Bs or fuses are in common areas such as the basement or in utility closets, thereby reducing project cost.
  - Also, no apartment access is required during the installation or for reading the submeter.
Factors which impact Submetering Implementation Cost:

- Location of dedicated apartment circuit breakers (C/Bs) or fuses inside the apartment requires location of dedicated submeter inside each apartment in the proximity of the C/Bs or the fuse box, thereby apartment access during installation is required.

- PLC or Wireless communications are available to facilitate remote meter reading.
Factors which impact Submetering Implementation Cost:

- Number of dedicated fuse boxes or dedicated circuit breaker (c/b) panels located inside each apartment (e.g. One original (c/b) for apartment and one (c/b) added for air conditioners) may require additional submeter for each apartment, thereby increasing project cost.
Factors which impact Savings due to Implementation of Submetering:

- **Types of Electrical Loads**
  - Individual Air Conditioners
  - Electric Heaters
  - Electric Hot Water Heaters
  - Electric Ovens

- **Types of Buildings Systems**
  - Central Heating/Cooling such as Steam Absorption System

- **Apartment/Common Area Load Ratio**
  - Submetering impacts apartments only; therefore, the more loads located inside the apartments the greater the potential savings from submetering
Some of the 700+ buildings which are participating in the NYSERDA “Submetering in Multifamily Buildings” Program:
Clinton Hill Apartments, Brooklyn, NY
Park City Submetering Installation

- Apartment submeters are installed in approximately 1,100 apartments under current NYSERDA “Submetering in Multifamily Buildings” and NYSERDA CEM programs.
Integrated Building Control Module
Stevenson Commons, Bronx, New York

The IBCM combines electrical submetering, apartment temperature monitoring (for boiler optimization), building security and fire detection/sprinkler monitoring. Metering data and equipment status available via the Internet.

Stevenson Commons is also a Demonstration Site for the NYSERDA CHP Program and is in the process of installing a Microturbine Cogeneration System.
Integrated Building Control Module

- Miniaturized Electronic Meter (beta unit depicted)
- Integral apartment temperature sensor
- Wireless communications to apartment smoke detector and building fire sprinkler systems
- Apartment meters accessed via the Internet to obtain metering data and equipment status
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NYSERDA Customized Energy Management (CEM) Program

• CEM program currently provides incentives to residential buildings which install advanced meters. Incentives vary but range between $250 to $300 per apartment for implementation costs which exceed $500 per apartment. Program initiated in 2000.

• The CEM program will utilize real time, load aggregation, time-of-day and price responsive signals to economize procurement of electricity and facilitate peak load reduction.
Existing Barriers to Submetering Implementation in New York

1. PSC Voting Requirement for master metered cooperatives and condominiums

2. Lack of Rent Reduction Methodology for master metered rentals with rent stabilized and/or rent controlled apartments
Existing Barriers to Submetering Implementation in New York continued

3. Lack of enforcement of New York State Energy Conservation Construction Code

4. Political ramifications of either mandating submetering or even simplifying the process for owners to submeter
Herbert E. Hirschfeld, P.E. provides technical consulting services to government agencies, utilities, builders and developers of multifamily housing regarding electrical submetering, energy management and cogeneration technologies. Hirschfeld has also provided consulting services to metering equipment manufacturers with regard to marketing of products and end user issues.


Hirschfeld is currently a contractor to NYSERDA providing services under the “Submetering in Multifamily Buildings” program and has developed the “submeteronline.com” and “cogenerationonline.com” websites as mechanisms to provide information regarding these technologies.

With a degree in Mechanical Engineering from the City College of New York obtained in 1960, Hirschfeld worked in the aerospace and private sector until 1974 and has been in private practice since then.