



## **Energy Efficiency and Wireless Communications In Multi-Tenant Buildings**

The significant economic benefits of providing some form of monitoring of energy consumption in large commercial and residential buildings are well documented. Direct and indirect savings can often amount to 25% or more on a typical energy bill invoiced either to the building owner or the occupant of the space within the building. The primary barrier to implementation is often considered to be the up front cost of device and equipment installation. The largest component of this is not the hardware, but the labor to install and configure each device in tenant spaces<sup>1</sup>. “Research done by the New York State Energy Research and Development Authority (“NYSERDA”), a strong advocate of accurate information as a driver of energy efficient behavior in consumers, estimates that installing submeters in master-metered buildings can reduce ....consumption by 18 to 26%”<sup>2</sup>. Further reductions can be achieved by providing technology to permit the consumer to recognize and modify behavior patterns.

“David Kuperberg, the chief executive officer of Cooper Square, compared two co-op buildings he manages on the Upper East Side. Annually, the one with a master meter used 1.38 kilowatt hours per square foot more than the one with submeters, he said, costing an additional \$52,000 a year. Over all, Cooper Square’s 45 or so master-metered buildings have energy costs 14 to 24 percent higher than their submetered counterparts, Mr. Kuperberg said.”<sup>3</sup>

The barrier that residential and commercial property owners have faced was the cost of equipment and installation of the systems to perform the necessary functions to monitor and control energy usage.

Emerging wireless systems offer a substantial lower capital cost to implement both submetering and “smart building” technologies in multifamily residential and multitenant commercial buildings. New intelligent devices and wireless communications technologies are helping to “eliminate these additional cost barriers, often by as much as 70%” according to Hugh Lindsay of Schneider Electric.

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<sup>1</sup> Lowering the Total Cost of Ownership of a Submetering System, Hugh Lindsay © 2006 Schneider Electric

<sup>2</sup> Ibid.

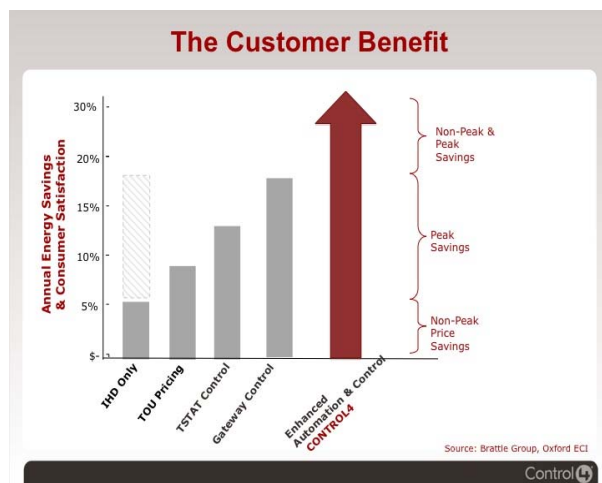
<sup>3</sup> New York Times, August 15, 2010: Air Conditioners That Run When Nobody is Home

The use of wireless systems that are based upon existing IEEE standards such as Wi-Fi (IEEE802.11) and Zigbee (IEEE802.15.4) make the design, installation and deployment easier and significantly less costly. Submeters can be installed at electric panels and utilize “plug and Play” data communications for monitoring via a Wi-Fi backbone within the building. At the same time, devices including thermostats, electric plugs, lights, drapes, etc. can all be controlled wirelessly through a Zigbee based internal network with a minimum of wiring requirements. Control of such a system is done through a remote control device within the apartment or office space, or via the web using an Internet Protocol (“IP”) based approach on a Wi-Fi backbone network.

A typical submeter installation alone costs approximately \$1,000 per panel. A typical “smart building” system for a one bedroom apartment costs approximately \$1,500. Submetering provides the mechanism to levy individual occupants specific electric charges, making the tenant responsible for usage. The “smart building” system gives the occupant the ability to reduce energy costs by modifying behavior patterns through control features.

A typical New York City one bedroom apartment averages \$250 per month for electric usage. If the building apartments were individually metered, the resident would be responsible for the utility bill, and would make the decision as to whether the costs justify the comfort as indicated in the aforementioned New York Times article.

**Figure 1**



Projections of a 25% savings on electric bills for residents is not uncommon for “smart building” implementations. Ahmad Faruqi of the Brattle Group recently indicated that the inclusion of energy efficiency technology coupled with critical peak pricing rates, enhances peak reductions in the range between of 34% and 38%.<sup>4</sup> The resulting payback for just the “smart building” system at 25% (see figure 1) is under two years, and with potential tax credits, could be considerably less. NYSERDA, in part out of concern over the environmental effects

of excessive air-conditioning, is planning to offer building owners financial incentives.

Additionally, according to the New York Times article, a 2009 report said that residential buildings account for 39 percent of the city’s greenhouse gas

<sup>4</sup> Demand Response & Energy Efficiency – The Long View – by Ahmad Faruqi - Goldman Sachs Tenth Annual Power & Utility Conference, August 12, 2010

emissions, and 40 percent of the energy that buildings use is spent on heating and cooling. “Smart Building” systems can be used to reduce the energy use in amenity areas of rental multifamily buildings including hallway lighting, lobby and fitness center climate control and office energy use, thus reducing the building owner’s energy costs. The reduction in “carbon footprint” and warming due to electric usage could also play a significant role in environmental considerations.

Finally, as an additional benefit to building owners and occupants, the same Wi-Fi network that provides the backbone network for both the submetering platform as well as the “smart building” network of devices also provides wireless high speed internet access to the occupants of the building. The average broadband internet plan costs around \$45 monthly, substantially higher than the wireless broadband internet access supplied through the Wi-Fi network. The owner can include a marked up Wi-Fi cost in the tenants’ rent thereby creating an additional revenue stream which will further shorten the breakeven period for the “smart building” network. Smartphones with signal issues caused by “green” building materials, laptops and other devices that are Wi-Fi enabled, are able to smoothly connect and operate on the backbone network, if designed properly. With the current demographic of multifamily dwelling units in urban, dense environments, the addition of mobility and increased capacity through the use of a secure, high quality Wi-fi network serves to enhance the value of the property, provides a valuable service to the residents and reduces energy usage and carbon footprint.