

Bringing energy efficiency to 65% of the commercial market

Building automation's **missing link**[™]

Addressing the barrier to entry of light commercial and mid-market buildings

Buildings of less than 100,000 square feet represent 98% of buildings, and 65% of the floor space, of the commercial real-estate market in the USA. Despite being huge, this market is largely underserved by the building automation industry. According to the U.S. Energy Information Administration's nationwide survey, the penetration rate of HVAC energy management and control systems (EMCS) in this market is 5%. It's even worse for lighting EMCS, which are present in about 1% of these small and medium buildings.

But why such a meager penetration rate in such a big market, especially at a time when rising energy costs are making energy efficiency imperative for building owners and managers?

Building automation systems (BAS) have proven their value with great return on investment in larger buildings, where HVAC and lighting EMCS penetration rates are ten times higher than in small and mid-size build-

ings. So, what is it about those smaller spaces that make BAS less attractive?

Barrier to entry

The relatively low BAS count in light commercial and mid-market buildings is not the result of disappointing energy savings. Building use, materials and systems are the main factors creating potential energy savings, not building size. Retail stores, restaurants, small offices and small schools, just to name a few, are obvious good fits for building automation systems. Taking this into account, if the barrier to entry is not on the end-user side, let's look at the servicer side.

“Although they represent 98% of units and 65% of the commercial floor space in the USA, small and medium buildings of 100,000 square feet or less are rarely equipped with a BAS.”

The end-devices and hardware costs of a BAS are not the barrier to entry either, because they scale with building size; the number of units needed in a sys-

TABLE: Penetration rate of building automation systems according to building sizes

Commercial buildings	HVAC BAS	Lighting BAS	No. of buildings	Surface
Small & medium buildings (100,000 sq.ft. or less)	5%	1%	98%	65%
Large buildings (over 100,000 sq.ft.)	43%	12%	2%	35%

Source: Data about EMCS taken from the Energy Information Administration (EIA)



tem decreases with the space that needs to be managed. The same goes with labor costs; man-hours needed for an installation decrease with building and system sizes.

The piece of a BAS that doesn't scale is the building management system (BMS) – the interface from which the building controls are programmed and managed. Whether software or server based, BMS tend to cost proportionally more to small and medium buildings than to larger constructions. The same goes with system-level gateways – the hardware that brings everything together for the BMS. These “fixed” costs, which represent a higher percentage of the total BAS cost, lengthen the payback period for smaller buildings, which affects negatively on the industry's market penetration rate.

Reducing fixed costs

The key to opening the door to this untapped market rests in reducing the aforementioned fixed costs of BMS and system gateways. This will reduce the total cost of ownership of building automation systems, shorten their payback period and produce the expected return on investment that comes with energy efficiency.

The endeavor is two-fold. First, it requires finding technological solutions to circumvent current limitations. Second, it implies improving on old business models, to better target a clientele that has different needs. The CAN2GO building automation system is one solution combining both the desired feature set and the novel business model to make BAS affordable for light commercial and mid-market buildings. CAN2GO controllers have embedded gateways and servers, and host their own web BMS without charging any license fee.

The embedded solution

A controller with an embedded gateway and web server means that the usual expenses dedicated to application specific gateways and system gateways are drastically reduced or eliminated completely. It also means that the building management system can run directly on the controller, without incurring extra dedicated

server costs or software licenses.

With these features, a complete network of controllers can be made available for management by connecting a single unit to the local area network (LAN). Data logs, scripts, schedules, events and other programming are stored locally on each unit, as well as relayed to their peers. This makes a single unit as autonomous and reliable as a network of many, and vice versa.

“The embedded solution reduces the fixed costs of building automation systems (gateway and software or server costs) by using controllers that are equipped with embedded gateways and web servers.”

Since a single controller can provide the functionalities of an entire BMS, small and medium buildings can benefit from the energy savings of building automation at a much lower cost. Installations of 1, 10, 100 or more controllers are now possible without gateways, dedicated servers and software packages.

Embedded gateway benefits

Besides hardware cost reduction, controllers that are equipped with embedded gateways offer other advantages to system-integrators and facility managers. First and foremost, it can enable a single controller to manage different applications and use different communication standards and protocols.

Controllers are usually application specific – designed for HVAC or lighting. In each case, they require external gateways to bridge to the rest of the system. With the appropriate embedded gateway, controllers can manage both HVAC, lighting, access and metering applications at the same time. They can also simultaneously control end-devices that use different standards to communicate – like Modbus and BACnet for example, or EnOcean and ZigBee if we're talking about wireless end-devices.

The controller with embedded gateway offers more energy savings opportunities than traditional con-

trollers because they are more interoperable and can integrate the best combination of energy efficiency and control products. If they have wireless capabilities, these controllers reduce labor (wiring & repair work) and other installation costs significantly.

Embedded server benefits

Many of you have wireless WiFi routers, at home or at work, from Linksys or another company. If you didn't know, there's actually a web server in each and every one of them – and that server doesn't make them bulky or unaffordable.

The same rules apply for building automation controllers that are equipped with embedded web servers. This is not a revolution; it is simply leveraging mainstream IT practices to empower BAS solutions. You could say it was about time.

Besides their cost incentives, web servers provide mobility and flexibility for managers and servicers, with

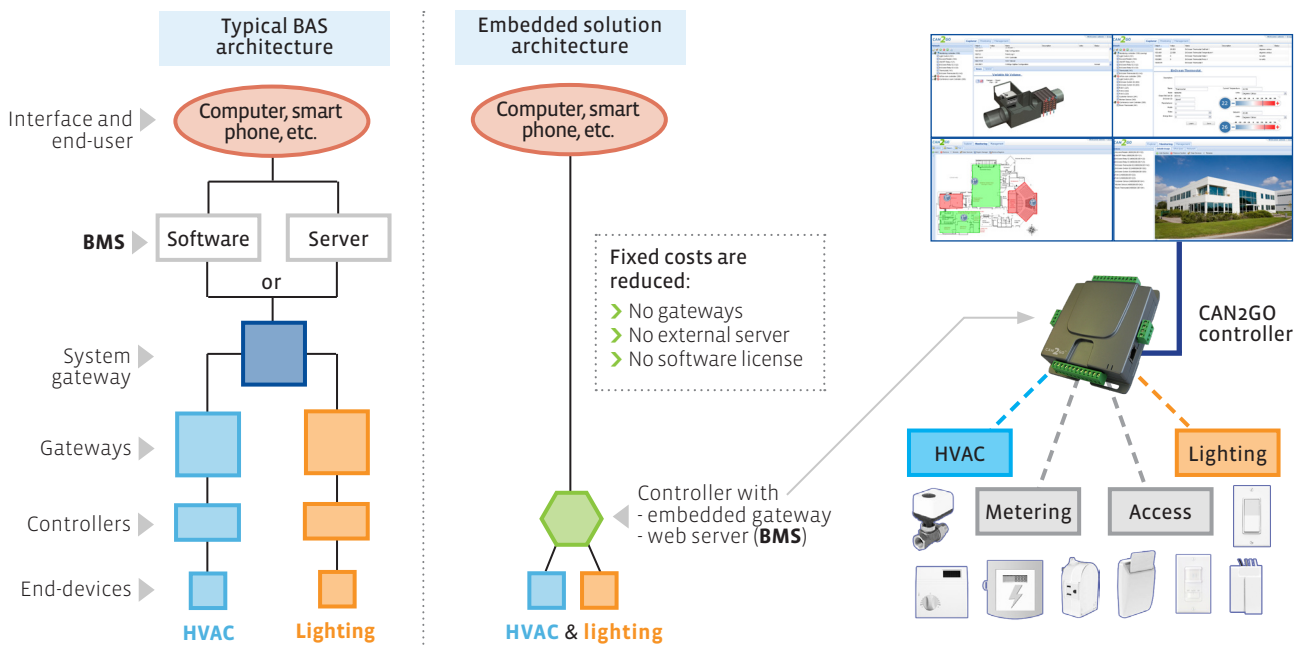
local and remote access via local area networks (LAN). The only “tool” necessary is a web browser. Depending on what kind of BMS is hosted by the controllers, access can also be possible via smartphones, tablet PCs and other similar internet-ready devices. Furthermore, because each controller has local storage (memory), they will continue functioning, with all their programming and trend logging, even if the LAN goes down.

Use cases: retail

There are many use cases where controllers with embedded gateways and servers shorten the payback period for building automation installations in small and medium buildings. One of them is retail of any type: stores, restaurants, garages, banks, etc.

Whether for one or multiple locations, the embedded solution is more cost effective than typical BAS architectures. It provides savings on hardware (gateways) and software or servers. In the case of multiple locations, the controller-hosted web-based BMS allows one

FIGURE: Network architectures compared





person to manage any number of outlets remotely. It is therefore cost-effective both in the installation phase and during its entire lifetime. It also provides the same energy savings that can be expected from typical BAS because there is no loss of control. Even smart grid integration and demand-response applications can be handled with a web-based BMS. In many cases, it actually makes it much easier.

So, for very small stores and their storage areas, 1, 2, 3 or 4 controllers can be sufficient. For larger ones, dozens of controllers can be networked together to provide the necessary control of HVAC and lighting, without excessive expense. The embedded solution is easily scalable – that is precisely why it has been designed.

Use cases: offices & schools

Schools and small offices acknowledge the need for increased energy efficiency, but are hesitant when it comes to building automation because of lengthy payback periods. The projects are big, but not big enough to absorb fixed system costs like a skyscraper would. In this context, the embedded solution offers the right kind of payback and ROI.



Use cases: telecommunication equipment and utility substation buildings

Those little “bunkers” are literally everywhere, and they need heating in the winter and air conditioning in the summer to keep the equipment they store in working condition. Telecommunication equipment and utility substation buildings can use BAS, but are way too small to justify the cost of any traditional BMS. This is another perfect fit for the embedded solution.

Ripe for the picking

Small and medium buildings are affected by rising energy prices and receptive to the financial and social arguments of energy efficiency. Now that adapted solutions, like the CAN2GO building automation system, are available, this market is wide open.

If you are a system integrator, you’ve just found a way to significantly expand your business. If you are a light commercial and mid-market building owner or facility manager, you’ve just found the solution you were looking for.



for more information, contact CAN2GO

5800 Saint-Denis, Suite 222, Montreal, Qc, Canada, H2S 3L5 T:+1.514.313.8885 F:+1.514.313.8894 info@can2go.com www.can2go.com

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