

# SOLUTION BRIEF

Intel® IoT  
Smart Buildings



## Reduce Energy Costs and Carbon Footprint with Smart Building Management

**Tatung, Elitegroup Computer Systems (ECS), and Intel create a comprehensive, effective, green building management solution. Even newly constructed buildings are seeing energy savings.**

“Smart building technology investments typically pay for themselves within one or two years by delivering energy savings and maintenance efficiencies.”<sup>1</sup>

Dan Probst, Chairman,  
Energy and Sustainability Services,  
Jones Lang LaSalle

### Addressing Energy Efficiency Challenges

Building automation solutions have been around for years, but their high cost has traditionally been difficult to justify for many commercial, industrial, and institutional facilities. Now, more affordable technologies and the Internet of Things (IoT) are being used to drive down cost, add new capabilities, and change the market dynamics for building management.

Tatung Co., in collaboration with Intel and Elitegroup Computer Systems (ECS), developed an IoT-based solution using an intelligent gateway that brings energy savings to businesses, minimizes power and water consumption, and provides superior tenant services. This Smart Building Management System (SBMS) is helping to improve occupant experience, while supporting environment-friendly practices.

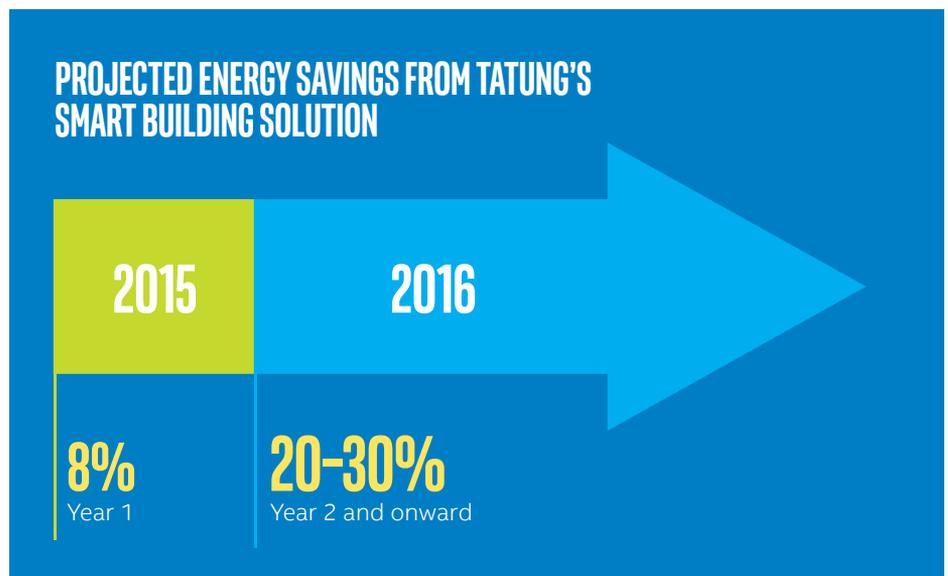


Figure 1. Tatung's smart building solution is helping ECS save energy.

## Concern for the Environment Drives Improvements in Building Efficiencies

Reducing energy consumption is good for both the bottom line and the environment. It can also be essential for compliance with government initiatives. For example, in Taiwan, the government is actively promoting conservation programs with a target of increasing energy efficiency by 33 percent by 2025.<sup>2</sup> In the U.S., 30 percent of the energy used in an average commercial building is wasted, so the potential to reduce energy consumption is enormous.<sup>3</sup> The U.S. Environmental Protection Agency's Building Technologies Office (BTO) is targeting a 20 percent energy use reduction in commercial buildings by 2020, and even greater savings by 2030.<sup>3</sup>

Tatung's Smart Building Management System (SBMS) offers a cost-effective way to reduce the amount of energy wasted in commercial buildings. For example, an implementation of Tatung's SBMS at ECS is expected to save them about eight percent in power usage during the first year and around 20 to 30 percent thereafter, following further efficiency enhancements (Figure 1).<sup>4</sup>

## Smart Buildings. Satisfied Tenants.

Common smart building use cases cover a wide range of building management issues. Making buildings smarter can have a positive impact on both operations and tenants.

### Smart Energy Management<sup>4</sup>

- **Public Areas:** SBMS avoids unnecessary heating and cooling in public areas based on the preferences and behavior of occupants, potentially reducing energy usage by 10 percent, even with the most efficient HVAC units. Another 10 percent can be saved by the solution's predictive capabilities, which allow for higher average temperatures in summer and lower temperatures in winter.
- **Conference Rooms:** Following a thorough analysis of the building systems, the SBMS can be configured to turn equipment on/off throughout the day to minimize energy consumption. For instance, lighting and HVAC systems could be turned off when meeting attendees leave a conference room. Automatic operation can be overridden manually.
- **Elevators:** The solution takes advantage of regenerative motors in elevators to pump current back into the electrical network when they are going down, thus cutting total energy usage by 10 to 35 percent.
- **Swimming Pools:** The cost of heating a swimming pool can be reduced by 20–30 percent with energy-efficient heat pumps that move heat from one place to another, instead of generating heat themselves.
- **Renewable Energy:** The SBMS enables companies to use less energy, reuse rain water, and utilize renewable energy sources, such as solar.

## Improving Tenant Experience

- **Scheduling Management:** The SBMS schedules lighting and air-conditioning systems to turn on/off for offices, conference rooms, or classrooms. Automated scheduling makes it easier to achieve energy-saving goals, because it does not rely on human intervention. It can also be overridden, as needed, for one-time or periodical requests.
- **Electricity Sharing:** When multiple organizations share a building, the smart building solution can calculate each organization's energy usage and charge the corresponding cost to the associated financial department. These costs can be assessed by meter reading value, fixed amount, or percentage.
- **Energy Saving Management:** Energy-saving units can be used as a metric to measure progress towards achieving energy efficiency goals. The SBMS monitors these units, along with providing alarm and scheduling functions, to help building managers conserve electricity.
- **Energy Consumption Analysis:** The SBMS provides demand and consumption by period and device in table summary. The solution analyzes energy-saving performance in accordance with the energy-savings unit trends.
- **Energy Demand Management:** The SBMS monitors energy consumption on a per-control-system basis and automatically manages power usage to avoid exceeding contractual energy consumption limits and incurring fines.
- **Smart Meeting Room:** Data analytics are used to optimize the conference room environment based on user behavior. The SBMS accesses the conference reservation system, handheld devices, lighting system, projection equipment, office furniture, and the air-conditioning system. It analyzes this data to determine what adjustments the occupants are making and how resources are being used. This analysis provides a better understanding of usage models and allows the building manager to optimize the system to satisfy occupant preferences.
- **Smart Parking:** Using the SBMS, VIP visitors can find parking spots more quickly. Thanks to a reservation system that manages guest information, such as name, license plate number, and time of arrival, a personalized parking experience can be provided for visitors.

## Increase Energy Efficiency, Even in New Buildings

Newer commercial buildings are typically energy-efficient, benefiting from significantly improved windows, lighting, insulation, advanced heating, ventilation, and air-conditioning (i.e., HVAC). This can make meeting mandates to continue increasing energy efficiency more difficult—the easy enhancements have already been done. Providing the means to reduce energy usage further, the SBMS performs ongoing measurement and verification of energy usage, allowing for continuous improvements through:

- **Demand Response:** By communicating in real-time with utilities, smart buildings can reduce energy usage during peak utility loads, thus enabling building managers to take advantage of lower utility rates and credits.
- **Green Building Concept:** By coordinating the operation of both new and old building equipment (e.g., HVAC), energy can be saved by running energy-efficient equipment more frequently and energy-inefficient equipment less often.
- **Data Analytics:** By performing data analytics in the cloud, building managers can better understand occupant behavior and schedules, allowing them to turn off building systems (e.g., HVAC, lighting) when not needed.
- **Visibility and Manageability:** By using the solution's dashboards and sophisticated analysis and control functionality, building engineers can more efficiently and effectively manage building systems.

## Intel®-Powered SBMS Solution

Tatung's SBMS collects building data from environmental sensors (temperature, humidity, and occupancy) and equipment (HVAC, heat pumps, and lighting), analyzes the data, and then controls the equipment operation based on tenant and building management requirements. ECS intelligent gateways, powered by Intel® processors, collect data from building devices and equipment, and send the data to a Supervisory Control and Data Acquisition (SCADA) system and into the SBMS. The SBMS then analyzes the data and determines how to control the building equipment to match the tenants' requirements. The SBMS next automatically changes equipment operation. There is no need for human intervention, although the system can be overridden for manual control, if required.

The SBMS handles both energy and building management, performing a wide range of functions related to power, lighting, air conditioners, environment, heat pumps, and building access.

### ECS INTELLIGENT GATEWAY

The ECS GWS-QX\* intelligent gateway connects energy management systems to commercial building devices, integrating old and new building equipment, and enabling affordable energy conservation. The gateway is based on an Intel® Quark™ SoC and the Wind River Helix Device Cloud\*, allowing it to be rapidly deployed and provisioned, and easily managed throughout the system lifecycle. ECS takes advantage of Intel's powerful processors and software to securely manage gateways. The choice of Intel processor-based intelligent gateways also helps ODMs and software vendors deploy solutions seamlessly, without having to replace the existing infrastructure.



## SBMS Architecture

The SBMS architecture shown in Figure 2 uses the ECS intelligent gateway based on the Intel® Quark™ system-on-chip (SoC) to collect data from building sensors, devices, and systems, and sends the data to the cloud through a supervisory control and data acquisition (SCADA) network. Tatung's SBMS processes the data and helps building managers measure and control energy consumption.

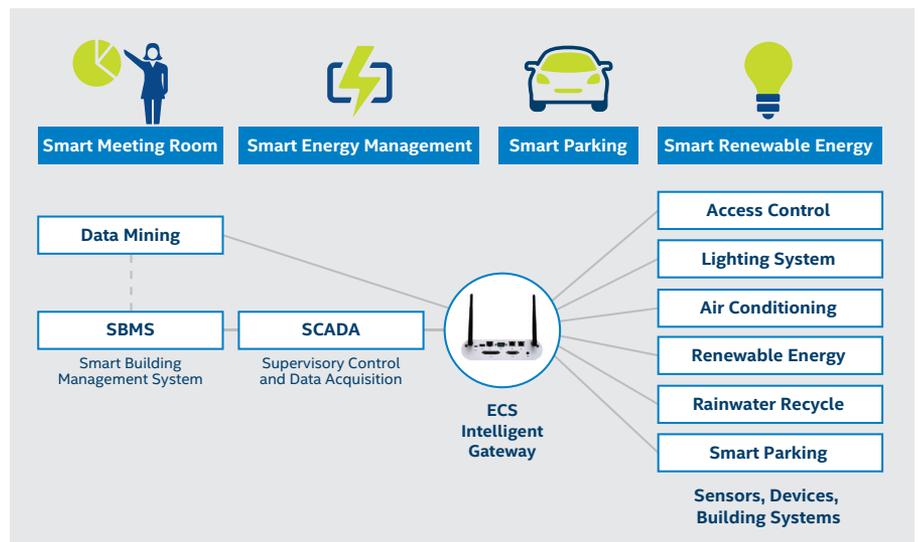


Figure 2. Tatung Smart Building Management System\* architecture

## Moving Buildings Forward

Tatung SBMS integrates IoT architecture to realize the benefits of a smart building. As a flexible solution, it can be used in many types of buildings, including as factories, schools, hospitals, and office space. The solution not only makes physical life more convenient and comfortable, it also makes it easier to conserve energy for a more sustainable future.

## Learn More about IoT

For more information about IoT solutions from Elitegroup Computer Systems (ECS), visit [www.ecs.com.tw](http://www.ecs.com.tw).

Tatung capabilities are listed at [www.tatung.com/en/investment\\_taiwan.asp](http://www.tatung.com/en/investment_taiwan.asp).

To learn more about Intel solutions for smart buildings, visit [intel.com/iot/smartbuilding](http://intel.com/iot/smartbuilding).



1. Dan Probst writing for Greentech Media, "The Business Case for Smart Building Technology," October 8, 2013, [greentechmedia.com/articles/read/the-business-case-for-smart-building-technology](http://greentechmedia.com/articles/read/the-business-case-for-smart-building-technology).

2. Asia Europe Energy Policy Research Network on Taiwan, October 23, 2013, [aeeprn.com/countries/asia/rest-of-asia/taiwan-\(republic-of-china\)](http://aeeprn.com/countries/asia/rest-of-asia/taiwan-(republic-of-china)).

3. Energy.gov website, "About the Commercial Buildings Integration Program," [energy.gov/eere/buildings/about-commercial-buildings-integration-program](http://energy.gov/eere/buildings/about-commercial-buildings-integration-program).

4. ECS data.

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