

Electric Energy Saving with MERS Fluorescent Lamp Dimming Controller IVM-18 Zone Control type MERS series

This document will be modified without any notification.

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Super Security Solutions Co., Ltd.

Over 40% Electric Power Saving for Fluorescent Lamp

Customer's Objectives

- Save electric power consumption by dimming
- Healthy ROI by minimized investment

Technical Approach

- Retrofit of MERS Controller on conventional fluorescent lamp system (magnetic ballast)
- Improved magnetic ballast if necessary
- Cluster dimming control of lamps

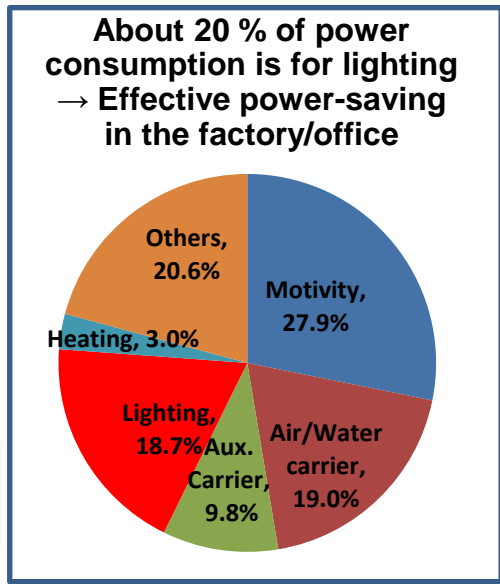
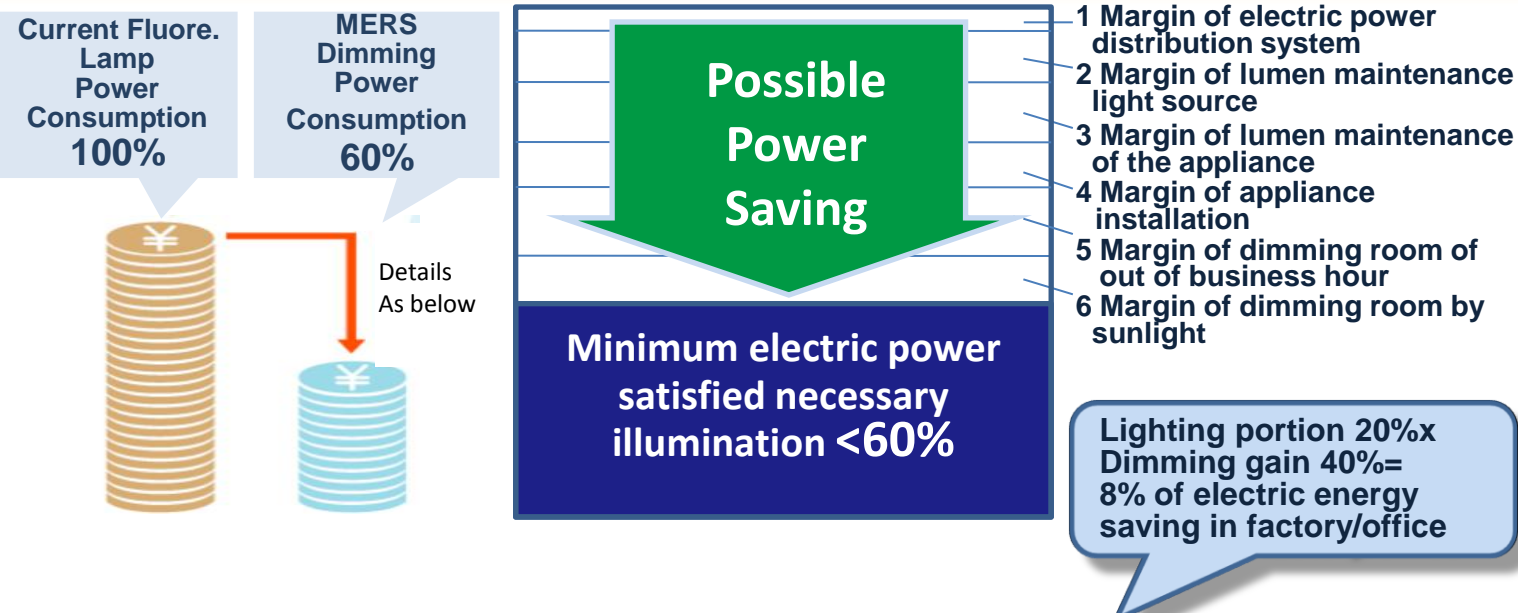
Benefit

- Decreased electric power consumption / Minimum investment / Extended useful life / Less EMI

Functions

- Dimming Rate : over 40%
- Cluster : Up to 28 lamps (AC200V)
- Controller : Interface to LAN is available

Big Energy Saving by Dimming



Effects by the Demonstration Experiment (Present situation :100%)

	Current		MERS Dimming
Electric Power	100%	➤ Electric Power Reduction	60%
Fixed Point Illumination	100%		60%

Wiring=Existing
Fixture=Existing
FL lamp= Existing

Fixture=Magnetic Ballast
FL lamp=Glow/Rapid

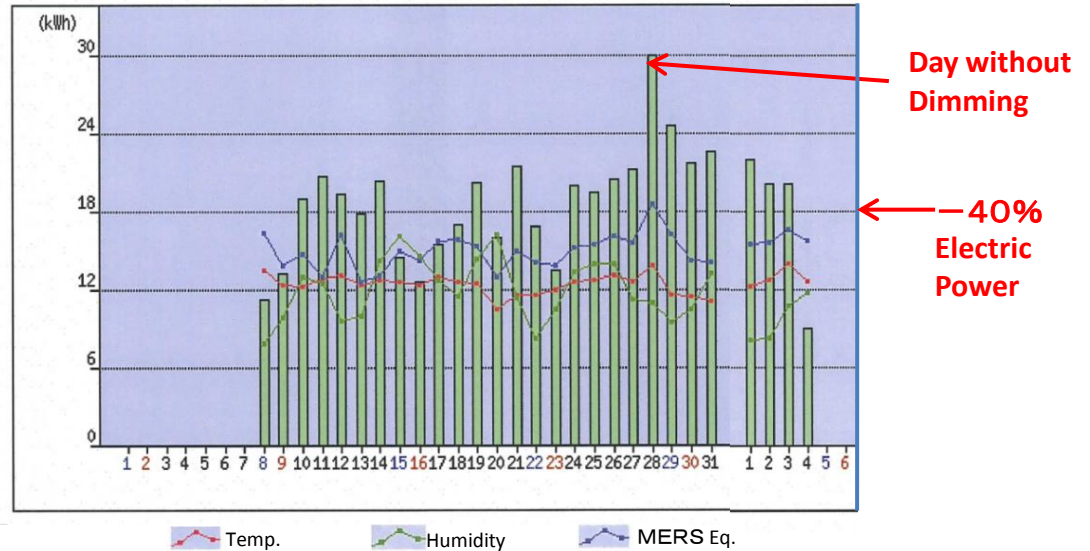
Example of Installation Site of MERS Dimming System

MERS Installed Office



Electric Power Saving Effect Measurements by MERS Dimming

Log of the power consumption for 1 month:
Power-saving effect exceeds average of 40 %



MERS Dimming Controller



Effects by the Demonstration Experiment

Place	Experiment Result
Nippon Steel Corporation	Ave.40% Elect. Power Saving
US Navy, Office of Naval Research (Tokyo)	Ave.39% Elect. Power Saving
Tokyo Institute of Technology	Ave.35% Elect. Power Saving

Evaluation by Third Party (US Navy, Office of Naval Research)

Magnetic Power Offers Energy-Saving Alternative

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FOR IMMEDIATE RELEASE: Sept. 23, 2010

By Rob Anastasio
ONR Corporate Strategic Communications

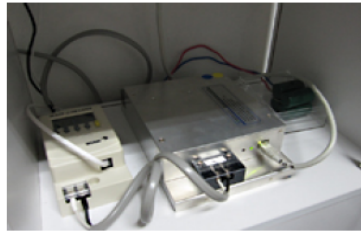
ARLINGTON, Va. -- The Office of Naval Research Global ([ONR Global](#)) continues to pursue aggressive energy goals established by Secretary of the Navy Ray Mabus, with the design of a system that controls electrical flow for lighting, a highly efficient platform that may spark a new era of power savings.

Designed by the Tokyo Institute of Technology and fine-tuned by researchers at MERSTech in partnership with the [ONR Global's office in Tokyo](#), the Magnetic Energy Recovery Switch (MERS) harnesses and recycles residual magnetic power that is produced by electrical current. By using a device that controls the flow of electricity, light bulbs can now maximize their potential. The proposal for the expanded experiment is scheduled for completion in October.

Dr. Chandra Curtis, program officer in ONR Global's Tokyo office, said she is excited about the potential for mass consumption savings.

"We initially started by helping [MERSTech and the Tokyo Institute of Technology] optimize the development and assess the potential of the technology," Curtis said. "Now, we are looking for ways to demonstrate our commitment of energy savings to the Japanese government."

This technology directly aligns with Mabus' goals for the Department of the Navy, which were set at the [2009 Naval Energy Forum](#). Aside from utilizing renewable power sources for at least half of the shore-based energy on Navy bases, Mabus iterated a goal to ensure that at least 40 percent of the Navy's total energy consumption comes from alternative sources by 2020.



From April to June 2010, ONR Global funded a series of experiments at Tokyo's Hardy Barracks Installation to analyze and evaluate the energy saving capability of the MERS lighting controller. After working with several overhead fluorescent lights that require 24-hour power, scientists proved that the MERS technology significantly reduced lighting energy consumption.

"After the testing was complete, we learned that with the new device installed there was a peak power saving of 39 percent," Curtis said. "The device not only conserves electricity, but produces far less heat and produces less electromagnetic interference than conventional technologies."

A proposal to apply the experiment to the entire Hardy Barracks Installation will be completed by the end of October 2010, carrying the project into 2011 if approved. Proposed testing areas include a break room, printing press room, laundry room, gymnasium and several offices.

"In trying to align with the Joint Statement of the U.S.-Japan Security Consultative Committee, scientists are trying to help reduce the impact on local communities by reducing the energy footprint of existing U.S. installations, becoming more responsible stewards of the environment," Curtis said.

The U.S. Energy Information Administration estimates that in 2008 about 517 billion kilowatt-hours of electricity were used for lighting by the residential and commercial sectors. Lighting accounts for nearly 20 percent of the average home's electricity use, according to the U.S. Environmental Protection Agency.

About the Office of Naval Research

The Office of Naval Research provides the science and technology necessary to maintain the Navy and Marine Corps' technological advantage. Through its affiliates, ONR is a leader in science and technology with engagement in 50 states, 70 countries, 1,035 institutions of higher learning and 914 industry partners. ONR employs approximately 1,400 people, comprising uniformed, civilian and contract personnel with additional employees at the Naval Research Laboratory in Washington, D.C.

Source: <http://www.onr.navy.mil/Media-Center/Press-Releases/2010/Magnetic-Energy-Recovery-MERS.aspx>

Effectiveness of MERS Fluorescent Lamp Dimming

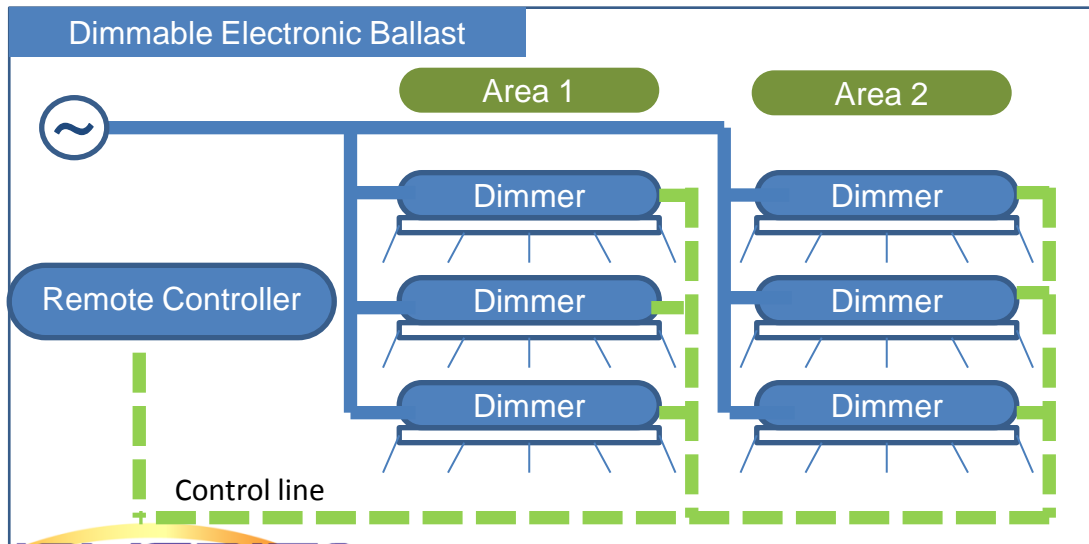
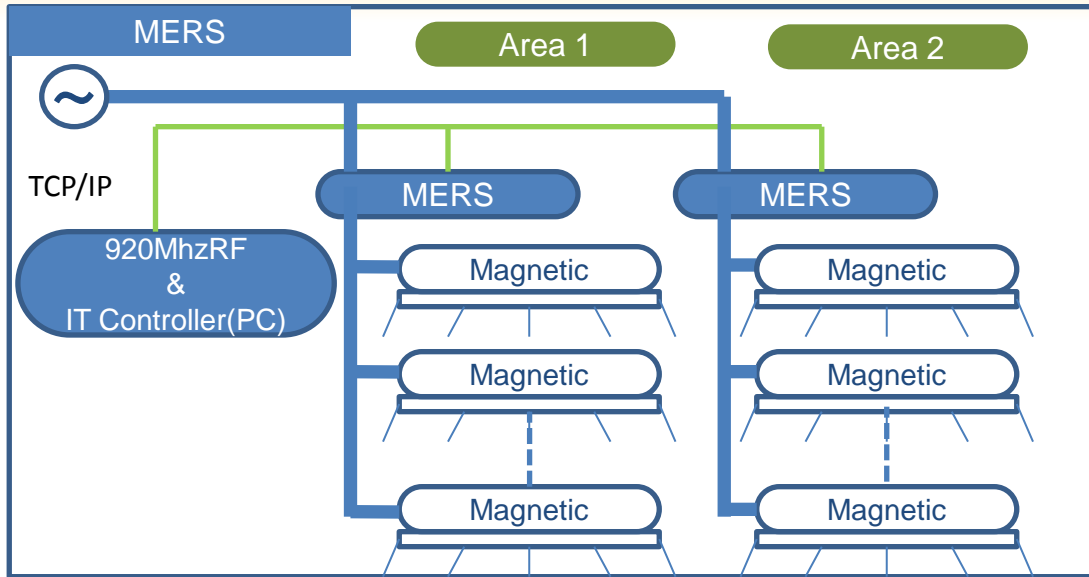
Reduction Target	Feature of MERS	Effectiveness
Electricity CO2	Dimmable (Over 40%)	Easy brightness control according to place, time and occasion individually. No-thinning of apparatus ensures uniform illumination.
	Reuse Retrofit Lighting Apparatus	Adoption of MERS controller on conventional retrofit fluorescent lighting apparatus. Reuse retrofit lighting apparatus makes no scrap and low lifecycle energy.
	Longer Life	Extending of replacement cycle of lamps and ballasts enhances ecological advantage (low lifecycle energy).
Cost	Cluster Control	Cluster dimming control of up to 28 lamps reduces quantity of dimming equipments and amount of installation works.
	Dimmable	Saving electric power consumption by dimming. Reduction of contract demand. Healthy ROI by minimized investment.
	Affinity with IT	Dimming based on the demand of brightness with interface to LAN reduces electricity. Demand control makes reduction of contract demand.
	Reuse Retrofit Lighting Apparatus	Reuse retrofit lighting apparatus makes simple additional fitting work of MERS dimming equipment.
	Reduce frequency of replacement	As tube and ballast will be longer life, labor and replacement material costs can be reduced.
Noise	Less Noise (Less Heat)	Avoiding of adversely affect for electronics equipment by less EMI, medical institution, precision instruments factory, and railway facility can be dimmable.

-MERS dimming system for HID lamps (mercury lamps, sodium lamps and metal halide lamps) is the final stage of product development. It will be available soon.

Advantages of MERS

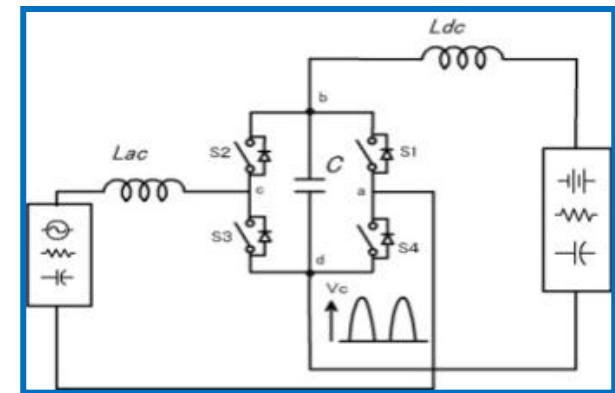
	Electronic PWM (Dimmable)	MERS + Magnetic Ballast(Dimmable)	Magnetic Ballast (Not Dimmable)
Dimming		Yes	No
Ballast Replacement	Required	Not Required	
Initial Cost	Very High	Low - can use magnetic ballast	
Product Lifetime	4 to 6 years	10 years and more	
Lifecycle Cost	Very High	Very Low - 60% less than electric in 10yrs	
Switching Loss	High	Very Low or Nothing	
Lighting Efficiency		20% and more Improvement	No Improvement
Wiring	2+2 wire	2 wire only	

Competitive analysis : MERS vs Dimmable Electronic Ballast



MERS Advantages (Estimated)	
Less Controller	90% less
Less wiring	50% less
Less Maintenance	60% less
High Reliability	
Retro-fit	

Original MERS Circuit



SE-81 MERS Controller Specification (Tentative)

	Description	Note
Lamp	Fluorescent 20W to 110W (T5-T12)	High output lamps are not recommended
Ballast	Magnetic steel ballast, grow and rapid/instant preheat type	Electronic ballast is not applicable
Operating voltage	AC85V up to 264V 50Hz/60Hz, DC not permitted	100V or 200V auto adjustment
Load capacity	10A current load max	Ex. 40W/200V tube, 28 tubes
MERS capacitor	10uF to 100uF film capacitor	According to load inductance
Parallel connection units	No limited number of apparatus, same electric characteristics are required in the same MERS segment	For stable dimming
Fuse protection	15A	
Operating temperature	+5degC to +40degC (+41degF to +104degF)	
Operating humidity	25% to 80%RH	
Protection class	IEC IP20	Installed in wall mounted panel Or inside of Fluorescent tool
Protection mode	Overheat, capacitor over voltage, current overload	
Dimmable range	10% to 60%	Basically continuous power consumption
Dimensions, weight	Refer other document	About 9.0 inch x 2.5 inch

IVM-81 MERS Dimming System

Configuration

Replacement:

- Magnetic Ballast
(if necessary, Lamp/Glow Starter)

Remaining:

- Lighting Fixture/Wiring

Cluster Type MERS Dimming Controller

MERS is inserted between power supply and fluorescent lighting fixtures in series (Dimming rate is adjustable by Switch or PC or Remote Controller)



**Electric Power : 30~50% save
vs existing apparatus**

Application Area

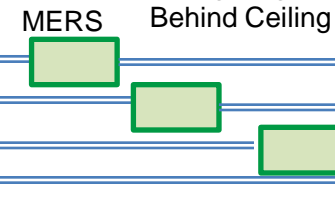
- Factory
- School/Public Space
- Commerce Facility
- Parking Lot
- Railway/Ship
- Plant Factory
- Advertising Display
- Road/Tunnel

Fluorescent Lighting Fixture



Control Software (Wireless Control)

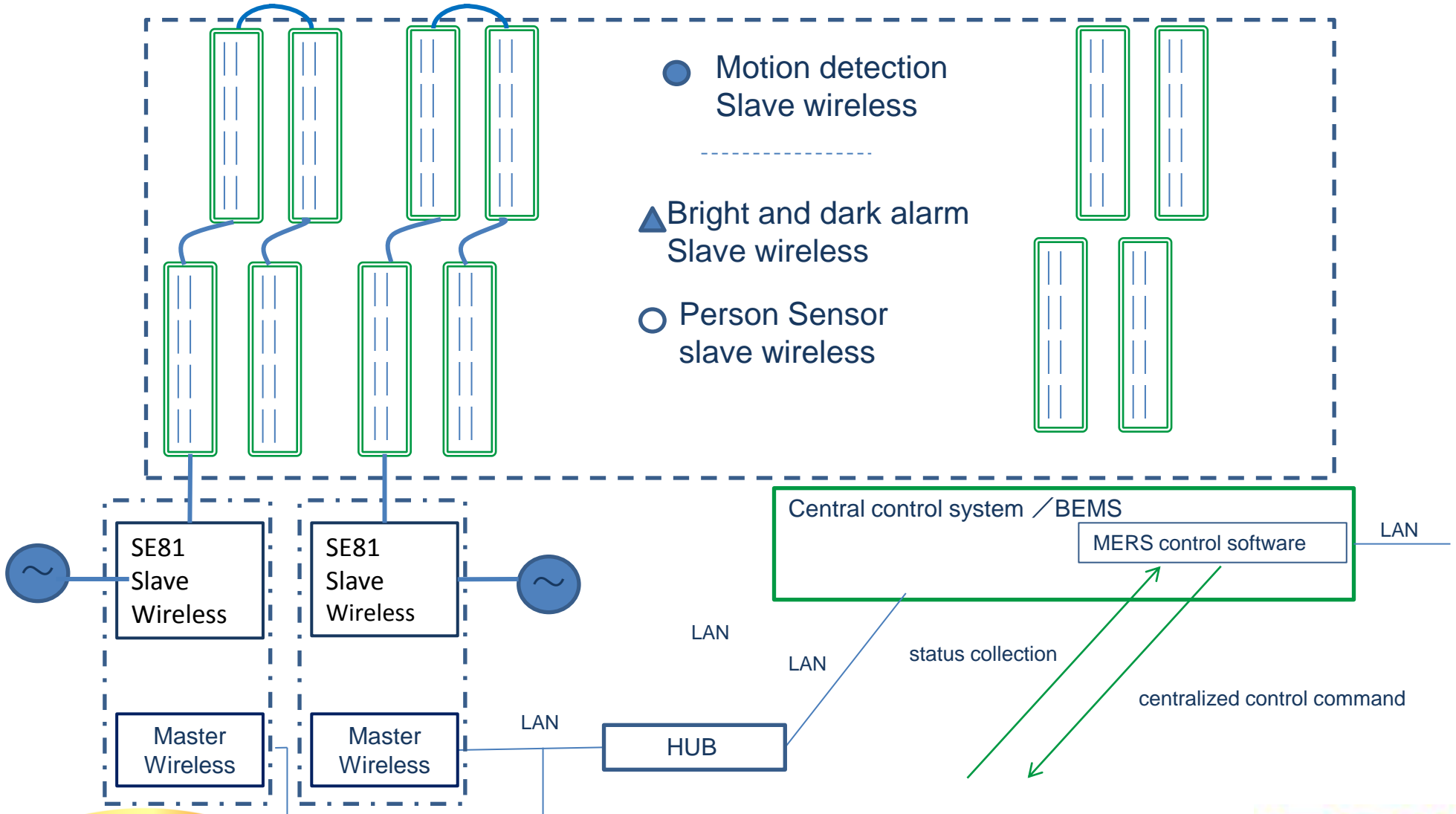
(In Lighting Fixture,
Behind Ceiling or on Wall)



Distribution Panel

Automatic Control through wireless LAN

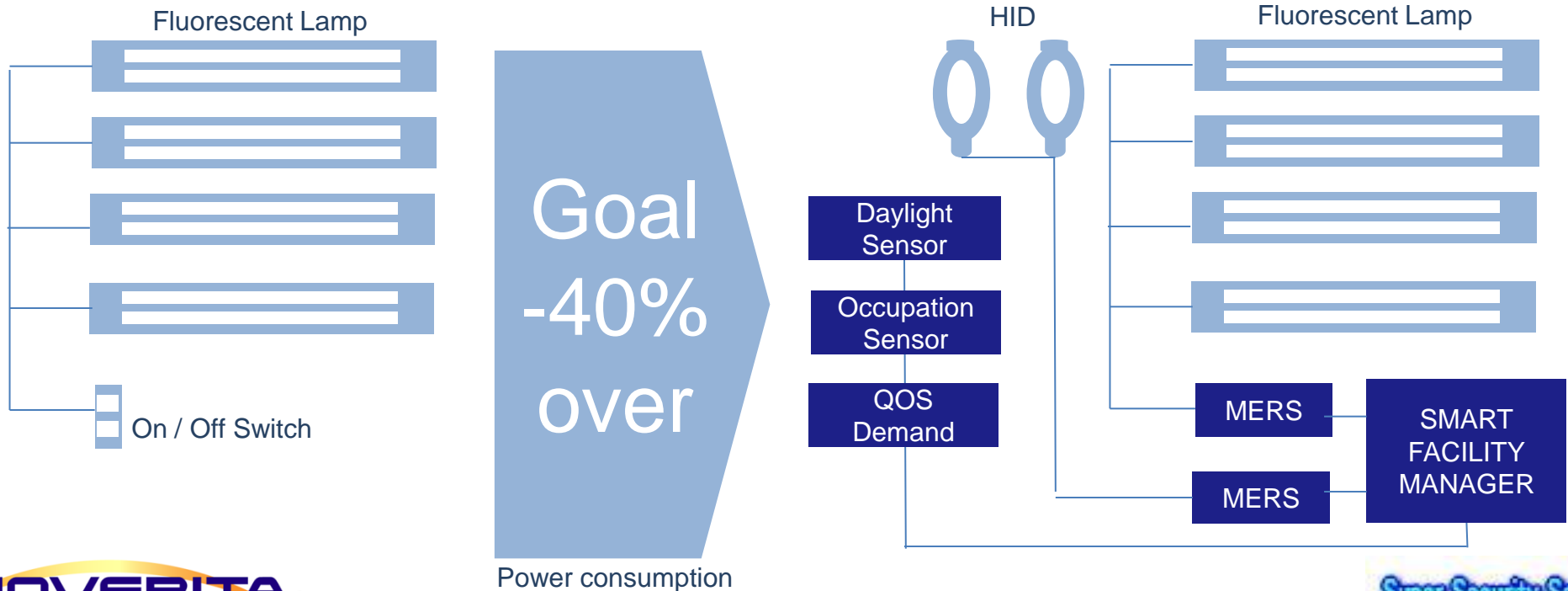
Only using the standard Wireless network infrastructure



Integration with Smart Facility Manager

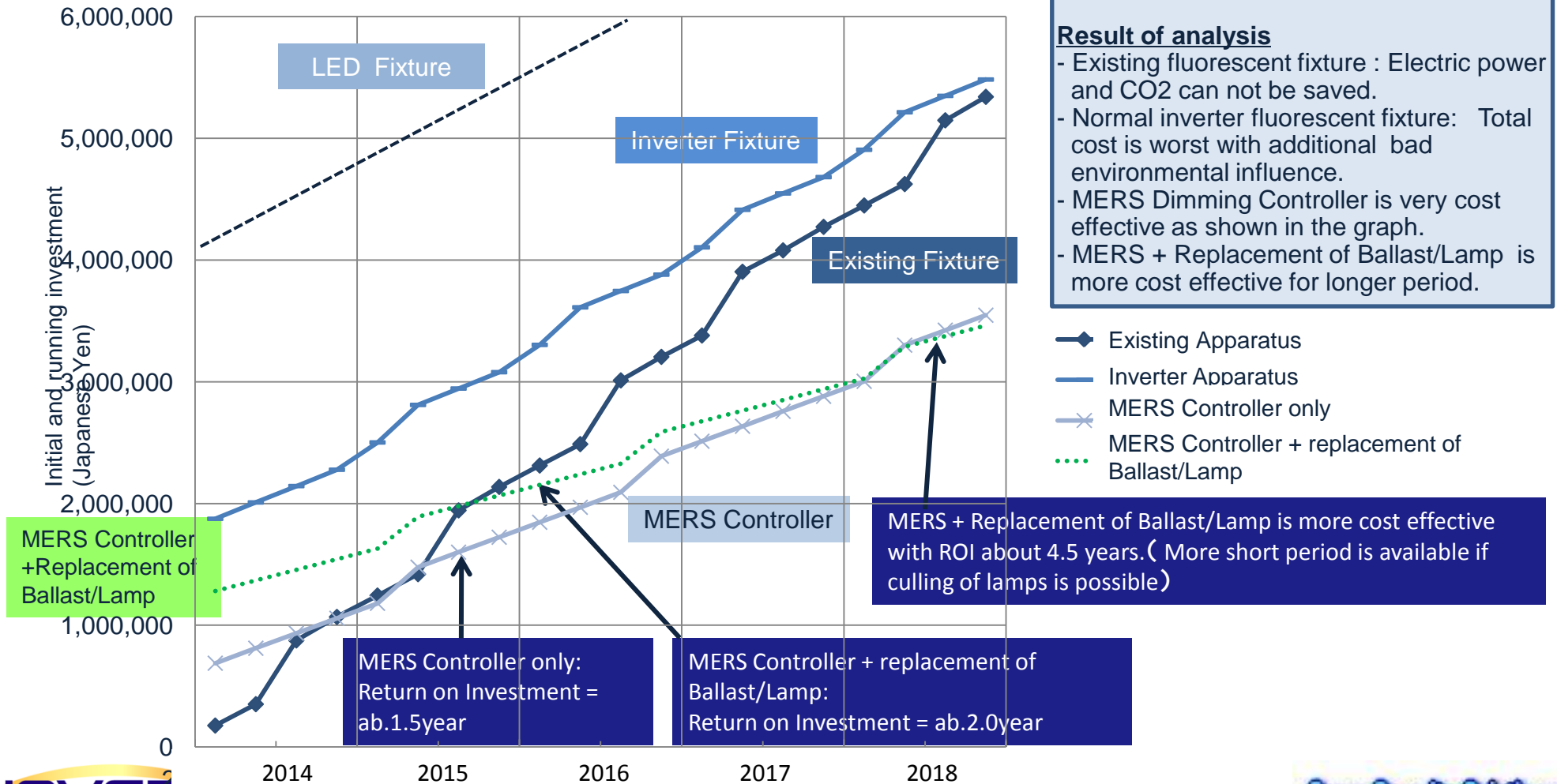
Lighting Controller

1. Dimming control of fluorescent lamps, mercury lamps, sodium lamps and metal halide lamps.
 - More than 40% electric power saving compared with NO MERS systems.
2. Replacement of mercury lamp with metal halide lamp with MERS dimming controller.
 - Approx. 40% electric power saving compared with NO MERS mercury lamp systems.
3. Intelligent dimming control of lamps with MERS, sensors and Constraint Technology.
 - Significant saving can be expected compared with existing systems according to QOS.



Example of the Return on Investment

- Calculation of return on investment (ROI) by the simulation from the total investment (initial investment + electric bill) and the reduction electric bill.
- Case : Two rapid lamp type (40Wx2lamp), 87 lighting fixtures (retrofit fluorescent lamp)



Take Energy Control with MERS