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# Construction of IoT-based Campus Micro-grid project in South Korea

2016. 11. 21

# Contents

Leading a New Energy Industry Era  
Campus Microgrid and  
Changes in Seoul National University



## Project Overview

How will it be pursued?

How will it change?

# IoT-based Campus MG Project Overview

## SNU Campus MG Demonstration Project Overview

**Project Budget:** 15.7 million USD (Government 10.3M, Private 5.4M)

**Project Period:** 2015. 06 ~ 2019. 05 (for 4 years)

**Project Site:** Seoul National University

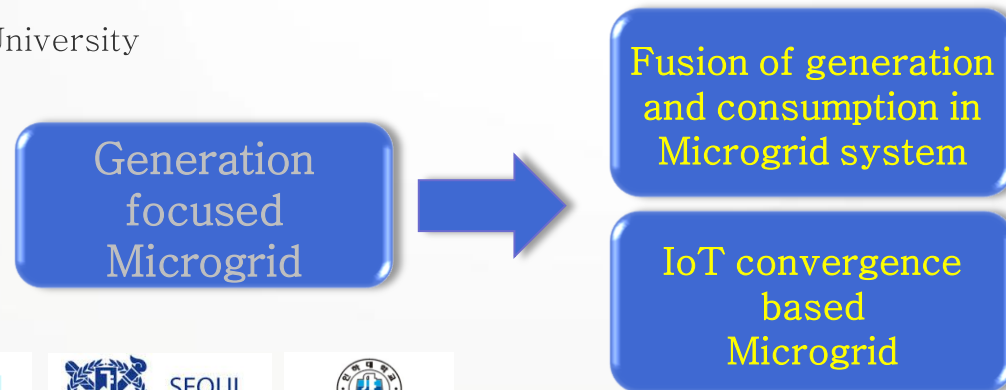
## Project Goal:

Development of a customized SNU Campus MG model to provide

- 1) 4 hours islanding operation to critical loads
- 2) 20% peak load reduction and energy cost saving by cell MG model
- 3) Consumer participative energy-saving services by employing Big Data platform

\* SNU: Seoul National University

\* MG: Microgrid



Best Team including LSIS,  
KEPCO, LG Electronics, SNU  
(21 Industry-academia-  
research institutions)

**Best Team** of best organizations in each field

Solution/ Services	  
Operation	  
Analysis/ Design	  
Component technologies	     
Development/ Manufacturing	     





Korea's Representative **Campus Microgrid**

# HOW will it be pursued?

Leading a New Energy Industry Era Campus Microgrid and Changes in Seoul National University

Campus change through Premium MG Cell : 4-hour independent operation and MG power sharing technology and demonstration.  
Uninterruptible switching by coordinated operation between DG and ESS, 4 hour island operation, Consistent level of power control and supply, Power sharing between MGs.  
Demonstration of energy cost and peak load reduction by application of campus building model for each type. Optimum operation by power load characteristics, Peak load energy savings, Renewable energy and ESS operation, Power saving HVAC facilities



# Demonstration Plan

Achieve early commercialization by 2 years of development and 2 years of demonstration

- Derive best demonstration strategy through in-depth analysis of campus system
- Analysis of the effect of the demonstration results and confirmation of results by external verification organization

2015~2017

2017~2018

2018~2019

After Completion of Project

2 Year  
Development

1 Year  
Demonstration  
Internal  
Verification

1 Year  
Demonstration  
External  
Verification

Jun' 2019  
Completion  
of Project

Business  
Association

Design and  
development  
of Element  
Technology

Demonstration  
Design and  
Construction/  
Commissioning

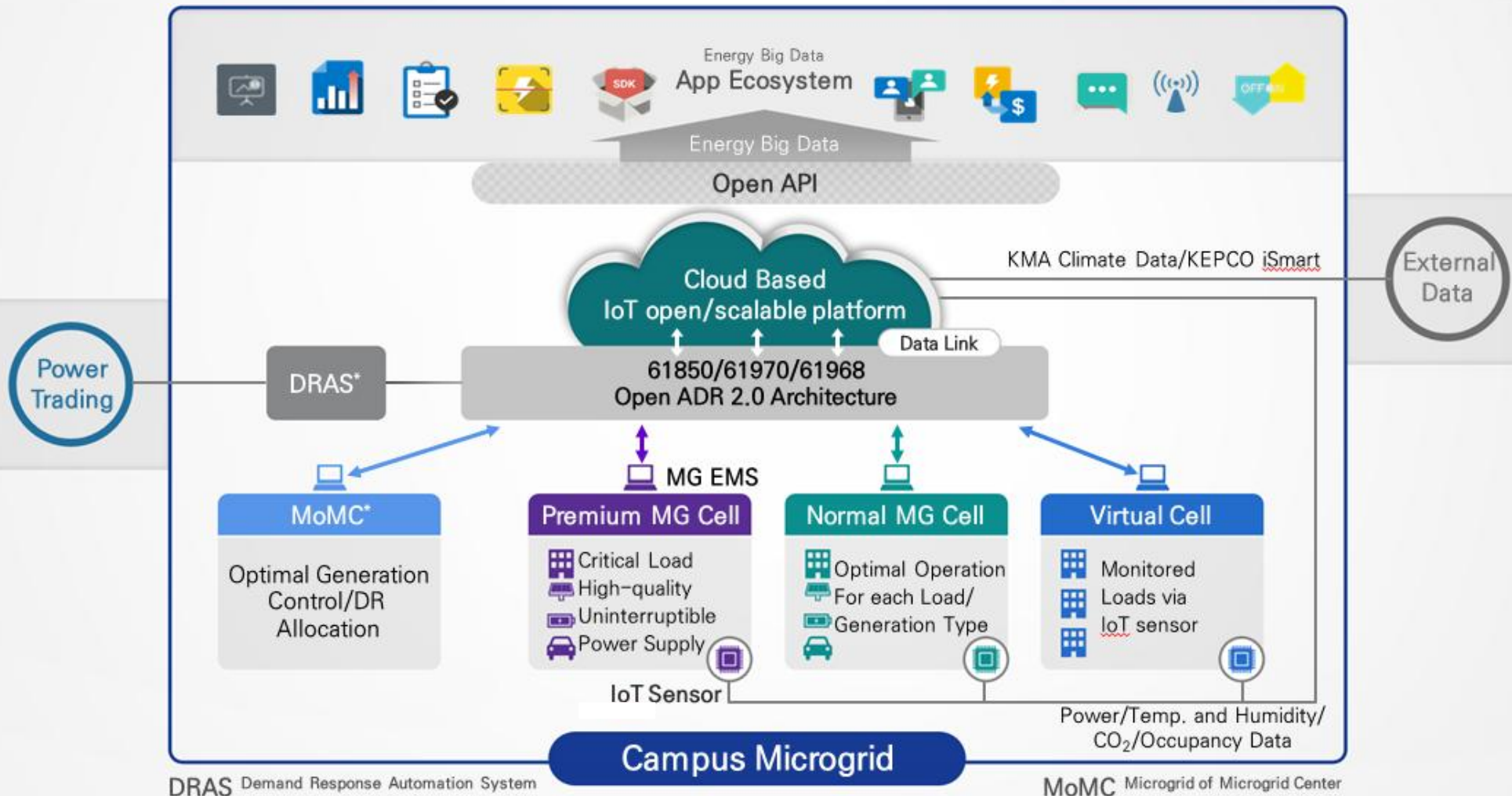
MOU for  
transfer of  
ownership  
and  
operations to  
SNU

Sign contract  
for transfer of  
ownership and  
maintenance

SNU  
Step-by-step  
Commercialization

# SNU Campus MG Conceptual Model

**Cell region:** Efficient energy operation   **Cloud region:** Providing variety of IoT based services





- Develop accurate model (Lecture, Research, Hospital, Dormitory, and etc.) for each building types
- The accurate model will be designed by enhanced time-spatial resolution from IoT-based big data technology.

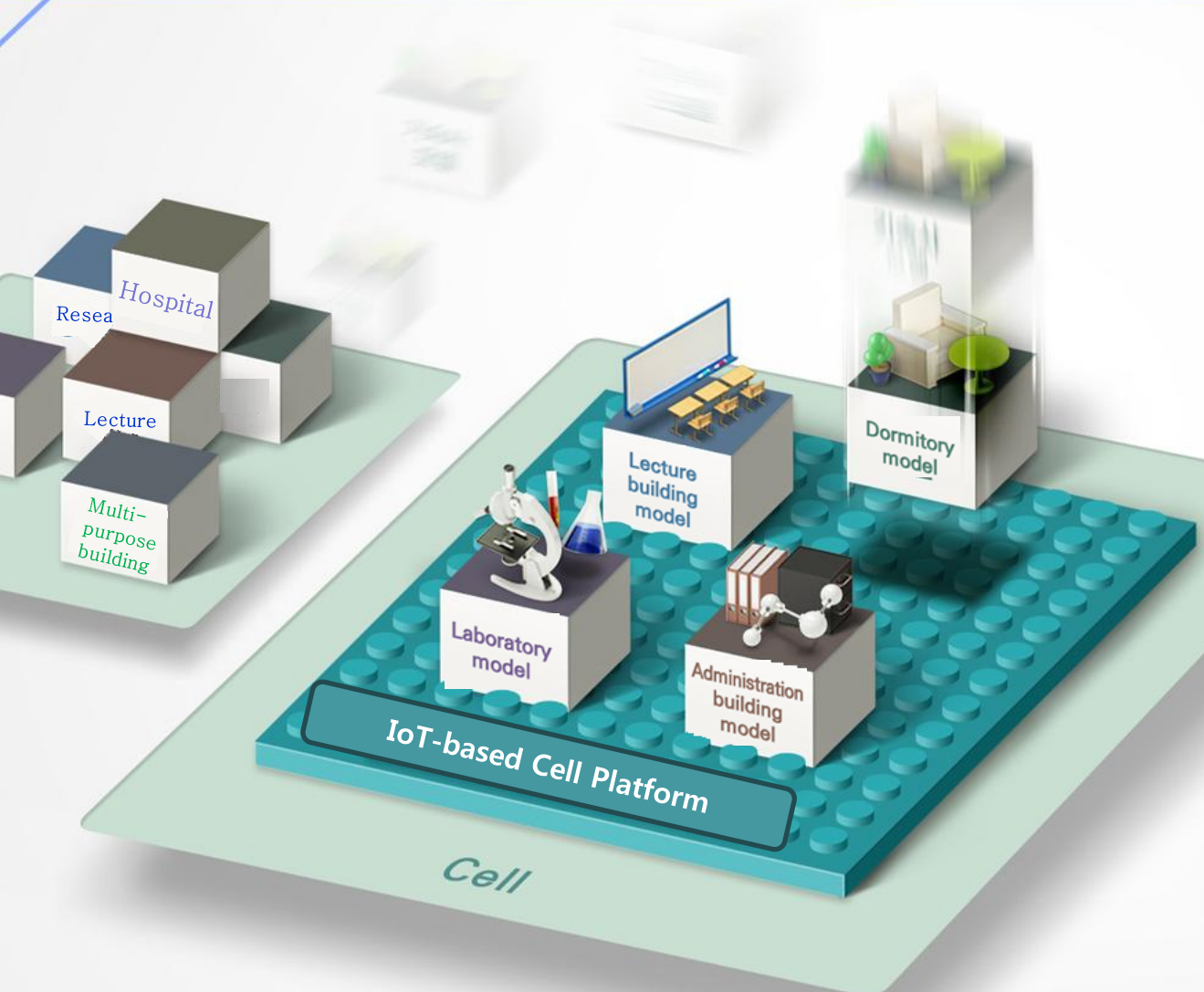


## Standardization of energy-saving technologies and engineering methods for Reuse in Future Projects



# SNU Campus MG Characteristics

Lego style Campus MG Customized Model taking flexible configuration change depending on customer demand



## Lego-style Campus Micro-grid Customized Solution

### Campus Model Development

Build campus model according to different energy consumption characteristics of campus buildings

### IoT based Cell Platform Development

Platform for combining the required models through the Open API

Flexible solution by model combination

Cell IoT Based Cell Platform + Campus Model

Minimum sales unit of customized solutions



Korea's Representative **Campus Microgrid**

# HOW will it change?

Leading a New Energy Industry Era Campus Microgrid and Changes in Seoul National University

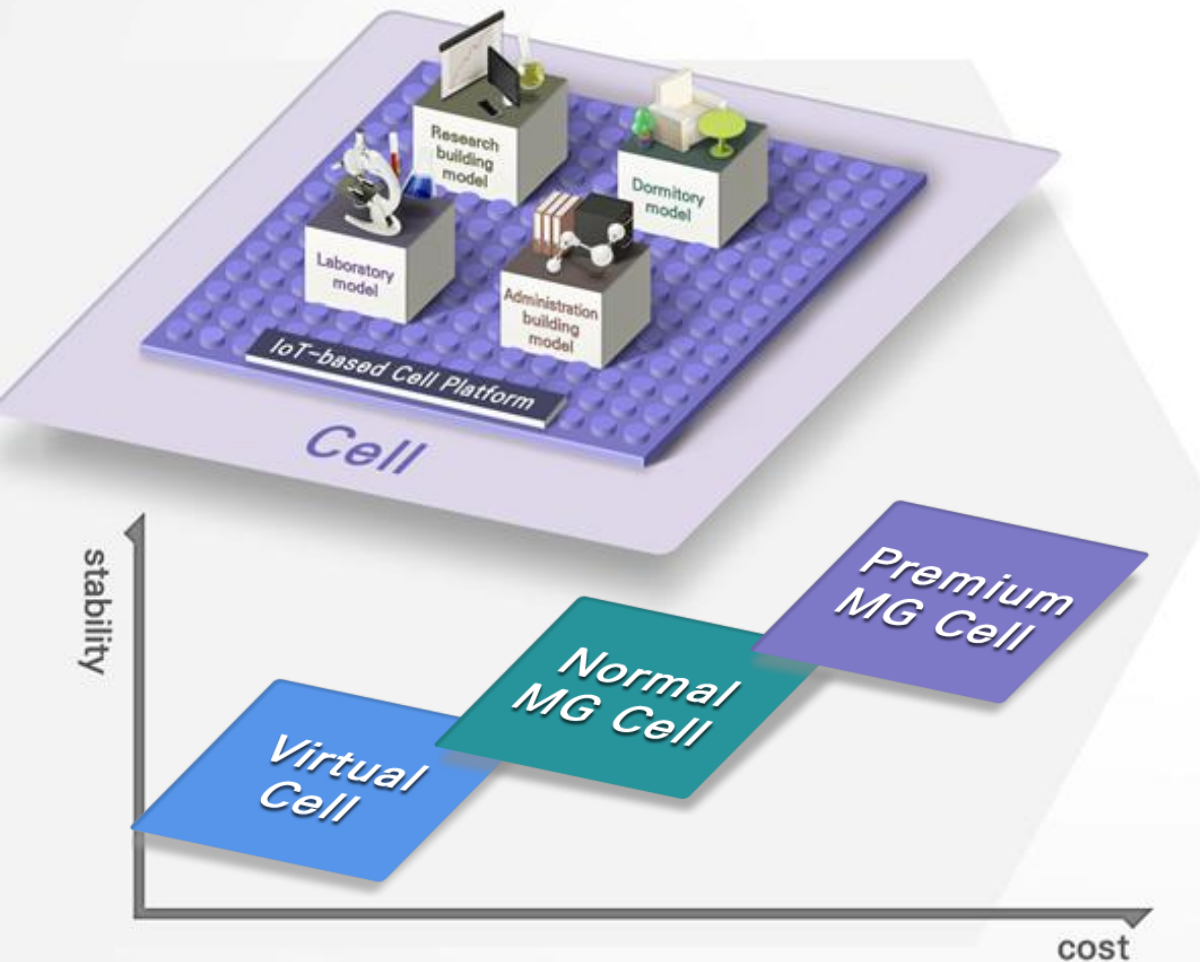
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# Cell Solution Type

Cell : IoT-based Cell Platform + Campus building model for each type ⇒ **Minimum unit of customized solutions**

- Cell divided into 3 categories based on **stability/cost**



## Premium MG Cell

- Cell model for critical loads (**research buildings, hospitals, etc.**) requiring islanding operation and power quality
- 4 hours islanding operation and 20% energy savings

## Normal MG Cell

- Cell model for general loads (**lecture halls, dormitories etc.**) with DGs considering energy efficiency
- 20% saving of energy costs by peak load reduction

## Virtual Cell

- Cell model for general loads without DGs that provides energy saving service based on the analysis of information from IoT system
- 10% energy saving through IoT based user participative energy service platform



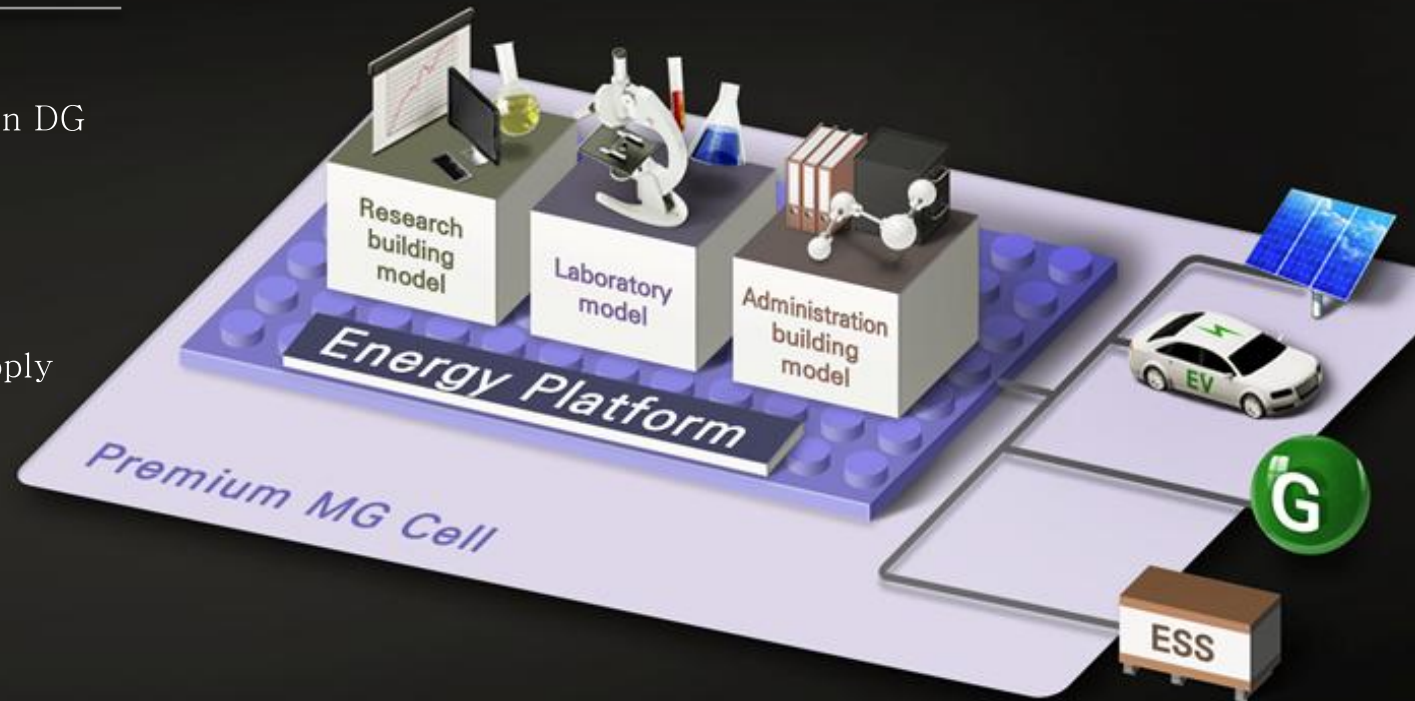
# Campus Change Through Premium MG Cell

4-hour islanding operation and MG power sharing technology and demonstration



## Main Target

- High-speed switching by coordinated operation between DG and ESS
- 4 hour islanding operation
- System reconnection
- Consistent level of power supply
- Power sharing between MGs





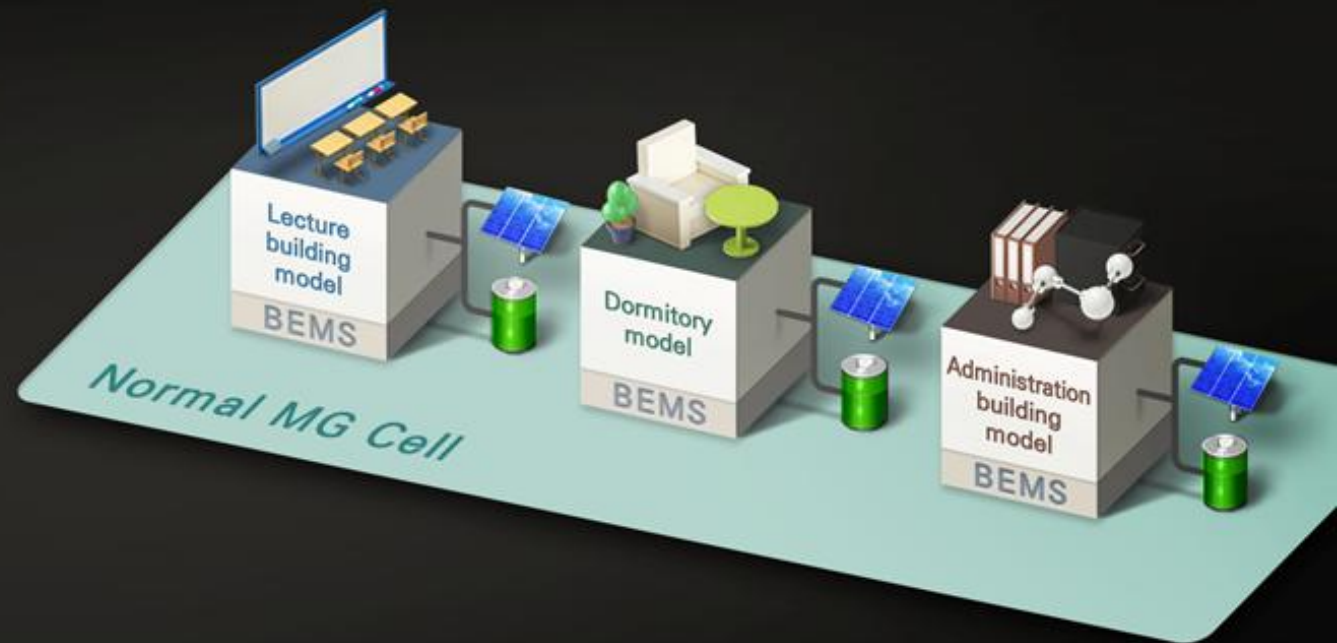
# Campus Change Through Normal MG Cell

Demonstration of energy cost and peak load reduction by application of campus building model for each type



## Main target

- Optimal operation by power load characteristics
- Peak load energy reduction
- Renewable energy and ESS operation
- Power saving HVAC facilities



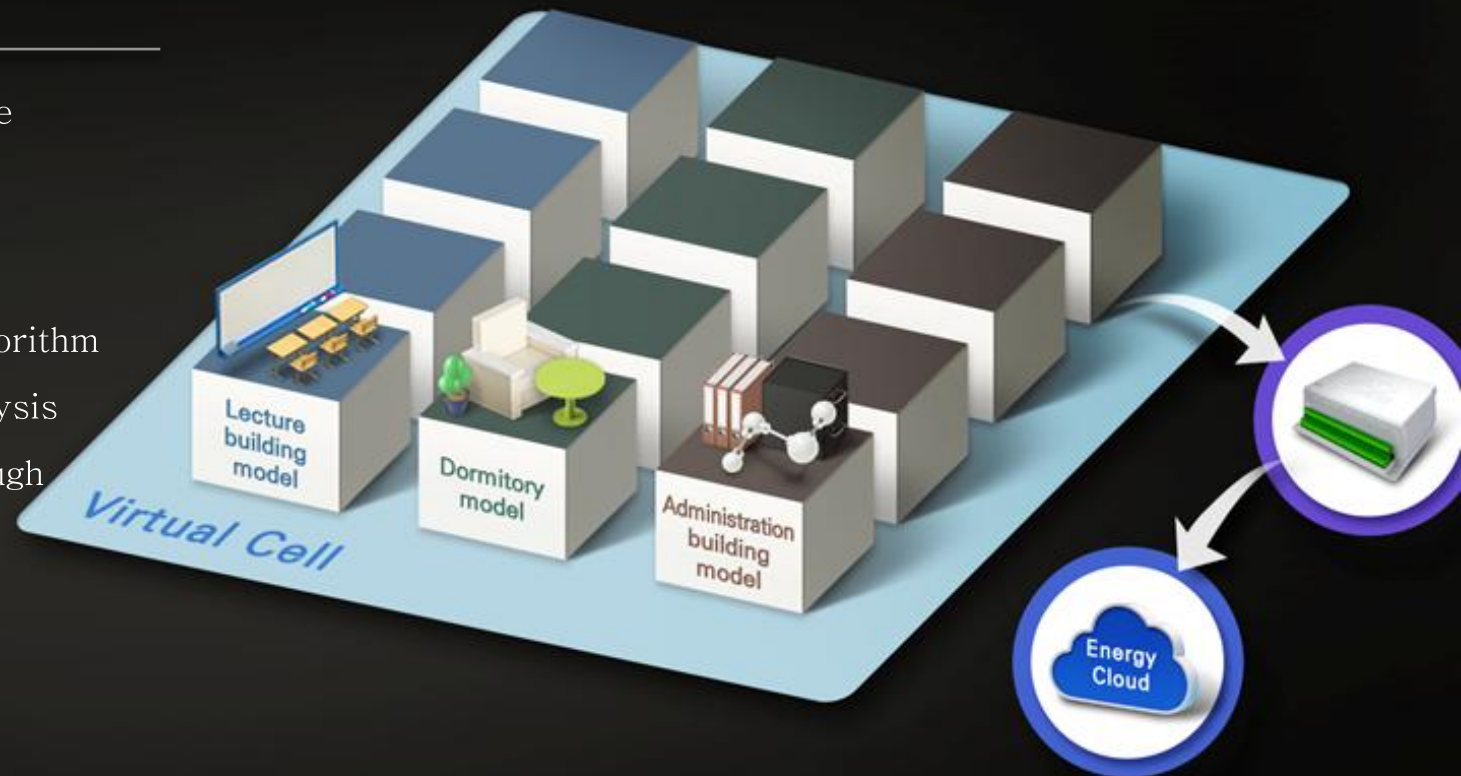
# Campus Change Through Virtual Cell

Demonstration of energy saving through IoT-based **participatory energy service platform**

**ENCORED**

## Main Target

- Data acquisition through the campus IoT sensors
- Big Data platform
- Big data-based energy consumption predictive algorithm
- User behavior pattern analysis
- Energy-saving service through user participation



# Thank You

Best Team of best organizations in each field

Solution/  
Services



Operation



Analysis/  
Design



Component  
technologies



Development/  
Manufacturing

