Echo & Deco YH Project (YH Energy Management System) – South Korea

SUMMARY

Project Description: Reduce CO2 emission by energy management in an environmentally friendly Youth Hostel made out of timer

Project Type: Energy Efficiency

National Association: HI Korea

Project Location: Seohae Youth Hostel (Timber House)

Estimation of number of reduced tonnes of CO2 per year: According to POC business step 1, If we replace normal light with LED light, we save 39,109KWh per to POC business SEOHAE youth-hostel main building (except guest room and seminar room) and reduce TOE and 18.4 tonnes CO2

Total Funds Requested: £ 25,000

Total Project Cost: £ 26,500

Annual £ saves and ROI (return of investment): £3,416.28 per year with 3.38 years ROI

Why should this project be funded ahead of others?

To apply M2M/IOT and Cloud infra, we would like to build the platform to save the energy consumption. The platform will bring the huge CapEx/OpEx reduce. Moreover the platform enables to utilize to other areas.

DETAILED PROJECT INFORMATION

Timber House (Seohae Youth Hostel) is located on the beautiful Ganghwa Island - the fifth biggest island in South Korea. **Timber House is an environmentally-friendly hostel**, offering villa style accommodation. The hostel has easy access to well-built hiking and cycling paths, providing great outdoor activity opportunities for guests.

Timber House (Seohae Youth Hostel) provides comfortable, fully-furnished rooms and relaxing outdoor areas that are equipped with picnic and barbecue areas. The hostel offers a variety of room types including double, duplex and family rooms.

During their stay, guests can visit the delicious Korean-fusion sushi restaurants nearby, shop at the local fish market or take an excursion to Seoul which is an hour and a half away.

Purpose / objectives

Through 3 phases, we would like to conduct the project as safe as possible under the conservative manner.

Regarding **Phase 1**, we would like to validate the project feasibility through replacing some of key facilities.
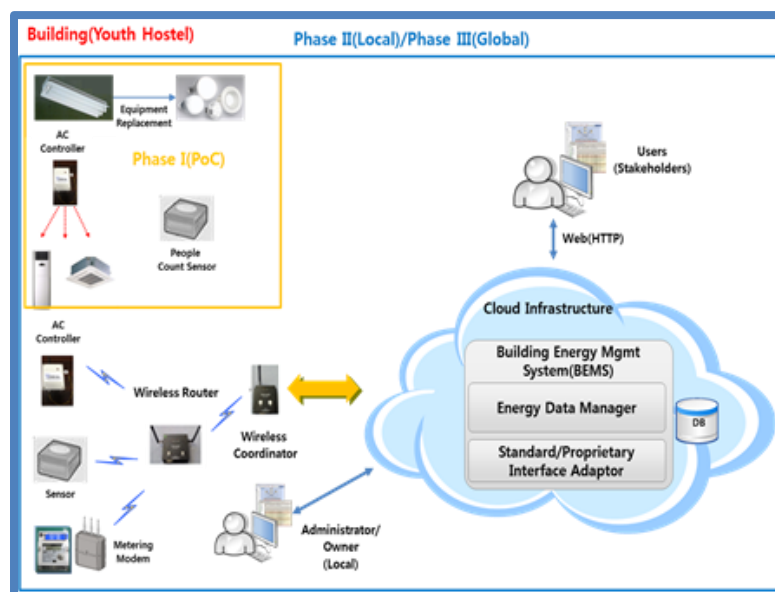
Regarding **Phase 2**, we would like to expand the project to nation-wide, Korea only.

Regarding **Phase 3**, we would like to share this project to other international communities, who are willing to share.
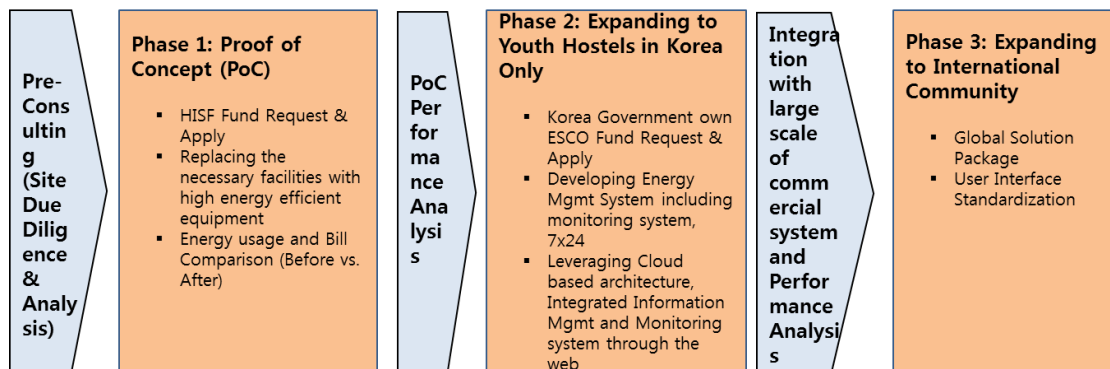
- Efficient energy management based on M2M/IoT technologies.
- Integrated energy source management after we build the integrated energy management system,
- Energy consumption management through the software tool which can provide monitoring, statistics, analysis and system operation.
- Enable to share the certain energy consumption data such as before & after the system installation, compares the data with other youth hostels to compete for energy savings and reference.
- Meet with Korea Government's Energy Saving Policy: such as Korea Government drives "Management of Targets for GHGs & Energy" based on "Basic Act on Low Carbon Green Growth".
- Contribute the improvement of Earth-Environment through replacing high-efficient environmental facilities, and reducing CO_2 & Green House Gas emission

Methodology (How)

1. **System Architecture & Diagram**

2. Progress Brief

Pre-Consulting (Site Due Diligence & Analysis)

Phase 1: Proof of Concept (PoC)

- HISF Fund Request & Apply
- Replacing the necessary facilities with high energy efficient equipment
- Energy usage and Bill Comparison (Before vs. After)

PoC Performance Analysis

Phase 2: Expanding to Youth Hostels in Korea Only

- Korea Government own ESCO Fund Request & Apply
- Developing Energy Mgmt System including monitoring system, 7x24
- Leveraging Cloud based architecture, Integrated Information Mgmt and Monitoring system through the web

Integration with large scale of commercial system and Performance Analysis

Phase 3: Expanding to International Community

- Global Solution Package
- User Interface Standardization

Regarding Phase 1, throughout HISF Fund we've targeted an youth hostel in Korea and would like to replace the key facilities only to improve the efficiency of BEMS (Building Energy Management System) as Proof of Concept. On Phase 2, we would like to leverage ESCO (Matching Fund) from Korea Government to develop and deploy Integrated Energy Management System to other Youth Hostels in Korea. On Phase 3, we would like to package the BEMS product for Youth Hostel and share the knowledge and system to other global community.

3. Phase 1 (Proof of Concept, PoC)

By managing Energy Source of the target building, Seohae Youth Hostel, we would like to see the huge amount of energy saving.

Consider energy saving from:

1. Replacing/Adding new facilities which are applied of the emerging technology;

2. Optimum control of conventional/existing facilities and equipment

2.1. Replacing into the eco-friendly facility

- Replacing LED lighting

2.2. The improvement of Energy Efficiency: Implementing Eco-Friendly Lighting (LED)

- Software On/Off Control due to the occupants
- Operational hour analysis for energy saving

4. Phase 2 (Expanding to other YH in Korea)

Establishing Integrated Energy Management System based on Information Technology

- After Phase 1, based on the actual validated data, we would like to expand the implementation to other Youth Hostels in Korea.
- Utilizing Wireless M2M/IoT technology, establishing the Infrastructure of Usage Data Collection.
- Energy Management covering the whole hostel: segmenting energy source from USN sensor and automatic read the meter.
- Lead the energy saving competition comparing among hostels' energy consumption and savings.
- Automated Data Collection and Accumulation through the Cloud Infrastructure.

- Data Analysis and Green Gas Energy Goal based on Government Compliance
- Establishing Periodical Electricity Usage Collection and Monitoring System
  - Electricity Peak Electricity
  - Usage Monitoring by different type of energies
  - Trend monitoring of daily, weekly, monthly & yearly load/energy usage
  - Analysis per energy source/type
  - Calculation of CO_2 emissions and Tone of Energy
- Offering Integrated Dashboard
- Support various types of information, statistics, analysis, report
- Leverage the data of Energy Usage (and savings) and goal of green gas energy

5. **Phase 3 (Expanding International Community)**

Throughout Phase 1 and 2, the proposed BEMS should be validated and we would like to package the solution and system to share global community. Develop and Support International User Interface (Graphic User Interface)

Monitoring Plan

Detail Report for every System Integration

After the project implementation, issue the Performance Analysis Report

To help the monitoring by HI, all of system User Interface will be provided in English version as well and the pre-approval personal could login the system and enable to monitor continuously through the web

The clean, modern and secure hostel is also an active member of the **Rotorua Sustainable Tourism Charter** - recycling, energy efficiency and biodegradable laundry powders and cleaning products are just some of the measures taken at YHA Rotorua.

Contribution to Sustainable Development

1. We put a lot of effort to protect the environment and energy saving. However, we haven't enabled to get the outstanding result. Therefore to introduce the professional system. We would like to reach the goal that we couldn't do it by human-manpower.

2. We haven't seen any Youth-Hostel to reduce the electricity usage by computerized system. Because we have the limit to get the information about the computerized energy management system and the budget limitation.Therefore through HISF, we would like to move the effectiveness of the system and later based on our case study this kind of system can be wide-spread to other global Youth-Hostel community.

3. In long-term, Hostelling international KOREA would like to offer to Korea Government to establish the energy management center to save the electricity energy.

Estimations of emission reduction (CO2 tones)

According to POC business step 1, If we replace normal light with LED light, we save 39,109KWh per to POC business SEOHAE youth-hostel main building (except guest room and seminar room) and reduce TOE and TCO2 wattage analysis results make as follows.

Wattage TOE = reduce wattage (kWh)*TOE*0.001
= 39,109(kWh)*0.215(kg/kWh)*0.001
=8.40843(TOE)

CO2 tones (TCO2) = reduce wattage (kWh)*0.001*(TCO2/MWh)
= 39,109kWh*0.001*0.4705(TCO@/MWh)
= 18.40079 (TCO2)The project costs include the supply and installation of the down-bore heat exchanger, connection and installation of above ground pipework and high grade thermal insulation, supply and installation of hot water storage tanks and associated pumps and controls.

The project budget is NZD $52,000 + GST (Goods and Services Tax) which at today's exchange rate equates to approximately GBP £28,500.

Saved Funds and ROI (return of investment)

According to POC business step 1, changing cost about SEOHAI Youth-Hostel main building (except guest room and seminar room) ROI analysis results make as follows.

Current lighting system Electricity cost and Maintenance cost (Annual) = 6,164.43 GBP
Changing LED light system Electricity cost and Maintenance cost (Annual) = 2,748.15 GBP
Reduce costs (Annual) = 3,416.28 GBP
Forecast investment payback period (year) = 3.38
Warranty: 3 years

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