# Global Energy Management System Implementation: Case Study

United States of America

# JW Marriott

*Washington DC*


Rehearsal # 5. We care for our Hotel, Our Community and the Environment

## Business Case for Energy Management

**1.1. Organization Profile/Business Case:**

**Marriott International (MI):**

Marriott International, Inc. is a leading global lodging company with more than 6,000 properties in 122 countries and territories, reporting revenues of more than $17 billion in fiscal year 2016. Founded by J. Willard and Alice Marriott and guided by family leadership for nearly 90 years, the company is headquartered outside of Washington, D.C. in Bethesda, Maryland

**JW Marriott Hotel, Washington DC:**

The JW Marriott Washington DC is a luxury downtown Washington, DC hotel located on Pennsylvania Avenue. Situated near some of the most recognizable landmarks in Washington, DC, this hotel provides easy access to renowned monuments, the National Mall, museums, and other cultural venues around the city. Additionally, the JW Marriott hotel is conveniently located around the corner from the White House, one block from the Metro and 15 minutes from Reagan National Airport. We offer 29 meeting rooms and 37,000 square feet of total meeting space, making it a premier meeting facility in the area. All of our 777 luxurious rooms and suites are equipped with high-speed Internet access and HDTVs. The excellent location and amenities at this downtown hotel in Washington, DC make it the ideal choice for business and leisure travelers alike.

**Energy Management:**

**Motivations for energy and climate sustainability efforts:**

To support corporate energy goal and to rehearse our Commitment to our community and environment, JW Marriott Washington DC sets energy reduction goal each year to achieve our corporate long term energy reduction target. Energy reduction goal became part of our Top Management commitment and our annual leadership performance evaluation process. Above requirement motivated us to outperform from our routine. Marriott International Energy team has implemented various energy conservation best practices such as, Signature Energy reduction project per hotel per year, quarterly Energy and Environment Action Plan process, minimum one ROI Energy improvement project budgeted per year in our ten year Capital Expenditure budget planning, etc. However, Implementing ISO 50001 and 50021 Superior Energy Performance Certification helped us to merge Marriott energy conservation best practices along with ISO 50001 standard expectation to establish robust process and communication pathway to hold ourselves accountable to consistently deliver results by using Plan, Do Check and Act. ISO 50001 internal and external audit process has created energy awareness and commitment to excel by our hotel associates.

**Reduce Environmental Impacts:**

We minimize our footprint by sustainably managing our energy and water use, reducing our waste and carbon emissions and increasing the use of renewable energy. We employ innovative technologies to plan, implement, track and communicate how we operate responsibly to mitigate climate-related risk, benefitting our business and the communities we serve.

**MI Energy Reduction Impact form past Initiatives:**

In 2016 (against 2007 baseline and first-generation Goals for Marriott Rewards and The Ritz-Carlton Rewards hotels):

•Reduced our energy intensity by 13.2%

•Reduced our water intensity by 7.7%

•Reduced our GHG emissions intensity by 15.8%

**MI Sustainability Certification GOAL:**

100% of Marriott International hotels will have a sustainability certification, and 650 hotels will pursue LEED certification or equivalent by 2025

Sustainability Certifications:

» By 2025, 100% of hotels will be certified to a recognized sustainability standard

**MI Environmental GOAL:**

Reduce environmental footprint by 15% | 30% | 45% across the Portfolio by 2025 (from a 2016 baseline; for water/carbon/waste on an intensity basis)

Water: Reduce water intensity by 15%

Carbon: Reduce carbon intensity by 30%

» Commit to analyze the opportunity to set a science-based target by 2018

Waste: Reduce waste to landfill by 45%. Reduce food waste by 50%

Renewable energy: Achieve a minimum of 30% renewable energy use

"Implementing ISO 50001 has been valuable, including increasing employee awareness of energy issues and the benefit of behavioral changes to support energy management and helping the hotel develop achievable energy performance targets,"—Raj Srinivasan, DOE

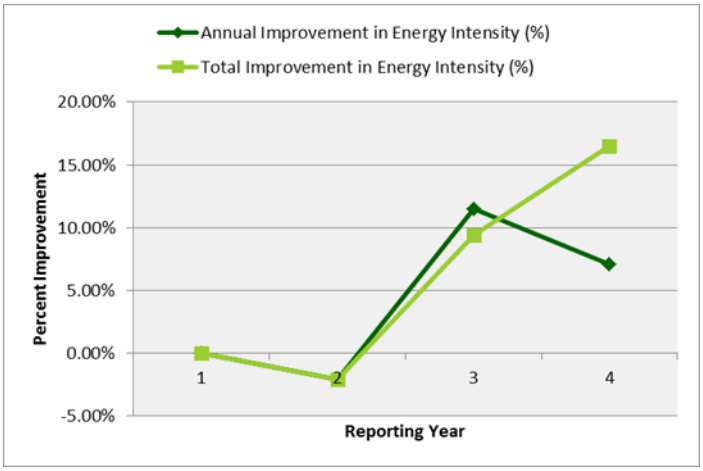
## Case Study Snapshot

| | |
|---|---|
| **Industry** | Commercial Building |
| **Product/Service** | Hospitality |
| **Location** | Washington DC USA |
| **Energy Management System** | ISO 50001 |
| **Energy Performance Improvement Period** | 3 years |
| **Energy Performance Improvement (%)** over improvement period | 16.48% |
| **Total energy cost savings** over improvement period | 19094 MMBtu Convert to USD $471,891 |
| **Cost to implement EnMS** | USD $3.3M(Including project cost to upgrade equipment to achieve 16.5% energy reduction in three years) |
| **Payback period (years)** on EnMS implementation | 7 years |
| **Total Energy Savings** over improvement period | 20160 (GJ) |
| **Total $CO_2$-e emission reduction** over improvement period | 4,136 (Metric tons) |

## Business Benefits Achieved

Implementing Energy Management System and Energy improvement projects at the JW Marriott, DC helped to reduce our energy usage by 16.5% over three consecutive years. It helped us to reduce CO2 emission

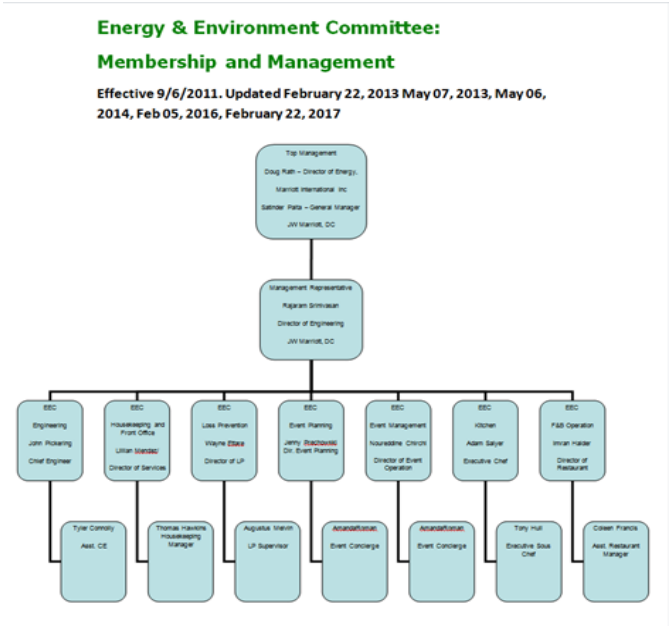
by 4,136 MT which supports our corporate carbon reduction goal and to achieve Platinum level Superior Energy Performance certificate in 2016. We were the first Marriott Hotel to accomplish SEP certification. Our customer sees that we are an environmental friendly hotel and they intent to recommend and come back to our Hotel. EnMS process helped us to meet corporate/Government group's RFP with Environment survey expectation to conduct business with us. In addition, our hotel associates highly engaged towards energy conservation efforts due to the communication and awareness campaign through EnMS implementation.




## EnMS Development and Implementation

**Organizational:**

Marriott International has implemented robust energy awareness and reduction process in each of its Hotel and the Top Management at the JW Marriott, DC hotel has elevated our commitment by developing energy action committee involving each department key representatives to carefully review all available energy improvement opportunities and support implementing ISO 50001 EnMS. We were the first hotel in the US to achieve ISO 50001 in 2013. We have received recertification of ISO 50001 in 2016 and also upgraded to ISO 50021 Superior Energy performance Platinum Certified Partner Certification.




**Energy Review, Planning, and Energy Improvement:**

Top management annually reviews EnMS Objectives and Targets, plans and actions, energy usage trend, Monthly energy usage analysis report developed by ECOVA (External Utility bill usage and cost audit and analysis services) to understand where the energy being used the most, focus on significant energy usage equipment operation and procedures, internal and internal audit feedbacks. Top Management sets each year energy goal based on year over year improvements and implementation of Energy ROI projects. Yearend energy usage summery report is used to determine whether energy performance is improved.

1.4c JW Marriott - Energy Management Action Plan GT (2017).doc

## 2017 Energy Management Action Plan

| | |
|---|---|
| **Objective:** Reduce energy consumption in 2017 | **Original Issue Date:** 02/24/2017 |
| **Target:** Reduce electric use by 0.25% compared to YTD actual 2016 | **Revision Date(s):** 02/24/2017 |

**Energy Management Project:**

Implement Associate Cafeteria LED light upgrade to reduce Electric consumption by 03/31/2017

Implement Back of the House (BOH) LED Light upgrade to reduce Electric Consumption by 12/31/2017

Continual Commissioning of chilled water production system by implementing chilled water diagnostic tool to reduce kw/ton by 08/31/2017

EEC team to meet quarterly to drive behavior change in the hotel to conserve energy – EEC to attend department meetings

**Project Planning**

| Action Items | Person Responsible | Due Date | Required Resources/Comments |
|---|---|---|---|
| Test sample LED's for Back of the House Area LED Light ROI and approve samples | Raj Srinivasan<br>Satinder Palta<br>Michael Chang | 03/31/2017 | Samples ordered |
| Send purchase order for final LED light quantity and expedite shipment | Raj Srinivasan | 04/30/2017 | Done |
| Schedule and complete LED light installation | Raj Srinivasan<br>John Pickering<br>WB Electric | 05/31/2017 | Done |
| Chilled water Production Diagnostic Test and continual commissioning | Raj Srinivasan<br>John Pickering | 08/31/2017 | Review chilled water diagnostic tool and collect plant data per checklist<br><br>Input data and compare results. Follow recommendation to make necessary correction in the system to improve chiller efficiency<br><br>Provide training to engineering associates to operate chiller system and access Chiller EnMS during each shift to check proper operation |
| Savings validation | Raj Srinivasan | 06/30/2017 – 12/31/2017 | Review monthly energy analysis report from Ecova. See Project Verification Plan |
| **EEC team to meet quarterly to drive behavior change in the hotel to conserve energy – EEC to attend department meetings** | John Pickering | 06/30/2017 | John to meet with EEC team to come up with ideas to change associate behavior towards energy conservation efforts during their day to day operation |

**Target Verification Plan**

| Item | Information/Resource Requirements |
|---|---|
| | |
| | |
| Monthly Energy Consumption Report | Review monthly energy consumption report from Ecova and MI Energy team to compare energy reduction goal vs target |

## 2017 Energy Objectives and Targets Worksheet

| Objective: | Date |
|---|---|
| Reduce energy consumption in 2017 | 02/24/2017 |

**Target 1:**

Reduce Electric consumption by 23721 KWH (0.25% from 2016) by 12/31/2017

Target # 1a Implement Associate Cafeteria LED light upgrade to reduce Electric consumption by 03/31/2017

Target # 1b Implement Back of the House (BOH) LED light upgrade to reduce Electric consumption by 12/31/2017

Target # 2c Continual Commissioning of chilled water production system by implementing chilled water diagnostic tool to reduce kw/ton by 08/31/2017

**Target 2:**

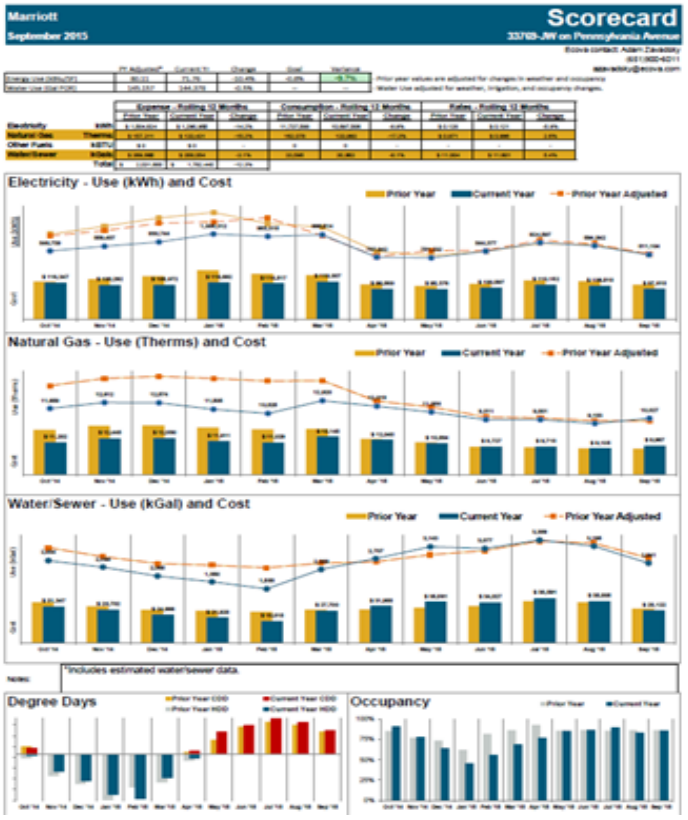
EEC team to meet quarterly to drive behavior change in the hotel to conserve energy – EEC to attend department meetings

**Target 3:**

**List the energy policy commitment(s) relevant to this objective:**

- Continual improvement in energy performance
- Ensure the availability of information and necessary resources to achieve objectives and targets
- Comply with all legal and other requirements pertaining to energy use, energy consumption, and energy efficiency
- Consider energy efficiency when procuring products and services, and during design work.
- Establishing and pursuing energy objectives and targets

**Considerations**




Management Review Record Form

**MANAGEMENT REVIEW RECORD FORM**

| Date of Management Review: | Prepared by (name/position): | |
|---|---|---|
| 02/22/2017 | Rajaram Srinivasan, Director of Engineering | |
| **Attendees (Names):** | **Title/Position** | **Organization/Department Represented** |
| Satinder Palta | General Manager | General and Administration |
| Rajaram Srinivasan | Director of Engineering | Engineering |
| TBD | Chief Engineer | Engineering |
| Donnie Sutton | Director of Food and Beverage | Food and Beverage |
| Sophia Swamba | Director of Finance and Accounting | Accounting |
| Loretta Fisher | Director of Human Resources | General and Administration |
| Kristen Garcia | Director of Sales and Marketing | General and Administration |
| TBD | Resident Manager | General and Administration |

| *Input* | *Covered in this management review?* | *Information attached?* | *Discussion/Decision Summary* | *Action Item(s)* | *Assigned to:* | *Due Date:* |
|---|---|---|---|---|---|---|
| Previous management review action items | ☒ Yes ☐ No | ☒ Yes ☐ No | Reviewed | | | |
| EnMS audit results | ☒ Yes ☐ No | ☒ Yes ☐ No | 2017 Audit results have been reviewed | | | |
| Results of legal compliance evaluations | ☒ Yes ☐ No | ☒ Yes ☐ No | Reviewed Legal and other requirements. Management team agreed not to compromise any legal and other requirements while implementing ISO 50001 Standards | No action Required | | |

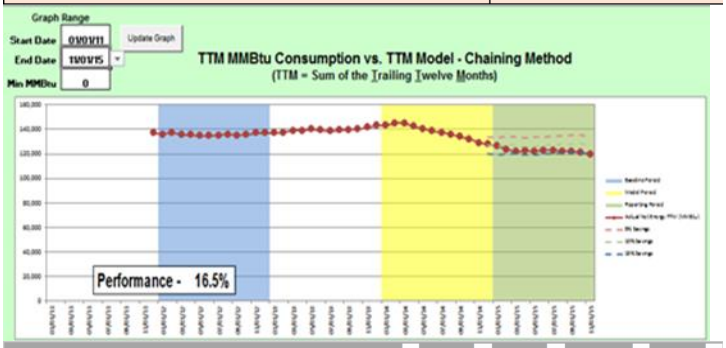
Daily utility meter readings are taken to narrow down the focus of where the energy is saved or exceeded

EnMS took about six months to be more effective from developing the Energy Manual based on EnMS expectation with property specific details and process to establish successful system.

**Cost Benefits:**

Our energy usage reduced by 16.5% over three consecutive years which is a reduction of CO2 emission by 4,136 MT. Energy saving helped to improve profit margin. Total cost to implement EnMS system was about $32.5K. However there are additional Capital Expenditure energy ROI projects were implemented to achieve above energy reduction. EnMS process helped to identify areas where energy improvements can be accomplished.

| Cost to implement | Cost to implement ($USD) |
|---|---|
| Internal Staff time to develop and implement the EnMS | 10000 |
| Internal staff time to prepare for external audit | 2000 |
| Additional monitoring and metering equipment installed to meet EnMS requirements | 2000 |
| Third party audit costs for three years | 18000 |
| Technical assistance (e.g. hired consultants to assist with EnMS implementation) | 0 |
| Other (e.g. internal communications) | 500 |
| Total | 32500 |



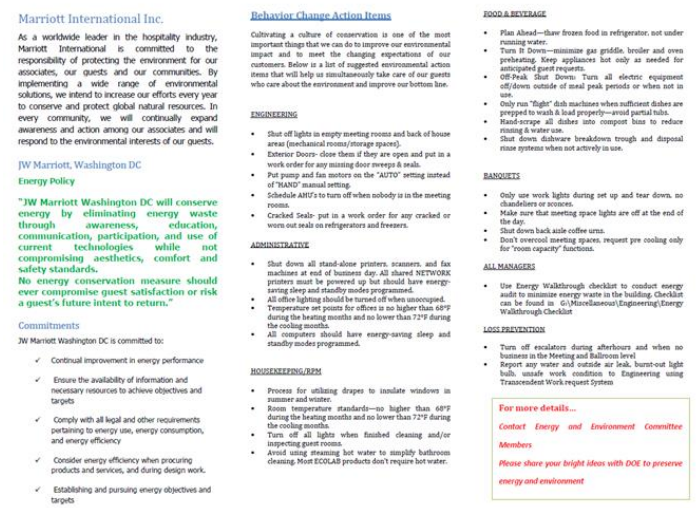

| | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|
| Actual Electricity(MMBTU) | 117,471 | 124,259 | 112,619 | 102,170 |
| Actual N-Gas(MMBTU) | 19,453 | 19,076 | 15,205 | 13,948 |
| TOTAL (MMBtu) | 136,924 | 143,336 | 127,824 | 116,118 |
| | | | | |
| Adjustment Method | Chaining | Chaining | Model Year | Chaining |
| Modeled Electricity(MMBTU) | 109,498 | 111,764 | 112,619 | 111,207 |
| Electricity(MMBTU) Annual Savings | 0 | -4,522 | 7,973 | 9,038 |
| Modeled N-Gas(MMBTU) | 14,586 | 15,112 | 15,205 | 14,782 |
| N-Gas(MMBTU) Annual Savings | 0 | 903 | 4,867 | 834 |
| Total Modeled Energy Consumption (MMBtu) | 124,084 | 126,877 | 127,824 | 125,989 |
| Total Improvement in Energy Intensity (%) | 0.00% | -2.11% | 9.38% | 16.48% |
| Annual Improvement in Energy Intensity (%) | 0.00% | -2.11% | 11.48% | 7.10% |
| Total Energy Savings since Baseline Year (MMBtu/Year) | 0 | -3,619 | 12,840 | 9,872 |
| Cumulative Savings (MMBtu) | 0 | -3,619 | 9,222 | 19,094 |
| New Energy Savings for Current Year (MMBtu/year) | 0 | -3,619 | 16,459 | -2,969 |
| Adjustment for Baseline Primary Energy Use (MMBtu/year) | 0 | 2,793 | 3,741 | -10,934 |

**Validating Results:**

Monthly Energy critique meetings are conducted between the General Manager, Director of Finance and Director of Engineering to review energy usage vs. energy goal and validate energy savings based ROI project and process implementation and take corrective actions if targets are not met.

**Operational Control and Sustain improvement:**

Hotel guest becomes first priority in our industry. Our hotel has developed an energy policy that keeps guest comfort and safety into consideration while implementing energy conservation efforts. It made it clear to our hotel associates that energy conservation is not a compromise of guest priority. Thus, our associate finds every possible opportunity as part of their daily routine to patriciate in energy conservation efforts. Trainings are provided for setting room temperature based on weather pattern, educating kitchen associates of turning off gas burners when not in use are become routine to energy management committee. Hotel has put together a nice two page energy action item flier for associate's reference tool which became part of their day to day operation.


Marriott International Inc.

As a worldwide leader in the hospitality industry, Marriott International is committed to the responsibility of protecting the environment for our associates, our guests and our communities. By implementing a wide range of environmental solutions, we intend to increase our efforts every year to conserve and protect global natural resources. In every community, we will continually expand awareness and action among our associates and will respond to the environmental interests of our guests.

JW Marriott, Washington DC

Energy Policy

"JW Marriott Washington DC will conserve energy by eliminating energy waste through awareness, education, communication, participation, and use of current technologies while not compromising aesthetics, comfort and safety standards.
No energy conservation measure should ever compromise guest satisfaction or risk a guest's future intent to return."

Commitments

JW Marriott Washington DC is committed to:

- Continual improvement in energy performance
- Ensure the availability of information and necessary resources to achieve objectives and targets
- Comply with all legal and other requirements pertaining to energy use, energy consumption, and energy efficiency
- Consider energy efficiency when procuring products and services, and during design work.
- Establishing and pursuing energy objectives and targets

Behavior Change Action Items

Cultivating a culture of conservation is one of the most important things that we can do to improve our environmental impact and to meet the changing expectations of our customers. Below is a list of suggested environmental action items that will help us simultaneously take care of our guests who care about the environment and improve our bottom line.

ENGINEERING

- Shut off lights in empty meeting rooms and back of house areas (mechanical rooms/storage spaces).
- Exterior Doors- close them if they are open and put in a work order for any missing door sweeps & seals.
- Put pump and fan motors on the "AUTO" setting instead of "HAND" manual setting.
- Schedule AHU's to turn off when nobody is in the meeting rooms.
- Cracked Seals- put in a work order for any cracked or worn out seals on refrigerators and freezers.

ADMINISTRATIVE

- Shut down all stand-alone printers, scanners, and fax machines at end of business day. All shared NETWORK printers must be powered up but should have energy-saving sleep and standby modes programmed.
- All office lighting should be turned off when unoccupied.
- Temperature set points for offices at no higher than 68°F during the heating months and no lower than 72°F during the cooling months.
- All computers should have energy-saving sleep and standby modes programmed.

HOUSEKEEPING/BPM

- Process for utilizing drapes to insulate windows in summer and winter.
- Room temperature standards—no higher than 68°F during the heating months and no lower than 72°F during the cooling months.
- Turn off all lights when finished cleaning and/or inspecting guest rooms.
- Avoid using steaming hot water to simplify bathroom cleaning. Most ECOLAB products don't require hot water.

FOOD & BEVERAGE

- Plan Ahead—thaw frozen food in refrigerator, not under running water.
- Turn It Down—minimize gas griddle, broiler and oven preheating. Keep appliances hot only as needed for anticipated guest requests.
- Off-Peak Shut Down: Turn all electric equipment off/down outside of meal peak periods or when not in use.
- Only run "flight" dish machines when sufficient dishes are prepped to wash & load properly—avoid partial tubs.
- Hand-scrape all dishes into compost bins to reduce rinsing & water use.
- Shut down dishware breakdown trough and disposal rinse systems when not actively in use.

BANQUETS

- Only use work lights during set up and tear down, no chandeliers or sconces.
- Make sure that meeting space lights are off at the end of the day.
- Shut down back aisle coffee urns.
- Don't overcool meeting spaces, request pre cooling only for "room capacity" functions.

ALL MANAGERS

- Use Energy Walkthrough checklist to conduct energy audit to minimize energy waste in the building. Checklist can be found in G:\Miscellaneous\Engineering\Energy Walkthrough Checklist

LOSS PREVENTION

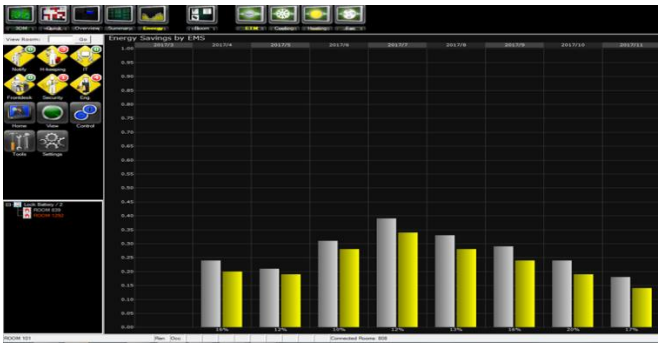
- Turn off escalators during afterhours and when no business in the Meeting and Ballroom level
- Report any water and outside air leak, burnt-out light bulb, unsafe work condition to Engineering using Transcendent Work request System

For more details...
Contact Energy and Environment Committee Members
Please share your bright ideas with DOE to preserve energy and environment

**Tools and resources:**

Marriott International Energy team has developed various energy measurements, monitoring and reporting tools to support hotels success. JW Marriott Hotel has developed Energy Manual that details about all available tools and resources for successful implementation of EnMS. Our third party service provider ECOVA's website offers all historical energy usage data and analysis which can be found online to review and compare with similar Marriott hotels to

benchmark energy usage. Building automation system offers trends to analyze significant energy usage equipment performance and energy efficiency



**Best practices, Training and Communication:**

Top Management created hotel wide energy awareness via communication boards, celebrating Earth Day and conducting Energy awareness posters competition which helped our associate's behavior change towards energy conservation. Energy Management Team has been trained onsite and via webinar on EnMS implementation and internal audit process by Georgia Tech Energy Audit experts. Hotel Associates have been trained about EnMS during all associate meetings and engineers are regularly trained on new equipment and technology to better manage significant energy usage equipment

***"Our customers appreciate efforts made in this hotel and we are actually able to gain business over our competitors in being socially responsible and very effective energy conservation in place"***

—Satinder Palta, General Manager

## Lessons Learned

Finding time in a busy operating hotel is always challenging especially to implement EnMS system. It has to be a commitment from Top Management and make rest of the organization to believe that it's possible to implement EnMS with a good plan and support. Use existing resources provided by Marriott International Energy team and merge it with ISO 50001 standard expectation to save time and effort. Hotel has developed an Energy manual that helps other Marriott hotels to easily adopt EnMS.

## Keys to Success

- Don't give up
- Take external help when needed
- Delegate responsibility and hold people accountable
- Follow Energy Management Plan thoroughly
- Over Communicate to create awareness and involve stack holders



https://youtu.be/is1pfTj0XzE

Through the Energy Management Working Group (EMWG), government officials worldwide share best practices and leverage their collective knowledge and experience to create high-impact national programs that accelerate the use of energy management systems in industry and commercial buildings. The EMWG was launched in 2010 by the Clean Energy Ministerial (CEM) and International Partnership for Energy Efficiency Cooperation (IPEEC).

For more information, please visit *www.cleanenergyministerial.org/energymanagement*.

CLEAN ENERGY MINISTERIAL
Accelerating the Transition to Clean Energy Technologies

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