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Benchmarking and energy efficiency improvements in at 1,000 hotels in Indonesia could yield annual savings of 533 million kilowatt hours (kWh), 388 billion Indonesian Rupiah (38 million USD), and 381,000 MMTOC$_2$e avoided, equivalent to 105 wind turbines installed.

The benchmarking tool uses a simple 1-100 metric to indicate operational energy performance within the national context.

ENERGY PERFORMANCE BENCHMARKING FOR THE BUILDING SECTOR

INTRODUCTION

A building energy performance benchmarking tool is a powerful mechanism for improving the energy performance of existing buildings. Its strength lies in providing a practical and equitable assessment of building performance to identify energy and financial savings opportunities which can be used to make the business case for energy efficiency investments. When applied across a portfolio of buildings, the tool indicates which properties are underperforming. This feedback can encourage owners to investment in improvements. Importantly, a benchmarking tool provides a core platform for national and regional building energy efficiency programs. Such programs enable tens of thousands of buildings to initiate energy performance improvements, contributing substantially to higher levels of efficiency and reductions in the carbon intensity of buildings.

In November 2013, USAID EECDP demonstrated how a building performance benchmarking program could be developed and implemented through a pilot in Indonesia. ICF leveraged ongoing work in the building sector under the USAID Indonesia Clean Energy Development (ICED) program and launched the first building energy performance benchmarking tool for Indonesia's hotel sector, along with trainings and technical assistance. The tool was used to benchmark baseline energy use and rank energy use in hotels across Indonesia. Additional tool functions include: identifying energy and financial savings opportunities in underperforming buildings; identifying high efficiency buildings that could achieve green building certification; and measuring progress from improvement projects. The project identified a potential savings of 533 million kilowatt-hours (kWh) of electricity, (equivalent to 381,214 MtCO2e) if applied to 1,000 Indonesian hotels.

Framework Overview

1. Select an appropriate building sector for benchmarking

Buildings are responsible for approximately 40% of global energy use and up to 30% of global greenhouse gas (GHG) emissions. In Asia, the building sector is responsible for approximately 25% of final energy consumption and is growing rapidly. The project targeted the hospitality sector in Indonesia for performance benchmarking based on several key factors:

- Significance of the hospitality sector in Indonesia and SE Asia
  - Buildings in Indonesia account for 20% of the country's final energy consumption and the hotel sector is expanding rapidly with visitor increases between 9% and 13% annually.

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How a Benchmarking Tool Reduces Energy Use and Carbon Emissions in the Buildings Sector:

- Makes the business case for efficiency investments by quantifying energy and financial savings potential.

- Identifies buildings with the most cost-effective technology retrofits.

- Measures energy and cost savings of retrofit and operational improvements.

- Identifies buildings that could readily achieve local green building certification.

- Supports minimum energy performance standards and retrofit policies.

- Establishes a robust database to better understand key energy performance drivers of buildings.

- Supports widespread performance improvement to meet energy and carbon targets.

- Data availability and data applicability to other countries in SE Asia

  – A Horwath HTL hotel survey in Indonesia contained the necessary energy use baseline data to create a benchmarking tool. The survey also indicated interest in energy sustainability and a lack of technical expertise on energy efficiency measures among most hotel managers in Indonesia.

  – Similarities in both the geographic climates and hotel markets across Southeast Asia mean the tool can be easily adapted to neighboring countries.

- Knowledge of local players for outreach assistance and continued support of project

  – Early discussions indicated sufficient interest in energy benchmarking in the local hotel sector, buy- in from key government and non-government players and access to hotel operators, including the Indonesia Ministry of Energy and Mineral Resources (MEMR), the Ministry of Tourism and the Bali Hotel Association.

2. Conduct outreach to key local public and private players in the hotel industry

Outreach for hotel energy benchmarking in Indonesia had the following results:

- Assistance in disseminating information and encouraging participation by other sectors/countries/regions

  – Partnership with the Indonesia Ministry of Energy and Mineral Resources (MEMR) resulted in government endorsement of tool development and demonstration of hotel energy performance. This included assistance in outreach and participation in workshops and trainings.

  – Outreach to the Ministry of Construction in Vietnam and the Philippines Department of Energy increased interest in energy performance benchmarking in buildings and the possibility of similar projects in other countries in SE Asia.

- Access to hotel operators and managers

  – Establishing a partnership with the Bali Hotel Association resulted in 26 hotels participating in the tool pilot program.

- Development of government standards and regulations encouraged long term energy improvements

  – The Indonesia MEMR used the tool to set minimum energy performance standards for hotels.

  – The Ministry of Tourism (MoT) committed to use hotel energy benchmark scores as criteria in Green Hotel Awards.

3. Develop and deploy standardized measurement method/benchmarking tool

The hotel energy performance benchmarking tool (modeled after the U.S. EPA ENERGYSTAR Portfolio Manager Tool) was developed with the following key features:

- The tool is easy to use and requires minimal data from hotel operators.

- The tool was developed using algorithms that allow for fair comparisons between all hotels, regardless of hotel size, operating hours, occupancy, amenities and the local geographic climate.

- The tool gives hotel operators a simple 1-100 rating of their operational energy performance within the national context. This allows operators to compare their energy usage to other hotels and assess whether energy efficiency measures are needed.

"Thank you very much for the training. It is a really great innovation to have a benchmarking tool to support us in controlling our energy use."
— Alila Hotel Jakarta

4. Develop a suite of technical assistance tools and training opportunities

Improving energy performance in hotels requires training operators in how to use the benchmarking tool, to understand where improvements can be made and how to make them. Training and efficiency programs developed include:

- Supplemental Tools and Resources
  - Tools that provided additional decision making and analytical support were developed, including a chiller retrofit calculator, the Opportunity Assessment tool, and the hotel energy management checklist. These were promoted to stakeholders as part of a Hotel Energy Management Manual developed by ICED, with ICF input. The manual also includes guidance on improving energy performance in Indonesian hotels by using the benchmarking tool before and after operational and technical upgrades; no-/low-cost energy management strategies; and case studies.

- Training and capacity building workshop for management and engineering staff for 90 hotels in Indonesia
  - "Introduction to the Indonesia Hotel Benchmarking Tool" Demonstrated how the benchmarking tool evaluates a building's energy performance and showed participants how to determine their hotel's energy performance benchmark score.
  - "Hotel Strategic Energy Management No-Cost and Low-Cost Approaches to Improve Energy Performance" Topics included 30 operations and maintenance measures associated with data management, energy performance benchmarking, equipment use optimization, lighting, appliances, indoor and outdoor air, HVAC maintenance, and general management strategies.

Project Accomplishments

- Delivered "proof of concept" energy performance benchmarking for Indonesia's hotel sector
  - The project identified potential savings of 533 million kilowatt-hours (kWh) of electricity (equivalent to 381,214 MtCO2e) if applied to 1,000 Indonesian hotels.
  - Over five years, energy performance benchmarking could save 540 million gigajoules of energy (equivalent to 7.9 MMTOC2e) if applied to commercial office, retail, and hospital buildings in Indonesia, Philippines, Thailand, and Vietnam.

- Built capacity on energy performance benchmarking among leading organizations in Southeast Asia
  - The Indonesia MEMR is considering using the tool to assist in setting minimum energy performance standards for hotels.
  - The Indonesia MoT will include an energy benchmark score as criterion for Indonesia's Green Hotel Award.
  - Partnering with The Bali Hotel Association facilitated training and providing technical

- Completed a comprehensive suite of hotel energy management technical assistance tools
  - The tools and resources include a chiller financial analysis tool, an automated "energy efficiency opportunity assessment" tool, an energy management checklist, a manual on hotel energy performance improvement, and case studies.

- Trained 90 hotels on energy performance benchmarking
  - Hotels that participated in the pilot program saved an aggregate of 10 percent in electricity usage from November 2013 to September 2014, compared to the previous year. The average electricity savings for these hotels is approximately 2.6 percent.

Recommendations for Replication and Using Energy Performance Benchmarking to Scale-up Energy Efficiency

- Find a local partner to take ownership of the tool, including funding and future improvements
  - While the Indonesian MEMR understood the value of the tool, it could not commit resources to developing an on-line building energy benchmarking tool to expand use.

- Develop training for tool use and technical assistance tools for how to improve energy performance
  - Operators must understand how to use the benchmarking tool and how to interpret the results. To improve energy performance, operators also need training in how and where energy efficiency improvements can be made.

- Public recognition can expand outreach and accelerate energy improvements
  - Development of government standards, regulations and "green" awards can foster rapid adoption of energy improvements.
  - Public support of sustainable initiatives can increase hotel occupancy and encourage other hotels to participate, including global hospitality brands.

- Conduct regional outreach to ensure other countries are aware and interested in the tool
  - Collaboration among bilateral and regional USAID missions can provide effective outreach to key local players.
  - Convene technical seminars describing the role of energy benchmarking in improving energy performance across the region.

The benchmarking tool was developed using a data set of approximately 120 to 160 hotels. Horwath HTL's hotel survey collects this data annually and covers 3-, 4-, and 5-star hotels in 12 cities across Indonesia, with the majority of hotels in Bali, Jakarta, Yogyakarta, and Sumatera.