Opportunities in Energy Efficiency: Green Building and the Industrial Sector

USAID's Energy Efficiency for Clean Development Program (EECDP)

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Opportunities in Energy Efficiency

High Impact Project & Strategies #2: *Building Energy Performance Benchmarking (Indonesia)*

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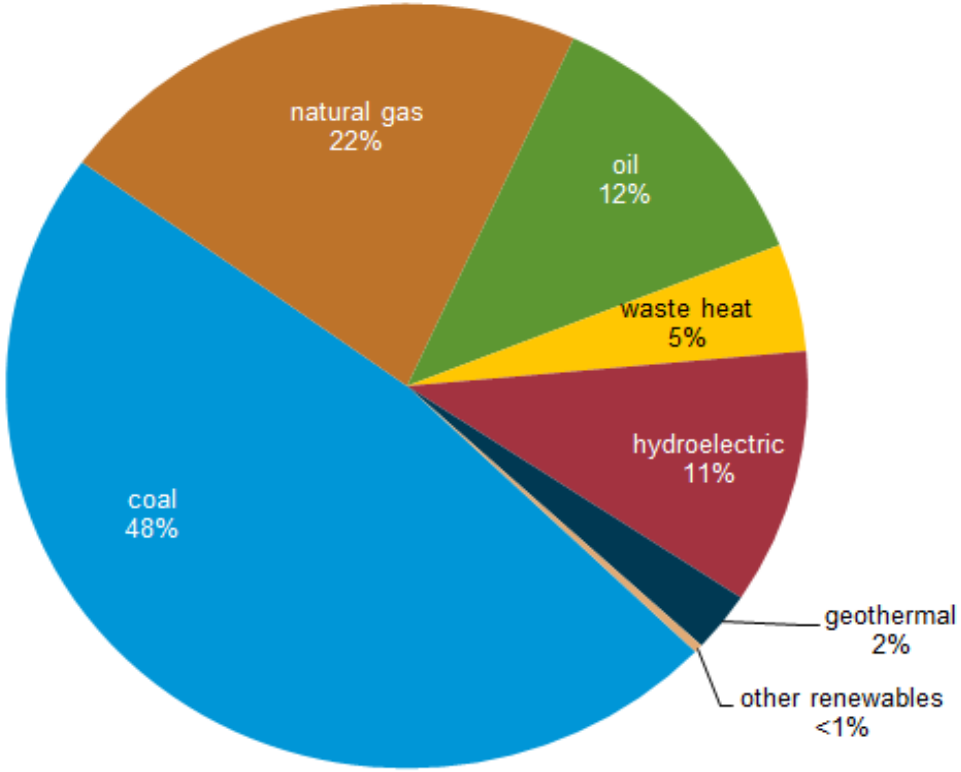
Context for Building Energy Efficiency in Indonesia

With only 14% of electricity supply from non-fossil fuel sources, electricity use for buildings in Indonesia has a very direct effect on GHG and pollutant emissions

Indonesia electricity generation capacity by source, 2012



Source: U.S. Energy Information Administration, International Energy Statistics, IHSEDIN.

Context for Building Energy Efficiency in Indonesia

Indonesia has had energy efficiency programs for buildings for nearly 20 years, but these programs have had very limited results due to several key barriers and constraints, including:

- Lack of mandatory minimum energy performance standards and codes (some work has begin since 2007);
- Subsidized energy prices, that limit consumer incentives to use energy efficiently;
- Weak institutional support for energy-efficiency programs;
- Lack of effective market-based programs; and,
- Lack of tools and assistance available for the building market, for building owners/managers to use in target achievement.

Context for Building Energy Efficiency in Indonesia

2007, National Energy Conservation Master Plan (RIKEN) Targets

- Primary EE policy driver – addresses all key economic sectors
- Targets decrease in energy intensity by an average of 1% per year to 2025.
- Energy saving potential in the commercial building sector, including electricity savings of up to 30%.

Energy Savings Targets for 2025 by Sector (RIKEN)

Sector	Energy Saving Potential	Energy Saving Target in 2025
Industry	10% - 30 %	17 %
Commercial	10% - 30%	15%
Transport	15% - 35 %	20%
Residential	15% - 30%	15%
Others	15% - 30 %	0%

What We Found

- While the RIKEN stated many intended actions and outcomes, we found that most buildings were not actively pursuing energy management, and lacked tools and training to pursue energy efficiency.

- This mirrored findings of a 2012 APEC report on the state of energy efficiency in Indonesia – “the responsibility of energy conservation and energy efficiency is only clarified in principle, but not clear in implementation in specific sectors.”

- This is consistent with the EECDP program’s focus on closing the gap on “enabling mechanisms” which provide end users with the means to implement policies and targets.

Energy Performance Benchmarking Demonstration

Opportunity for Engagement

- The Ministry of Energy and Mineral Resources (MEMR) was supportive of capacity building for its ongoing energy data management work, and to support development of a national benchmarking system.

- The Indonesia Green Building Council (IGBC) manages an emerging green building certification program, but lacked an energy performance benchmarking tool, a fundamental need for rating existing buildings.

- The Ministry of Tourism and Creative Economy, which runs a green hotel award system, was similarly interested in incorporating a common tool to support evaluation of energy use, a key component of its award.

- EECDP worked in close partnership with USAID's existing clean energy program (ICED) to implement a demonstration on development and use of energy performance benchmarking, using the hotel sub-sector as a focal point.

Demonstration Goals

- Building strengthened capacity for Indonesian stakeholders to implementation national EE policy at the end user level.

- Demonstrate the development and implementation of key tools, including benchmarking tools and related implementation resources, to fill the gap in key enabling tools/resources needed to implement national policy.

Key Activities

- Developed a “proof of concept” Indonesia hotel sector energy performance benchmarking tool, to be used by participating hotels to assess performance on a comparative basis.

- Built capacity on energy performance benchmarking at the Indonesia Ministry of Energy and Mineral Resources (MEMR), and the Indonesia Green Building Council, through training and joint work on benchmarking tool development.

- Established a **working group** on hotel energy performance benchmarking tool development and demonstration in Indonesia. This included:
  - MEMR, Ministry of Tourism and Creative Economy
  - Indonesia Ministry of Public Works
  - Indonesia Hotel and Restaurant Association (IHRA)
  - Green Buildings Council Indonesia (GBCI)
  - American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) Indonesia Chapter
  - Building Engineers Association (BEA)
  - Indonesian Hotel Engineers Association (ASATHI

Key Activities

- Developed and deployed an annual “Energy Survey” in partnership with a private hospitality sector service firm. Annual energy data is the foundation for building a benchmarking tool with actual market data.

- Partnered with the Bali Hotel Association, the largest hotel association in the world, to pilot use of the benchmarking tool, and to demonstrate the use of related training and technical resources among building managers to reduce energy use.

- In addition to the benchmarking tool, technical resources developed included:
  - Training on building energy management techniques for energy efficiency
  - Chiller (HVAC) retrofit financial analysis tool
  - Automated “energy efficiency opportunity assessment” tool, for identifying low-cost and no-cost energy efficiency opportunities at the building level.
  - Energy management checklist for building managers.
  - Manual on hotel energy performance improvement measures.
  - Case studies.

What is a “Benchmark” Rating?

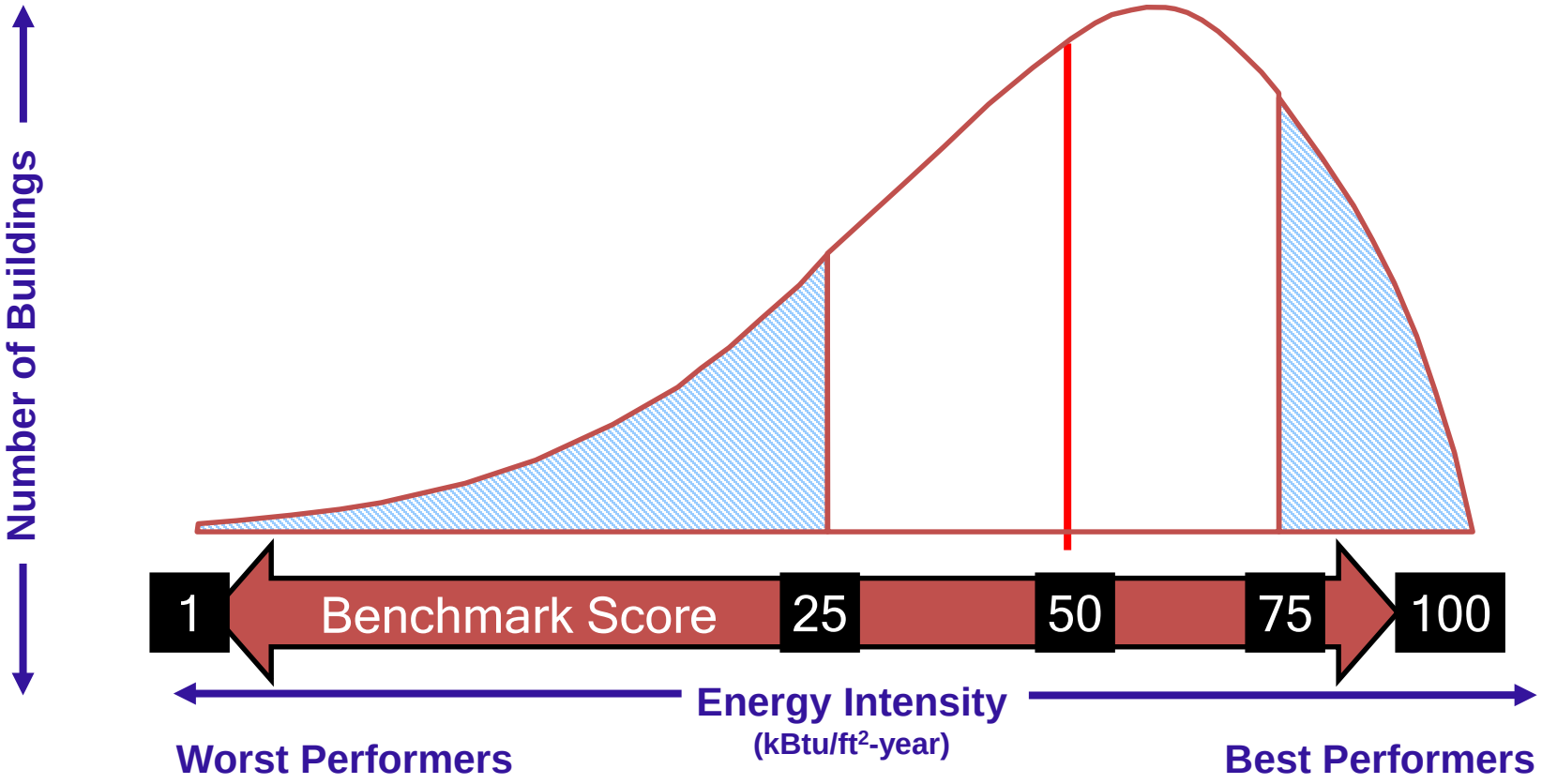
- Relative ranking based on energy performance. It provides a comparison between your building and other similar buildings based on actual building sector data.

- Provides a numerical common metric (a score) to allow for buildings to compare energy use in an easy to understand format.

- Can provide the foundation for a certification program, to support national regulations, or “voluntary” market-based programs.

A Benchmarking System Provides an Easy to Understand Numerical Measurement (a score)

The US ENERGY STAR rating system uses a 1-100 point scale.



Is Your Building Performing Well?

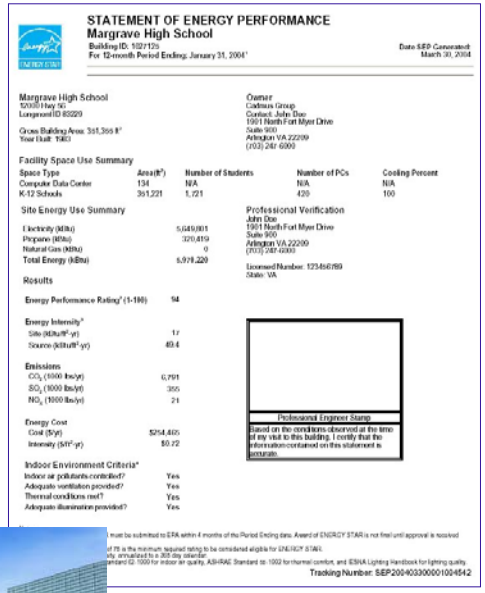
The Importance of Clear, Understandable Metrics

Fuel Efficiency

Miles per gallon/liter is a well understood metric

Building Efficiency

Is 0.25 kWh/SM/YR high or low for a building?



STATEMENT OF ENERGY PERFORMANCE
Margrave High School

Building ID: 102/129
For 12-month Period Ending: January 31, 2004[1]

Date SEP Generated: March 30, 2004

Margrave High School
12000 Hwy 50
Longwood ID 83229

Gross Building Area: 351,355 ft²
Year Built: 1963

Owner
Cadmus Group
Contact: John Doe
1901 North Fort Myer Drive
Suite 900
Arlington VA 22209
(703) 247 6000

Facility Space Use Summary

Space Type	Area(ft²)	Number of Students	Number of PCs	Cooling Percent
Computer Data Center	134	N/A	N/A	N/A
K-12 Schools	351,221	1,121	420	100

Site Energy Use Summary

Electricity (kBtu)	5,649,801
Propane (kBtu)	320,419
Natural Gas (kBtu)	0
Total Energy (kBtu)	5,970,220

Professional Verification
John Doe
1901 North Fort Myer Drive
Suite 900
Arlington VA 22209
(703) 247 6000

Licensed Number: 123456789
State: VA

Results

Energy Performance Rating[2] (1-100)	94
Energy Intensity[3]	
Site (kBtu/ft²-yr)	17
Source (kBtu/ft²-yr)	49.4
Emissions	
CO_2 (1000 lbs/yr)	6,791
SO_2 (1000 lbs/yr)	355
NO_x (1000 lbs/yr)	21
Energy Cost	
Cost ($/yr)	$254,405
Intensity ($/ft²-yr)	$0.72
Indoor Environment Criteria[4]	
Indoor air pollutants controlled?	Yes
Adequate ventilation provided?	Yes
Thermal conditions met?	Yes
Adequate illumination provided?	Yes

Professional Engineer Stamp
Based on the conditions observed at the time of my visit to this building, I certify that the information contained on this statement is accurate.

Tracking Number: SEP20040330000010245 42

Building Energy Management Training

Data → Schedules → Lighting → Air → HVAC → Management

Easy-to-implement operational measures that can be carried out by existing building engineers and managers, and that focus on no-cost and low-cost measures

Data Management
Optimize Equipment Use
Lighting Controls
Management of Indoor/Outdoor Air
HVAC Maintenance
Management Strategies

Results

- **Capacity**. Indonesian government and non-government stakeholders built capacity to continue designing and implementing a practical benchmarking tool and rating system in the market.

- **Connecting policy with implementation.** A key gap in enabling mechanisms was filled through developing of the benchmarking tool for use by Indonesian building managers.

- **Basis for policies & programs.** Indonesian policymakers and program designers now have access to a benchmarking rating system concept that can be applied to:
  - A national energy efficiency building certification program
  - Indonesia's emerging green building certification program
  - Direct use by buildings to assess improvement in EE over time (via scoring)