



More Local Efficiency Benchmarks Required



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When you are looking to improve anything, two basic questions are always asked: “How are you doing?” and “How do you know?” When it comes to improving buildings energy performance, you ought to assess how your building is doing and how its performance compares to other similar buildings.

Any successful energy reduction implementation strategy that aims to lead to a sustainable green economy should be based on an integrated and data-driven approach. Assessing a building’s need for an energy audit starts with calculating the Energy Utilization Index (EUI), which is basically an indicator of the annual energy usage per unit area (kWh/m²/year) as derived from utility bills and the area of the building. But this figure alone serves no purpose if not compared to the energy usage in other buildings with similar use. From here arises the need to establish a benchmark metric. A high EUI, when compared to the benchmark, will mean that there is room for improvement and that a building energy audit should be sought to determine the energy conservation measures required and the savings anticipated. A successful benchmark database helps identify how a building’s energy performance compares to other buildings of its type, if it matches its potential, and the gap in performance, if any.

The process of establishing a benchmark involves measuring and recording the total energy usage (may be across multiple sectors like electricity, water, and gas) consumed in multiple buildings forming a large sample of existing buildings in a city or a country. The records are then adjusted for essential factors like building type, area, and geographical location. Other factors like year of construction, number of occupants and/or users, and operational data may also be used for adjustment and have proven to be valuable additions. The most successful energy benchmarks use the median EUI as a metric for all buildings. This value will basically represent the middle of the database population meaning that half of the buildings

use more energy and the other half uses less.

Ideally, a benchmarking database is accompanied by a tool to provide an easy, fast and consistent way to benchmark any facility. A user would be required to enter basic information on the building as well as energy usage data over a period of time to generate the benchmarking report associated with the building under study. Facility owners and managers are always encouraged to consistently benchmark their buildings. A benchmark measurement at a single point of time is not going to drive the optimum energy reduction plan. After all, and you’ve definitely heard it before: you cannot manage what you do not measure.

EUI 250 kWh/m²/yr

Benchmarking Dubai

In today’s marketplace and given Dubai’s aspiration to be the Green Economy Capital of the World, there is an immense need for a comprehensive and local benchmark that can act as the reliable source for assessing buildings’ performances in the UAE and the region. So far, such a database that is made available to public is non-existent with undocumented and publicized efforts to get it created. In some cases, where the energy audit is conducted for large developers who naturally have access to the energy data on all of their developments, internal benchmarks comparing buildings of different ages and similar types have been used to gauge the value of the energy retrofits being studied. But generally speaking, energy experts have been relying on benchmarking data that are established in the USA and the UK; being the ones generally endorsed by international specifying organizations and certifying agencies.

A locally generated benchmark will better capture the buildings performance in the unique local and regional weather conditions of the UAE and the GCC as well as being adapted to the regional buildings construction practices. With the ongoing buildings energy retrofits efforts and by constantly updating the benchmarking data, the median of the database will continue to change raising the performance expectancy and injecting more pressure on the low performing buildings to improve their operations. A successful benchmarking strategy will also help prioritize energy audits and retrofits, monitor buildings performances over time, improve operations and maintenance, and assess retro-commissioning activities; all of which are main contributors to energy use reduction in buildings, and hence the city. Not only that, but new constructions may also benefit from energy performance databases to set energy goals during pre-design phases and to evaluate and refine designs on the go. Such a move to establish a reliable and comprehensive energy buildings benchmarking database in the Emirate of Dubai will positively contribute to the energy use reduction efforts and the underlying Dubai Integrated Energy Strategy (DIES) 2030.

EUI 300 kWh/m²/yr

Etihad ESCO, which is a DEWA venture whose mission is to “make the Dubai built environment a leading example of energy efficiency for the region and the world”, has taken it onto their responsibility to analyze energy data and create an energy benchmark for selected buildings in Dubai to which they have an agreement with the owners/facility managers to study. This database is, however, not made public (up to the date of this article).

The need to establish a public and reliable buildings energy benchmark will involve a number of key success factors. A disclosure policy needs to be put in place that identifies the frequency of disclosure and, if made mandatory by authorities, the phasing of buildings types and areas to disclose their usage. Informative campaigns will have to be activated to encourage disclosure of energy usage and educate developers on the benefit of doing so. Those campaigns should also include training facilities on what to disclose and how to extract the required data.

Established International Benchmarks

Several international benchmarking efforts and movements have been performed and done successfully.

The US Department of Energy (DOE) has developed benchmarks for commercial buildings based in sixteen climate zones covering the United States of America. The commercial buildings covered are of sixteen types like schools (primary and secondary), large to medium offices, retail, restaurants, warehouses, healthcare facilities, hotels, and supermarkets. They are separated into pre-1980 construction and post-1980 construction. The database is compiled under CBECS, which stands for "Commercial Buildings Energy Consumption Survey". The survey to update CBECS is conducted on a quadrennial basis. This benchmark was complemented by a benchmarking tool created by the US Environmental Protection Agency: EPA's Portfolio Manager. The Portfolio Manager relies on the data gathered by the CBECS and is an online tool to measure, benchmark, and track energy and water consumptions. It is said to be the leading benchmarking tool for commercial buildings in the USA with 40% of the commercial buildings space already benchmarked on it. The Canadian government, spearheaded by "Natural Resources Canada", is also now using the Portfolio Manager for a national energy benchmarking initiative. The EPA Portfolio Manager has its own building rating labeling system called the ENERGY STAR. The ENERGY STAR recognition label is awarded by the US EPA for top performers in the commercial buildings energy consumption sector when benchmarked and assessed using the Portfolio Manager.

On a smaller scale, in 2009, New York City adopted a set of energy efficiency requirements for existing buildings as a part of the city's plan "PlaNYC", to reduce greenhouse gas emissions by 30% by the year 2017. A vital component of the plan is a requirement for public buildings over 10,000 square feet (929 square meters) and private buildings over 50,000 square feet (4,645 square meters) to benchmark their energy use on an annual basis. In 2011, NYC had already benchmarked over 2,700 buildings of multiple types and usages including healthcare facilities, educational facilities, community centers, police and fire stations, libraries, courts, and offices. This is considered a vital part of and contributor to the city's adopted Greener Greater Buildings Plan (GGBP); a plan created to help the city achieve its aggressive sustainability goals.

In the UK, the most relied on benchmark database is the CIBSE Guide F- Energy Efficiency in Buildings, after which its publication in 2004, the UK government has set targets for reducing energy usage and associated greenhouse gas emissions that are legally binding. The Guide's latest edition in 2012 includes a section on developing energy strategies to reflect the changes in the governmental planning policies. A related publication by CIBSE is TM46: 2008- Energy Benchmarks. It was published to complement a governmental move named "Display Energy Certificates" which requires public or institutional buildings that are greater than 1000 square meters to display, in a prominent position, the grade rating which reflects the actual carbon dioxide emissions generated by the building. The benchmark covers 29 building categories for electrical and fossil fuel energy use.

EUI 178 kWh/m²/yr

Final Thoughts

"benchmarking will drive action."

One of the most common barriers facing building owners and developers to invest in energy efficiency and retrofit projects is the lack of accountable information and benchmarks to assist energy experts and consultants in creating a clear-cut financial case to demonstrate that investing in energy reduction measures can provide profitable growth. It is difficult for developers to make the right decisions when it comes to energy efficiency projects as long as established and widely adopted benchmarks are not in place. **Developers are reluctant to invest in energy efficiency projects in the fear of missing out on other more straightforward growth opportunities.**

Benchmarking is a key tool that cannot be overlooked when adopting a city or nation wide energy performance improvement plan. Not only is it necessary for effective planning for energy retrofits and carbon emission reductions, but a readily available benchmarking tool would encourage the private sector to assess the performance of their buildings, engage in energy efficiency projects, and to positively contribute to the overall reduction in energy usage. If anything, benchmarking will drive action. ■

EUI 140 kWh/m²/yr