Building Energy Benchmarking and Reporting in the City of Victoria

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Background:

In Victoria, one half of greenhouse gas emissions are generated through building operations. The City of Victoria has a target of reducing community greenhouse gas emissions by 33% by 2020. To reach this target will require a significant reduction in energy use and greenhouse gas emissions from buildings throughout the City. As the result of a research report submitted by a consultant team approached by the City in 2014 to explore the issues, opportunities, and feasibility of developing a building energy benchmarking and reporting policy the City came up with a proposal to adopt energy and water benchmarking its own buildings and exploring a policy to require the same of large buildings in the community in order to improve data access, transparency, demonstrate leadership and advocate early adoption with regard to building energy use.

What is Energy Benchmarking?

Benchmarking is the process of quantifying a property's energy consumption resulting from its operation and maintenance. This information can be used to evaluate a building performance against the other buildings in that geography, identify and communicate possible areas of performance enhancement among the building managers, create awareness among the occupants and a crucial tool for policy makers. City of Victoria, in addition to energy, also implemented water benchmarking for its facilities. A total of 32 properties that include city office administration and works buildings, public city buildings for arts, culture and recreation, and parkades were benchmarked using ENERGY STAR Portfolio Manager (ESPM).

ENERGY STAR Portfolio Manager (ESPM):

ESPM is an online benchmarking tool created by the EPA. In addition to energy benchmarking, this tool allows the user to measure and track the water consumption and GHG emissions. In addition to this the software provides information on Source energy consumption – a parameter that includes the amount of energy that is consumed from the point the fuel is mined, transported and till it reaches the facility where it is used, in addition to the actual metered consumption at the point of use; Weather normalized energy data – a parameter that explores how a property performs under average and actual weather conditions; direct and indirect GHG emissions and National median values for each of the parameter to facilitate comparison with other buildings. Of all, the most attractive feature of the ESPM is the ENERGY STAR Score.

ENERGY STAR Score:

ESPM, taking into account the data on building energy consumption, the water usage, GHG emissions, occupancy, functional hours, and appliances, against its repository of information available for the other properties in that geography generates a score for every property. Since this score includes all the performance metrics it makes comparison with other properties simple and efficient. However, ENERGY STAR Scores are available only for a few building types in Canada as opposed to US where it is available for more building types. Among the buildings benchmarked for the City of Victoria only Office buildings qualify for an ENERGY STAR Score.

An equivalent approach to ENERY STAR Score:

In order to be able to have a one parameter quantifying scale for building performance for building types other than Offices, a scoring pattern was developed evaluating a building's electricity and natural gas consumption intensity, Source EUI, water usage intensity and GHG emission intensity. In order to validate this approach, it was tested on the Office buildings for which the ENERGY STAR score is available already. Both the scales ranked the buildings in a similar pattern. Though this approach is not accurate as it excludes information on occupancy, appliances etc. it can still be considered valid for a basic comparison based on its water usage, fuel consumption and resulting emissions. This method was adopted to identify the best and worst performers of the other building categories.

Conclusion:

The 32 properties were benchmarked for energy and water for the years 20-11, 12, 13 & 14. A comprehensive performance matrix was developed containing all the key findings from benchmarking and they were categorized into nine building types based on the purpose they serve, in order to make comparison among themselves and with the other cities easier. This database is custom made to include all the information required for any future reference and easily comprehendible for all users. A reporting template for the building facility managers was created highlighting the information obtained using ESPM, with the inclusion of some insights into the reasons behind its performance. Throughout the study the City of Vancouver's "Energy Benchmarking How-to Guide" was used as a handbook. A list of suggestions and comments on ways to make the guide more effective was created along with a few suggestions to EPA to enhance the benchmarking experience using ESPM.