Energy Conservation Measures for Existing UBC Buildings

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Background:

UBC, on the path to achieving its Climate Action Plan goal of 66% reduction (from 2007 levels) in GHG emission by 2020 is investigating for new opportunities through possible energy conservation measures in existing UBC buildings. One of the key areas of focus would be reducing natural gas consumption as natural gas, used for space and water heating in the university buildings, has proved to be the single largest contributor of GHG emissions in UBC. It is hence the university is keen on employing energy saving retrofits for existing UBC buildings that could potentially reduce the natural gas consumption.

Sustainability Revolving Fund and the GRITS Online Database:

One resource available to support energy retrofits is the Sustainability Revolving Fund, part of the Billions Dollar Green Challenge initiative administered by the Sustainable Endowments Institute which loans to the institution the money required for implementing the approved energy conservation projects. The Sustainable Endowments Institute also has a collection of record of all the projects that has been approved by it and either completed or at different stages of implementation across various institutions in North America. This online resource called as the GRITS online database is a very effective tool to track the successfulness of the different projects and identify the best performers that suits the conditions here at UBC.

Evaluating the Projects:

The GRITS database provides detailed information about the participating institution, project type, type of resources tracked, GHG reductions achieved, financial savings, the building conditions and a brief description about the project itself. In order to help us pick the projects that would prove effective for UBC conditions certain evaluation criteria such as type of resources conserved, amount of energy saved, GHG emissions abated and payback period.

As a filtering mechanism, all the projects that involved reduction in natural gas usage were pulled out separately to help us with our main goal of reducing GHG emissions through reduced natural gas consumption. This is because reduction in electricity consumption will not contribute much to our GHG reductions as the power here in BC is sourced from its Hydro sources and by itself has low carbon footprint. This helped us downsize to a total of 65 projects with 55 of them being Building HVAC projects and a few building envelop projects. These projects were sorted by their geographical locations, amount of GHG emission reduction, amount of natural gas consumption reduction, life span and simple payback period. Since the projects were spread across USA and Canada, in order to draw a fair comparison all monetary terms were adjusted to CAD – For example, the price per unit, here in BC, for the resources tracked were used to arrive at the financial savings and the project cost

in US was adjusted to address the difference in currency value between the two countries. Most projects involved either mechanical insulation for HVAC components using thermal blankets or HVAC control upgrades using sensors. Using this sorted version of the projects the attractive projects can be identified.

Next, all the other projects that involved electricity consumption were sorted using the same criteria as the natural gas projects with the exception of climatic zones. The common project types in this category were lighting retrofit from T12 to T8 and employing motion strips to identify occupancy and use it as a mechanism to control lighting and HVAC. A separate list of the projects, from both categories, in Canada, was created.

While the Natural gas projects were spread out across different universities, the projects involving electricity consumption were mostly implemented by University of Michigan and Harvard University. Thompson Rivers University and Carleton University were the only participating institution from Canada, other than UBC, under the natural gas project and electricity project categories respectively.

Recommendations to Sustainability Endowments Institute on updating GRITS database:

To include area – the database does not have any information about the building area/ GFA/ volume heated or cooled for the projects and it causes an unfair comparison. With the inclusion of area it could be easy for one to identify with other similar projects and/or to scale the savings to one's building conditions.

To include power source – the database gives only the total amount of GHG emissions abated for the projects when the project actually conserves more than one kind of resource. This does not have a major effect on natural gas only projects as they have the same emission factor but with electricity, different sources of power have different emission factors and the same is true with steam in which case gas fired or oil fired to generate steam makes a difference in the emission factor. This is important because the hydro power in BC has a low emission factor when compared to coal power used elsewhere in the continent. With information about the source of power and its emission factor combined with the amount of power conserved one can scale it to the amount of GHG emission reduction that can be achieved in a geography that is of interest to the Institution.

To include weather data – including certain common weather data such as HDD, average temperature in summer and winter seasons, average duration of summer and winter seasons would make the user group projects in similar climatic zones easier.

Common units for reporting – using common units for the resources either at the point of entry of the project into the database by the participating institution or the provision to convert different units to one desired format by the GRITS user can save a lot of time and ease with comparison of projects.

Building type – although the GRITS database currently has a field to include the building type it is empty for most projects. Making it a mandatory field or including more building types for the user to select from could help solve this issue.