Telus / William Farrell Building Revitalization. Vancouver, BC
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The revitalization project of the William Farrell Building in Vancouver, completed in 2000, is a remarkable example of green building in Canada. The owner, Telus, instead of constructing a brand new building to satisfy their business needs, they chose to renovate the interior and exterior of a 1940s building extensively. The project turned a 127,000 sq. foot office and equipment space into office, retail/commercial and presentation space. The company's mandate was to reuse and recycle existing materials, and incorporate green strategies in an ongoing basis. In order to achieve the company's objective, the consulting team responded with innovative solutions that result in a significant reduction of operating energy. Moreover the reuse and recycle strategies divert large amount of solid waste from landfills and at the same time generate a significant amount of revenue. As the company is committed to sustainable practices in daily operations, they integrate devices to encourage reduced use of automobiles. Telus also ensured no harmful material was used in any of the construction and product fabrication processes.

Fig. 1 Left – Original William Farrell Building
Right – Revitalized William Farrell Building

Since reducing energy consumption helps to protect the environment and at the same time saves a company expense, it becomes a primary concern for the renovation project. One of the most noticeable energy saving features incorporated in the new Telus building is its triple-skinned, energy-efficient exterior. A new double glazed, fritted and frameless glazing with operable windows suspended 900 mm from the existing brick façade. The new cavity, called a plenum, acts as a thermal buffer, which provides insulation during winter and allows air intake during off-peak seasons (as per Fig. 2 and Fig. 3). In order to maintain optimum temperature inside the cavity, motorized dampers are installed at the top and bottom of the plenum. When the dampers are opened, it allows air to flow into the air space and create natural ventilation. Furthermore, photovoltaic-powered fans are employed to boost the air movement. The incorporation of operable windows also enhances natural ventilation. During the cold season, the dampers close and the cavity becomes an insulator.

To help reduce heat gain without foregoing natural lighting from the sun, the exterior glazing has a fritted pattern that blocks out the solar heat while allowing maximum daylight to penetrate into the interior. With the installation of the lightshelves at the southwest elevation, the natural lighting level increases in the interior area by reflecting light deeper into the interior floor, while they are also shading the building at the same time. Due to the seasonal changes of sun’s angle, the shading device reduces solar load in summer but allows solar gain in winter.

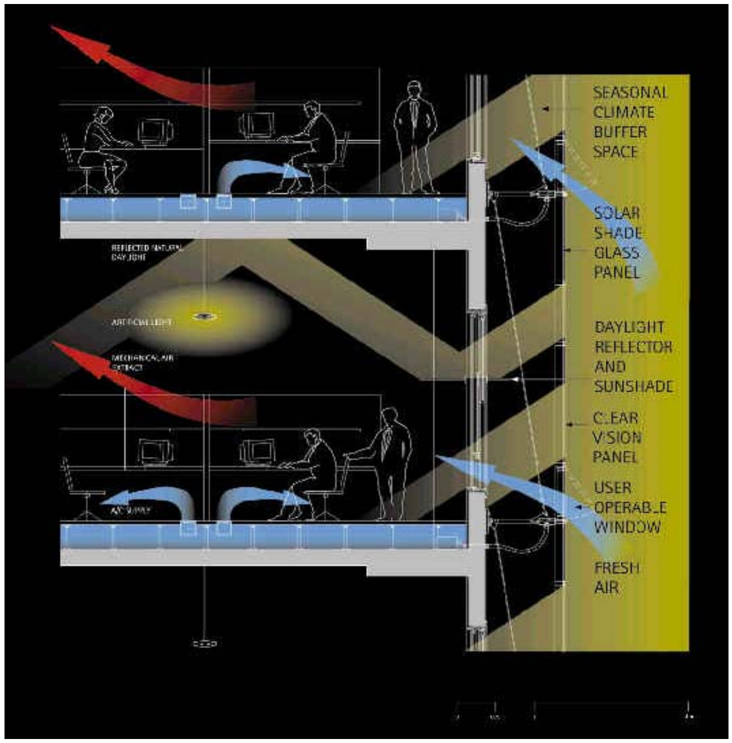

Fig.2 - Diagram of Telus Building ventilation and light control systems

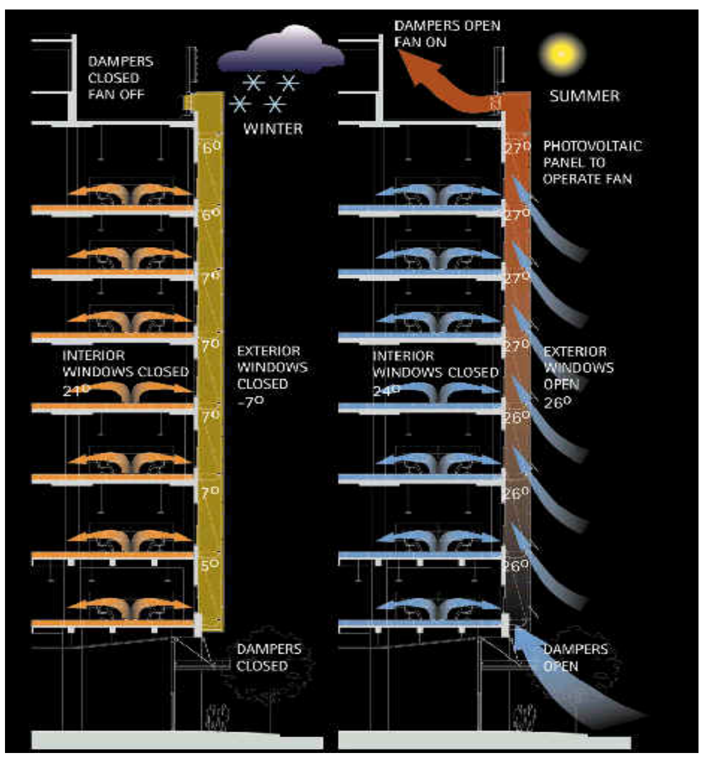

Fig. 3 - Diagram of Telus Building temperature control system

In addition to the glazing system, a new heating and underfloor system are the other major energy saving renovations to the building. In the existing building, a central chilled water system and central steam heating are used for air conditioning units and perimeter radiation units. As part of the retrofit, the steam –heating system was replaced with a heat-recovery system, which uses waste heat from the cooling process of the adjacent building. The new system meets 85% of the building's heat requirement. Since the original building has high floor to floor heights and no ceiling was installed, engineers took the advantage for installing an underfloor pressurized plenum with a raised–access floor. The underfloor plenum delivers conditioned air to localized diffusers in the occupied area of the building. The significant advantage is to allow occupants to have individual control of the incoming air, in order to improve thermal comfort, air quality and energy efficiency. The potential fan energy consumption is reduced when comparing with overhead ducted air distribution, due to lower static pressure requirements. Moreover, the exposed structural mass of the underfloor plenum can be used for thermal storage, which absorbs and then slowly releases heat, results in reducing peak cooling load.

With the installation of the building's new skin and the innovative heating and ventilation system, the facility uses 30% less energy[i] than one built to the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) standard 09.1989. The energy consumption level is also about 35% more efficient than levels stipulated by Vancouver's energy by-laws[ii]. The amount of energy saved also signifies that the company's expense on energy is reduced and the amount of CO2 emission is reduced. The figures show that the new systems are successful in achieving the company's objective.

The features that the Telus building adopted for energy saving are applicable for most commercial buildings. Although the design of the triple skinned glazing is due to the retaining of the original structure, and the recovery heating system is used because of the adjoining building can provide the heating requirements, the basic idea of these features can still be used after some modifications. The triple skinned facade can be modified to double skinned, which keeping the same thermal cavity idea for controlling the temperature of building. Instead of using the heat generated from the adjacent building, some building may have different type of machines operating for specific industry, that heat can be retrieved and recycled. The new heating and ventilation systems of Telus building are usually installed in a large scale, and require a large capital investment. They are more suitable for commercial buildings rather than residential. Moreover before installation takes place, engineers should conduct a thorough study of the building structure and the site condition in order to achieve optimum energy performance. However some smaller devices, like fritted glass, light shelving, and natural ventilation idea can be used in any building of any size.

Another goal the renovation project strives for is to reduce solid waste by reuse and recycling of existing materials. The most significant decision the company made was to retain the old structure. It prevented the production of a great amount of waste and saves the energy used for constructing a new structure. Other than the building envelope, a lot of interior components and fixtures are reused. For example, ground floor andersite stone and granite stone were re-cut offsite, and made into fittings for new window openings. Existing windows, handrails and stairs are also retained. Suspended lighting, electrical conduit, sprinklers and carpet tiles remain available for reuse. Furniture also is reused or relocated. The old chiller was removed and reused in another company’s facility. Salvaged or unused materials were sold. The material that was removed without selling or recycled are either toxic or of low economic value, such as materials containing asbestos or terra cotta.

In addition to the recycling of the existed material from the original building, the materials used by the telecommunications industry were also incorporated into the building design. Fibre optics are integrated into an exterior lighting system. Copper ducts are reconfigured and reused as guardrails.

For the new components added onto the building, the materials were selected carefully. The exterior building material are mainly recyclable, such as structural concrete, cinder block, electrical cable, rebar, anodized aluminum mullions, clear glass, aluminum roof screen and steel supporting structure. Some interior materials can be reconditioned and reused at the end of the product life, like carpeting, steel studs and gypsum board.

The decision to recycle the building diverted 16,000 tonnes of solid waste from landfill. The reused and recycled materials amount to 75% of the total material mass of the new building. With the recycling effort mentioned, the company estimated landfill avoidance cost of $1.3 million. Other than reducing waste, recovery operations helped the company to earn a significant amount of money. The recycling initiative combined with the sale of used and surplus equipment generated net sales revenue exceeding $4 million[iii].

The practise of recycling and reusing can be done in almost any place at any level. It is the easiest and yet one of the most effective ways to protect our environment. It also does not require specific knowledge for carrying out the action. In most construction cases, renovation of existing buildings should be encouraged. In today's urban society, housing is in high demand. Revitalizing of abandoned buildings, especially industrial buildings, becomes a common choice. Moreover reusing, relocating or re-selling used materials are also highly applicable in any situation. Many of the construction materials should be considered for reconditioning or reconfiguration into different forms for other usage, such as re-cutting the structural stones into smaller architectural components is something easy to accomplish. It may save construction cost in some cases.

Part of the Telus commitment to sustainable practices is to reduce harmful impact on the environment as a long-term consideration. They try to achieve the goal by reducing harmful emission in both direct and indirect ways. Maintaining a healthy working environment also becomes their concern. The replacement of steam-heating system with heat-recovery system results in reducing emission. Using air-cooled chiller rather than water-cooled chiller reduces the risk of Legionella's disease. With the installation of an underfloor plenum, the air quality and thermal comfort is better controlled and conforms to the ASHRAE standards.

Wall finishing materials are also selected with caution. They use low VOC (volatile organic compound) paint, no VOC linoleum and water-based adhesives, that minimizes the emissions contributing to ozone formation. Carpets used are low-pile, tight weave with low-emission backing. The cleaning products used by the maintenance staff also contain low-VOC.

Other than controlling the direct use of harmful material, they also promote minimizing the use of cars, to reduce carbon dioxide (CO_2) emissions. The project incorporates bicycle storage, showers and change rooms to encourage the choice of alternative transportation. The building site is also favoured for taking public transit, since it is only 100m from main downtown bus depot and 200m from Light Rapid Transit Station on Granville Street.

The result of the completed building saves 15,600 tonnes of greenhouse emissions (CO_2). The new building system operations will expect to save 520 tonnes of greenhouse emission per year. For the estimation of over 75 years lifespan. The project will save in total 54,600 tonnes of greenhouse emissions[iv]. The company also targets reducing pounds of halons by 85% and number of chemicals used by 50% by year 2004[v]. From the initial amount of greenhouse emissions reduced, the project is significantly successful. The new renovated systems are helpful in maintaining low emissions level from the building operations.

Among all the green strategies applied by the Telus building, the reduction of pollutant emissions is mostly ignored by most of the industries. It is because the strategies may involve life style changing, or giving up some product qualities. The idea of reducing automobile use is a very effective and direct way to protect the environment. However the location of the company and the routing of city public transit may restrict it. Human factors also hinder the execution of the policy. Avoiding the use of environmentally harmful chemicals should be all companies' and households' concern. However price and quality may hinder people from going for "cleaner" products. In the case of architecture, architects should act as leaders and set an example in choosing non-hazardous chemicals, especially when dealing with paint and wall finishing material.

From the green strategies used by Telus in their William Farrel building revitalizing project, we can see that there are many easy ways available to construction processes to protect the environment. From energy reduction, material recycling to pollutant emission reduction, architects can take a big part in supporting sustainable practices, which result in improving the quality of the natural environment. Committing to a green policy may require money investment, life style changes and extra physical effort. From the example of the Telus project, these extra efforts may pay off and for sure they are making a positive impact on the environment, which will bring a better future to the generations to come.

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[i] *Natural Resources Canada, "Canada's Energy Efficiency Awards 2000", Cat. No. M27-01-1566E*

[ii] *Telus Environmental Policy, http://about.telus.com/publicpolicy/environmental.html*

[iii] *Telus Environmental Policy, http://about.telus.com/publicpolicy/environmental.html*

[iv] *IDRA 2001 Award Winners, http://www.designresource.org/idra2001/Busy&Associates_ProFirstPlace.htm*

[v] *Telus Environmental Policy, http://about.telus.com/publicpolicy/environmental.html*

Fig 1 Telus: Revitalization of an Office Building http://www.oikos.com/library/showcase/telus/

Fig 2 and 3 Green Building Challenge 2000, Automated Buildings .com Review http://www.automatedbuildings.com/news/mar01/reviews/gbldg/gbldg.htm

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