



Green Roof in the Philippines Government Office Building

Project Details

COMPANY

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COUNTRY

Philippines

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Green Roof and Water Management in Philippines Government Office Building

CONTEXT

The two main stakeholders in the project are LafargeHolcim Philippines and Laguna Lake Development Authority (LLDA):

- A world leader in building materials, LafargeHolcim employs 63,000 people in 61 countries, and posted sales of €12.8 billion in 2014. LafargeHolcim has an established presence in the Philippines through a nationwide manufacturing network composed of five cement plants, one grinding station, cement terminal, and aggregates quarries that are strategically located throughout Luzon, Visayas and Mindanao, and operated by over 1300 skilled professionals.
- LLDA is a governmental agency in the Philippines. Its mission is to ensure the development and balanced growth of the Laguna Lake area while providing environmental management, control, and preservation of the quality of human life and ecological systems.

Rapid urbanization in the Philippines has given rise to many challenges as increasing infrastructure developments contribute to reduced open spaces and increased energy consumption.

Both the public and private construction sectors are responding by reshaping the cityscape and designing building structures that are environmentally responsive as they are beautiful and compact. Now, buildings should not only be sturdy and spacious, they should also be efficient in energy consumption and adaptive to the changing environment.

To address this need, some companies are installing artificial turf. However, LafargeHolcim Philippines (LafargeHolcim) has partnered with SIKA Ag – a manufacturer of specialty chemicals for construction and industry – to develop an innovative green roof solution.

LafargeHolcim supported LLDA's mission to protect the Laguna Lake area and be an exemplary environmental steward by providing innovative technology products for the LLDA's new building.

OBJECTIVE AND PROJECT OVERVIEW

One of the first public institutions to rise to the challenge is the LLDA, which unveiled a two-wing, four-story green building in Quezon City to mark its 48th anniversary in 2014. The LLDA building, which will be the Authority's new permanent state-of-the-art home, is the first ever Philippine government structure to be accredited as a Green Building. Located on a 3,021-square-meter (m²) lot at the National Ecology Centre (NEC), the new LLDA headquarters and laboratory will have around 5,600 m² of gross floor area, which will accommodate all the departments of LLDA including laboratories and the executive offices.

Reflecting the critical mandate of the LLDA to protect the country’s largest freshwater lake, the LLDA building features its own water treatment facility, material recovery facility, and a rain collection system that can hold 60,000 gallons of water. In order to be certified by the Building for Ecologically Responsive Design Excellence, several greened areas have been installed in the building: two “pocket gardens” in intermediate levels and a green roof (Bio Roof) which covers an area of 208 m².

THE BUSINESS CASE

Green roof systems are a natural solution to help reduce the environmental impacts of new and old buildings; they are not significantly more expensive than a conventional concrete roof (representing 0.5% of the total building costs) and they provide numerous benefits.

The Bio Roof is integrated within the building’s structure. Its vegetative layer protects the waterproofing membrane from climactic extremes, which allows for reduction in maintenance and the reduction in size of stormwater handling facilities:

- The reduction in maintenance occurs because the green roof protects the waterproofing membrane from climatic extremes, UV exposure and mechanical damage, so the life span of the roof is then significantly increased.
- The reduction in demand placed on facilities appears at city (or district) level to handle volume of stormwater. The green roof acts as a sponge, capturing 25 to 90 percent of the rainwater (which can be used for non-potable needs), thus reducing the volume of water needed to be handled by the drainage systems.

In addition to these monetary benefits, ancillary benefits include:

- According to Engineer Erickson De Guzman Facilities Manager of LLDA, the Bio Roof has also now become a focal area in the LLDA. “We have held flag ceremonies there, as well as conferences and other official functions,” he relates, adding that employees often go to the roof to take a breather from work and to relax.
- Rainwater, collected within the substrate for plants, helps cool the atmosphere when the temperature rises, as the water in the soil evaporates, reducing heat island effects.
- Insulating properties of our green roof system improve the energy performance of a building over its lifetime, reducing the demand for heating and cooling.
- Green roofs contribute to improved air quality; and have the ability to neutralize the pH of the rainwater run-off.
- By providing living space for plants and animals—particularly mobile species such as invertebrates and birds—the green roof serves as reservoirs of biodiversity in urban areas.

PROJECT DETAILS

In order to help customers differentiate themselves from competitors by receiving environmental credits for their projects, LafargeHolcim has partnered with SIKA—a manufacturer of specialty chemicals for construction and industry—to develop the innovative green roof solution that was used for the LLDA’s new building (Figure 1). The three main components of the system are:

1. The growing medium BioMix, a special lightweight medium composed of different ingredients, which enables stable anchorage of plants’ roots and provides appropriate water-holding capacity.



Figure 1. Green Roof System

2. The underlying layer of natural lightweight aggregates BioLite, for drainage. This natural material promotes healthy plant growth by retaining and draining water in a natural way. In addition, this material will conform to any shape and depth of the drainage course, does not require any maintenance, can be easily recycled, is durable, does not contain clay or organic material, and can support thick layer of soil and live load.
3. The waterproofing and root barrier membrane Sarnafil, which is a fiber reinforced, multi-layer, synthetic membrane.

The herbaceous plants and grasses are carefully chosen to regenerate themselves and stand up to extreme variations in heat and water availability.

In addition to the green roof, the project will also include other ecological features such as a wetland area for natural treatment of stormwater onsite and creating a cooling effect in the areas surrounding the building. Thanks to this wetland, the building won't have additional impact on municipal drainage systems. This wetland area will also act as a small-scale representation of the ecological processes that occur in Laguna Lake and will be used for educational purposes for visitors.

LESSONS LEARNED

- This system provides many benefits to a building's aspects, including improved cooling, better energy efficiency and water management, and the conversion of idle roofs to green spaces.
- Having historically worked primarily with contractors, LafargeHolcim was challenged to enter the process of building design from the planning and pre-design stages, to begin discussions with other key players, such as landscape architects, environmental consultants, and structural engineers.
- Similarly, job site supervision and team coordination during installation was a new activity for LafargeHolcim.

FUTURE IMPLEMENTATION AND NEXT STEPS

The LLDA building will be followed by other buildings in the Philippines and elsewhere in the world. Building on the success of this green roof project, LafargeHolcim is also offering additional solutions for stormwater management for driveways and pathways, using the pervious concrete Hydromedia.

ABOUT THE WORLD BUSINESS COUNCIL FOR SUSTAINABLE DEVELOPMENT (WBCSD)

The World Business Council for Sustainable Development (WBCSD), a CEO-led organization of some 200 forward-thinking global companies, is committed to galvanizing the global business community to create a sustainable future for business, society and the environment. Together with its members, the council applies its respected thought leadership and effective advocacy to generate constructive solutions and take shared action. Leveraging its strong relationships with stakeholders as the leading advocate for business, the council helps drive debate and policy change in favor of sustainable development solutions.

The WBCSD provides a forum for its member companies - who represent all business sectors, all continents and a combined revenue of more than \$8.5 trillion, 19 million employees - to share best practices on sustainable development issues and to develop innovative tools that change the status quo. The council also benefits from a network of 70 national and regional business councils and partner organizations, a majority of which are based in developing countries.

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