

Green Building Case Studies

Bahamas



The IDB Group Office in the Bahamas demonstrates the benefits of focusing on sustainability projects that fit the local context. By tackling the challenges of energy and water, the office has achieved a per capita carbon footprint that is 50% below the average for all IDB Group offices and eliminated its dependency on carbon-intensive desalinated water. These projects are easily replicable across the region and serve as a model for other building owners seeking quick wins for sustainability.

Planning for Resilience: Accounting for Local Conditions in a Green Upgrade

The Bahamas, like many countries in Latin America and the Caribbean, are particularly vulnerable to the effects of climate change. The country has already experienced climate impacts including

increasingly frequent and intense hurricanes; desertification resulting from the degradation of limited arable land, periods of drought and dust storms; sea level rise, coastal erosion, and drought. Water scarcity and water security, already a problem, will worsen with climate change. Like much of the Caribbean, even with an abundance of sunlight, the country is highly dependent on the consumption of imported fossil fuels – the combustion of which contributes to further climate change.

PROJECT HIGHLIGHTS

-  Grid-tied 74 panel, 15 kW solar PV system installed on new carports.
-  Payback period of less than 5 years and a projected ROI of 106% in 10 years.
-  Since commissioning in 2016, it is estimated to have produced more than a cumulative 1100MWh of electricity and savings of more than \$55,000. 50% reduction in electricity costs for the office.
-  Potable water system fed by rainwater will fulfill all the office's water needs.
-  Estimated to save \$1976 yearly on water bills.

But there is much that can be done to protect against these effects and reduce the greenhouse gases (GHGs) that cause deadly climate change. The IDB office in the Bahamas is demonstrating



Carport Photovoltaic Panels also provide shading for parking spaces.



how. Two recent updates to the facility – solar PV panels and a rainwater purification system –work in tandem to reduce the building’s environmental impact and enhance its resilience in the face of climate change, while dramatically reducing costs and setting a best practice example to colleagues, clients, and other stakeholders.

Start with the Sun

The Bahamas has a goal to produce 30% of its energy from renewable sources by 2033, but the country is heavily reliant on fossil fuel imports, which account for over 99% of total electricity production. This dependence on fuel imports, like other countries in the Caribbean, [has led to some of the world’s highest electricity costs](#) – in some cases up to four times higher than in countries such as the United States¹.

In 2014-2015, electricity costs for the IDB Bahamas office, a modest building with only 17 occupants, were on average US\$ 30,000 per year. Electricity represented 90 percent of total utility costs and almost 7 percent of non-personnel costs of the country office. With such high utility costs, but ample solar capacity – over 2,000 hours of sunshine per year—the decision to install an onsite solar PV system was simple. **The country has introduced multiple policies and incentives to support renewable energy generation, including for grid-tied small scale renewable generation supported by a Feed-in Tariff.**

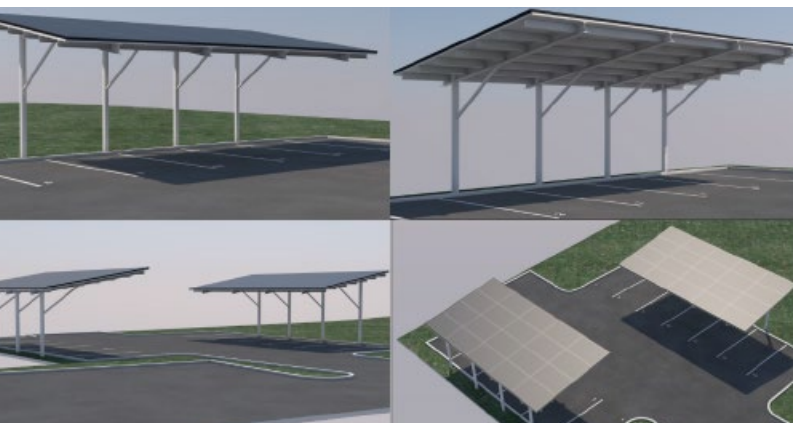
In November of 2016, the Bank installed a 15-kW solar PV system consisting of 74 panels on new carports constructed behind the office. With an installation cost of \$48,000, the system had a payback period of less than 5 years – and a projected ROI of 106% over 10 years. The location

Climate change and environmental sustainability is one of three cross-cutting issue addressed in all IDB group financed projects and initiatives. The team at Country Office Bahamas is dedicated to invoking change and providing relief to this pressing matter. Our office in the Bahamas manages projects that support a comprehensive renewable energy program that takes into consideration institutional reform, energy planning and investments. The office also leads the charge on reconstruction with resilience in the energy sector in the Bahamas. The overarching goal of these projects is to support The Bahamas in its drive to transform and advance the energy sector in a more sustainable and efficient way.

Country Office Bahamas

of the system, a response to the roof lacking the structural integrity to hold the panels, provides the double benefit of shading parking spaces during the day. While the IDB’s system is not connected to the grid, the project still enables local suppliers, installers, and building owners to see firsthand the simplicity and financial benefit of installing such a system.

Since the system’s commissioning, it is estimated to have produced more than 110MWh of electricity and saved over \$55,000 in energy and carbon offsetting costs, by cutting the office’s electricity costs nearly in half. In addition, LED lighting, motion sensors, solar film, and hurricane-proof windows have also been installed, increasing the efficiency of the building by decreasing electricity demand. By reducing fossil fuel-intensive energy from the local grid, approximately 18 tons of CO₂ equivalent have been avoided yearly since the system was installed.



Carport Photovoltaic Panels.





IDB Country Office: Bahamas.

Fighting Water Scarcity

Freshwater sources in the Bahamas are finite, vulnerable, and declining. There is little surface water runoff and no freshwater rivers. The frequency of droughts is expected to increase, further reducing the availability of freshwater. Although the country receives over 50 inches of rain per year, seawater reverse osmosis provides over half of the Bahamas' potable water supply. However, this water supply is vulnerable to extreme weather events that can damage water infrastructure. In addition, the purification process is very energy intensive, so it produces a high amount of greenhouse gases. Stresses on the water supply continue to grow from tourism and population growth. The Bahamas must address impending water supply challenges by reducing water demand and increasing the resilience and availability of freshwater sources.

To help meet these challenges, the IDB Group office has replaced its bottled water and municipal water use with an onsite rainwater-fed potable water system. This type of system is easy to install and is already in use in several homes and businesses in the Bahamas. Rainwater is collected from the roof, where it travels down the gutters and is filtered and ultra-purified. A UV light

filter disinfects and sterilizes the water, while carbon media filters remove chlorine, particles such as sediment, volatile organic compounds (VOCs), taste and odor. The purified water is stored in a holding tank where it is then pumped to the office. Water quality is tested by a specialized firm every three months to ensure that the water purification system installed meets safety parameters.



Example of Water Storage and Filtration Systems in the Bahamas.



The system is powered by the office's onsite solar panels and will be able to meet 100% of the office's potable water needs – around 16,000 gallons per month. The office already has a cistern with a capacity of nearly 30,000 gallons; during the drier months, an automatic valve will allow the office to use the municipal supply if necessary.

To further conserve water, the office has 8 low-flow toilets that use only 1 gallon per flush and is replacing all 10 faucets in the bathrooms and kitchens with sensor-driven automatic taps.

The system replaces the approximately 65,000 gallons of municipal water consumed by the office annually, saving an estimated \$1976 per year. In addition, eliminating the desalination process means an indirect reduction of approximately 62 tons of CO₂ equivalent.

Walking the Talk and Spreading the Word

Both the photovoltaic and the rainwater-fed potable water systems have significant environmental and cost savings benefits. They also serve as a clear signal of the IDB's support for sustainability in the region. Although the office's solar PV system represents 0.5% of the Bahamas registered capacity of small-scale renewable generation, it shows the ability of building owners to install these systems. It is a tangible opportunity to demonstrate and promote renewable energy across the region, which supports the Bank's commitment to climate action and dialogue on renewable energy investments.

Common concerns for building owners in the Caribbean when considering on-site solar are cost and suitability of their site. The IDB Group office had a positive experience with both challenges. When the project team found that the existing building could not support the weight of panels on the roof, they came up with the idea of building the canopy over the parking area – which offered the additional benefit of

shading the parking lot. Although the Bahamas faces intense storms and hurricanes, the panels and supportive steel structures have weathered these storms unharmed. During particularly severe hurricane activity, the solar panels can be dismantled.

Owing to the high cost of electricity and the falling cost of solar systems, the payback periods of on-site solar continue to be favorable – the system installed by the IDB Group office will pay for itself in approximately 5 years. The system can be easily replicated – the Bank's experience shows building owners don't even need a roof to install onsite solar.

The office also plans to help other stakeholders in the community to replicate the rainwater-fed potable water system. The system itself is easy to install, with several other systems already in use in Bahamian homes and businesses. Payback periods on the water systems are also quick – the ability to use “free” filtered water in place of municipal sources means that many of these systems could pay for themselves in less than five years. To showcase its efforts, the Bahamas office plans to develop an informative project video and an easy-to-read infographic for release across multiple social media platforms. The team also plans to engage local NGOs and Civil Society Organizations during regular meetings to showcase the office's enhanced water conservation system.

Finally, both projects are excellent opportunities to engage with employees. Staff can see that the Bank is implementing the solutions it promotes in its own buildings – that it is walking the talk. Employees can share these ideas with friends, family, and guests, who can consider implementing them in their own homes and offices.

Both projects show that small buildings located in difficult markets should not shy away from either onsite solar PV or rainwater filtration systems – if anything, building owners should run towards the opportunity for cost savings and environmental benefits.

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