Delivering sustainability

Integrating sustainability into capital projects from the outset is the best way to guarantee the long-term future of airports, writes Betsy Huigens.

Without a doubt, sustainability is the buzzword when it comes to developing and operating airports today.

Indeed, airport owners are becoming more and more aware of the benefits of sustainable design, construction and operations.

And, it is not only because of the need to comply with increasing regulations on carbon emissions, as an ever-increasing number of airports now realise that sustainable development can help them maximise the passenger experience and take advantage of long-term cost savings associated with implementing sustainable design technologies.

The case for sustainability hasn't always been an easy one. It has tended to be seen as an 'add-on' with an extra cost, instead of being integral to the project and therefore part of the planning process, right from the start.

To help airports justify sustainability in design and build, consultants and builders are now looking at the lifecycle-costs of projects – rather than simply at the total installed cost – and using data from case studies at other airports, in order to predict the future cost savings from various sustainable design solutions.

At London Gatwick, Bechtel has helped develop processes to assess the investments in their Capital Investment Programme based on long-term lifecycle costs, taking into account cost savings of energy reduction and other sustainable design initiatives.

Bechtel, HOK and Vanasse Hangen Brustlin (VHB) also collected benchmark information on sustainability initiatives undertaken by different airports in Europe and the US.

In fact, by collecting data on the performance of different sustainable design technologies, including total installed costs and maintenance costs, Bechtel has also been able to calculate approximate return on investment (ROI) periods, allowing the client to begin to justify potentially higher initial costs in exchange for lower operating costs.

Targets and objectives

Airports like Gatwick are now setting themselves tough, but achievable sustainability targets. In 2008, the UK's second largest airport launched a sustainability plan that set out ten issues and gave itself ten years to achieve established goals.

These included specifics such as reducing carbon emissions by 50% against a 1990 baseline; reducing energy against the same baseline by 20%; cutting water consumption by 20%; recycling 70% of waste and generating no waste to landfill.

It says it has already achieved a 97% reduction of ozone-depleting gases within its cooling system and will completely eliminate them this year.

Another project involved establishing a process to store concrete waste on site to be processed and reused in future construction projects.

In December 2009, Bechtel was selected to support the management of Gatwick's €1.4 billion Capital Investment Programme (CIP) by Global Infrastructure Partners (GIP), the major shareholder in London Gatwick Airport.

Airfield enhancement at Gatwick Airport is a top priority for owner, GIP.

Improvements include the expansion of two passenger terminals and airfield improvements. And recently, the gateway successfully delivered a €57 million runway rehabilitation project, and is currently working on a host of other projects across the airport site.

They include the renovation of North Terminal Pier 5; replacement of the airport's oldest pier facility, Pier 1, with an integrated extension to the baggage handling facility; and South Terminal International Departure Lounge.

Use of BIM at London Gatwick has allowed it to model energy performance, interior environmental quality, minimise waste during construction and maximise efficiencies during construction and operation.

Whether designing new terminals, upgrading existing ones or building entirely new airport complexes, airport projects tend to focus on minimising environmental impacts, maximising the passenger experience, and taking advantage of long-term cost savings associated with implementing sustainable design technologies.

If sustainability objectives are included from the start with maximum design flexibility, the chances of successful delivery of sustainable solutions are improved.

For example, Terminal 3 at McCarran Airport in Las Vegas, which opened last year, uses technology which has helped to increase efficiency and reduce waiting times.

Bechtel included 100% common-use systems to enable airlines to time-share facilities based upon their operational needs; new self-boarding gates to speed up passenger embarkation; and dynamic signage provided by more than 1,100 low-energy liquid crystal displays and LEDS to enable wayfinding, passenger information and airline branding with up to the minute information.

As programme manager of Hamad International Airport, it was also responsible for the overall airport master plan and managed the design of the main terminal building, whose building orientation and high-tech glazing was selected to help minimise the impacts of heat gain within the building from the hot desert temperatures.

The passenger terminal building has a canted north and south curtain-wall and high-performance insulated glass to reduce solar exposure. It also features demand ventilation controls that use carbon dioxide occupancy sensors, displacement air ventilation systems in the concourses, daylight and occupancy sensor controls for lighting. And if that is not enough, the complex will boast an energy management control system interfaced with the power monitoring and control systems to create a truly energy-efficient airport.

Yet, creating a sustainable airport doesn't need to rely on technology. Even simple solutions can make a real difference.

Bechtel helped to design and build a new terminal building at Curaçao International Airport that included a number of sustainable design technologies, including a fully automated louvre system designed to cool and ventilate the building by capturing the natural Caribbean breezes off the sea.

It required little energy to operate it, was more in keeping with the local architecture and resulted in a more comfortable experience for passengers.

It is also important to remember airside operations when drafting an airport sustainability plan. By optimising the operations of the airfield including runways, taxiways and stands, capacity can be maximised, making it more energy and cost-efficient.

At Gatwick, sophisticated airfield models helped the Civil Aviation Authority to optimise the airfield traffic patterns, therefore reducing taxiing and queuing times for aircraft. Re-routing roads in and out of the airport can also reduce carbon emissions, as at McCarran Terminal 3.

Airports can grow and develop their assets in a sustainable way. It is possible to upgrade assets to significantly reduce energy consumption and lower carbon emissions.

Identifying the issue and making the simplest of changes can often make a huge difference. Most important however, is to integrate sustainability at the start of any new build or upgrade and to look past the total installed cost and focus on the lifecycle cost of capital projects.

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About the author

Senior civil engineer, Betsy Huigens is part of Bechtel's Project Planning & Development group. Bechtel has been involved in 40 major airport projects around the world in the last decade, including the ongoing development of the new Hamad International Airport in Doha.