How Construction Tech Can Help Infrastructure Projects Go Green

Written by: InEight Blog Editors

Climate change has compelled a wide range of industries - from automotive and transportation to manufacturing and construction - to put more focus on going green by building sustainability into their products and practices. For construction, when you factor in the massive investment in infrastructure projects, it represents an opportunity to put those in place on a grand scale.

These dual developments have made construction technology more relevant than ever. From environmentally friendly design in the early stages to delivery of energy-efficient structures at handover, and beyond to operations, construction tech in its varied forms is poised to help the industry meet regulatory and societal expectations for making green building an achievable reality.

Exploration of Sustainable Designs and Materials

It might help to think of infrastructure projects as having a reciprocal relationship with their environment. Using 3D modeling processes known as building information modeling (BIM), design teams are able to take a multifaceted approach to designing with that relationship in mind.

BIM's virtual 3D viewing capabilities, when combined with augmented reality (AR), give teams a realistic idea of how a structure may look and fit within the context of its

surroundings. This has a dual benefit. Designs can be created to minimize the negative impact on the physical landscape and other nearby structures, while also taking advantage of the positive elements unique to the local environment in the form of renewable energy sources — such as sunlight and wind patterns — for better energy efficiency once the structure is put into operation.

As the most optimal designs are being evaluated, materials exploration can become a tangential part of that decision process. With so much existing infrastructure in various states of deterioration and disrepair, it has highlighted the need for more purposeful choices in materials that not only can withstand the test of time, but are sustainable, safer for the environment, and responsibly sourced. BIM continues playing

a direct role here, enabling design and construction teams to look at material attributes in a granular way as they virtually test more durable, environmentally friendly resources for their infrastructure projects. It allows them to see how particular materials will impact the overall performance of a structure and how they will perform over time in different conditions.

Reduction of Project-Related Waste

There's no doubt that sustainable materials are better for the environment than traditional materials for many reasons — lower carbon footprint, less potential for pollution and contamination, and so on. But it's not enough that sustainable materials are used in infrastructure projects; there has to be a corresponding reduction in the amount of resource waste produced.

And this is where BIM, ever the multitasker, shines once again. Its early role in an infrastructure project supports construction waste reduction in several ways. Building on the design and material explorations above, experimenting with different virtual design scenarios before erecting anything physical means less waste and improved quality control during construction. But it's the data linked to each component within the BIM model that takes this a step further. Each component's highly-detailed information — size, quantity, and lifespan, for example — goes toward creating a more precise procurement list, with less material waste overall that could result from over-ordering or incorrect ordering.

Another way to reduce waste during construction is through early detection of design conflicts and clashes. BIM's clash detection capability identifies interferences between physical objects within the model before they're built into the actual structure and slated for rework. With so much construction waste resulting from rework, preventing these hazards from happening in the first place means there's no dismantling, materials removal and disposal, and repurchasing of replacement materials to carry out the corrective work.

But project-related waste doesn't just apply to what goes into the structure itself. We can't overlook the landfill fodder that comes from the copious amount of documentation involved in a long-term infrastructure project. Construction tech that digitizes the many documentation processes — estimates, timesheets, drawings, contracts, compliance documents, daily reports, and checklists — dramatically reduces the thousands of hard copy forms that would otherwise be dumpster-bound and perpetuate demand for paper manufacturing.

Prevention of Wasteful Mistakes

Mistakes happen, but their consequences depend on whether they're discovered and corrected in time to avoid depleting material supplies and further damaging the environment. This speaks more to process than technology; however, two mobile-enabled construction tech options in particular can help keep environmentally unfriendly mistakes from happening or worsening: building commissioning software and punch list software.

When these processes and their respective software are implemented at the start of construction instead of close to the completion date, construction mistake elimination takes a more proactive approach than reactive. Logging errors and defects as they're discovered turns them into manageable, less wasteful fixes rather than late-stage major rework items that can eat into both labor and materials resource availability.

Verification of Environmental Regulatory Adherence

It's no longer just about "Does it work as it's intended?" but also "Is it environmentally friendly?" Green building is being driven by regulatory compliance as well as environmental awareness. And much like the commissioning process, it requires substantial documentation in order to demonstrate that a project meets environmental standards and requirements.

Construction companies are skipping the clipboards and leveraging the capabilities of construction-specific compliance software out in the field to document regulatory adherence as well as ensure all the right data is consistently being collected and reported. Where compliance inspections show something may be falling short, it can be noted in the online form so the software can alert the right project team members that it needs attention. This can be a verify-as-you-go process

alongside commissioning and rolling punch lists, providing an ongoing narrative of how environmental compliance was managed and substantiated from the beginning until handover. And it can provide the documentation necessary to support earning LEED (Leadership in Energy and Environmental Design) certification.

Healthy Internal Environment of Enclosed Structures

While many people naturally think that going green is more about not harming our surroundings and the planet, it has equally important value for the quality of the environment for those working or visiting within the structure itself.

This begins with good design and construction practices. The materials and systems used in building a structure can have a significant impact on how well it filters the air. For example, high levels of volatile organic compounds (VOCs) emitted from common building materials such as paints, sealants, and adhesives used in construction. When these VOCs are not properly filtered out of the air within an enclosed space, they can cause health problems such as headaches or allergic reactions.

BIM's systems design and materials exploration processes help create more sustainable buildings that are energy efficient, promote health and wellbeing, reduce pollution, and improve indoor air quality. These are the processes that allow you to experiment with ways to make the best use of natural lighting, strategic ventilation, cleaner materials, and even the outdoor environment, for example. As the structural systems from mechanical to electrical to ventilation are put into place, commissioning software steps in to ensure they're installed correctly as well as functioning optimally, not just separately but as an integrated whole, for occupant health and safety.

Green No Longer a Buzzword

These days, the phrase "green building" is no longer just a buzzword — it's a key component of project design and construction. Construction technology not only makes it more feasible for engineering and construction companies to be proactive in making their infrastructure projects and other large-scale builds greener, but it also lends transparency to their processes for project owners as well as regulators and the public at large.

About the Article

This article is republished from the InEight Behind the Build online blog. InEight provides field-tested construction project management software for the owners, contractors, engineers and architects who are building the world around us. Customers worldwide rely on InEight for real-time insights that help manage risk and keep projects on schedule and under budget across the entire life cycle.