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Precast Concrete Sustainability LEED

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Precast concrete offers a number of benefits that are recognized as aiding sustainable design by the Leadership in Energy & Environmental Design (LEED) criteria developed by the U.S. Green Building Council. Use of precast concrete components can help a building earn up to 27 points, one more than is required for LEED certification.





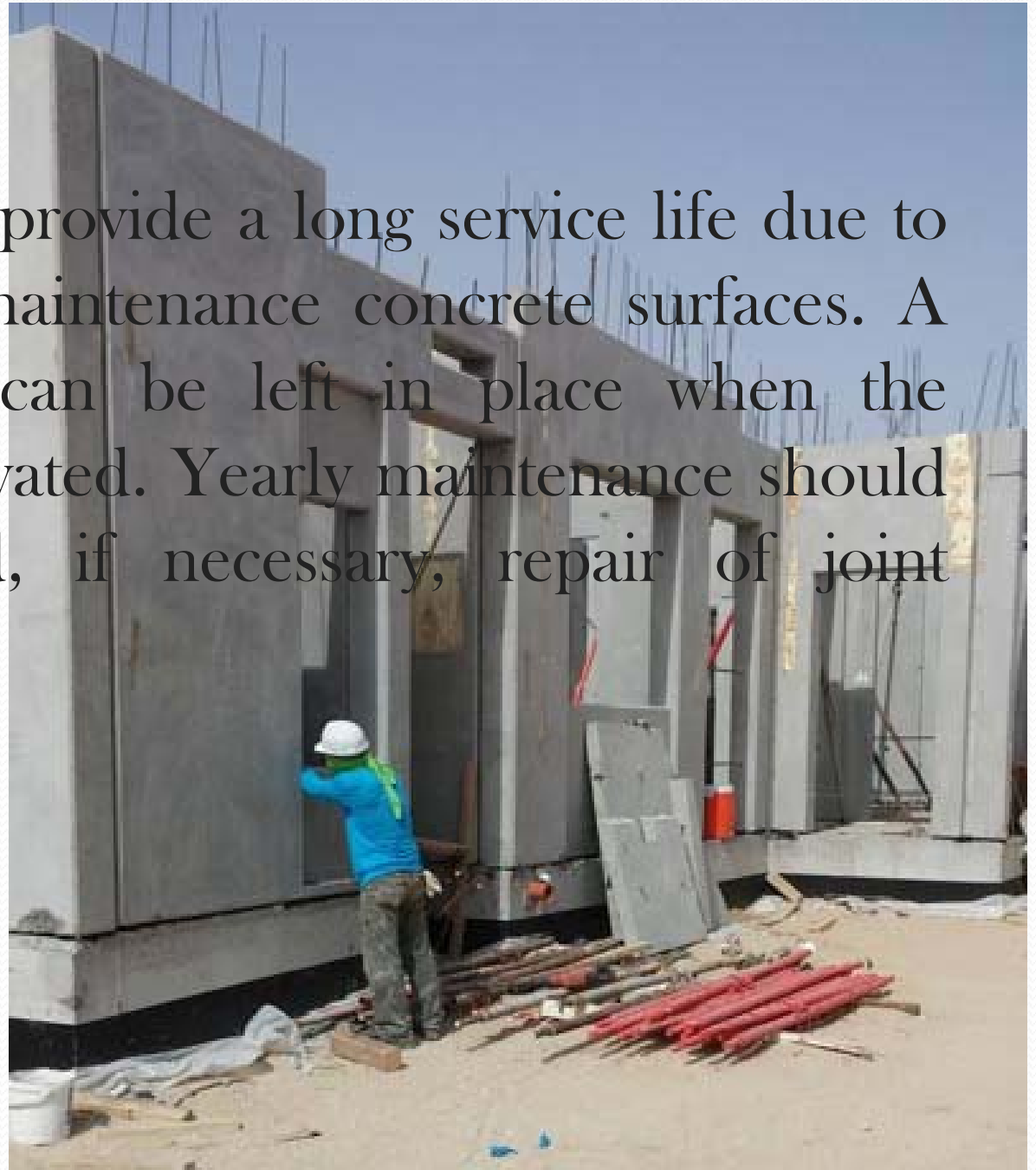
Precast concrete can help meet minimum energy requirements, optimize energy performance, and increase the life of a building. The constituents of concrete can be made from recycled materials, and concrete itself can also be recycled. The materials are usually available locally.

The general attributes and capabilities of precast concrete that help meet LEED certification center on these key areas:



1. Durability

Precast concrete panels provide a long service life due to their durable and low-maintenance concrete surfaces. A precast concrete shell can be left in place when the building interior is renovated. Yearly maintenance should include inspection and, if necessary, repair of joint material.



Its durability make precast concrete sustainable in two ways: It avoids contributing solid waste to landfills and it reduces the depletion of natural resources and production of air and water pollution caused by new construction.





2. Urban Heat-Island Mitigation

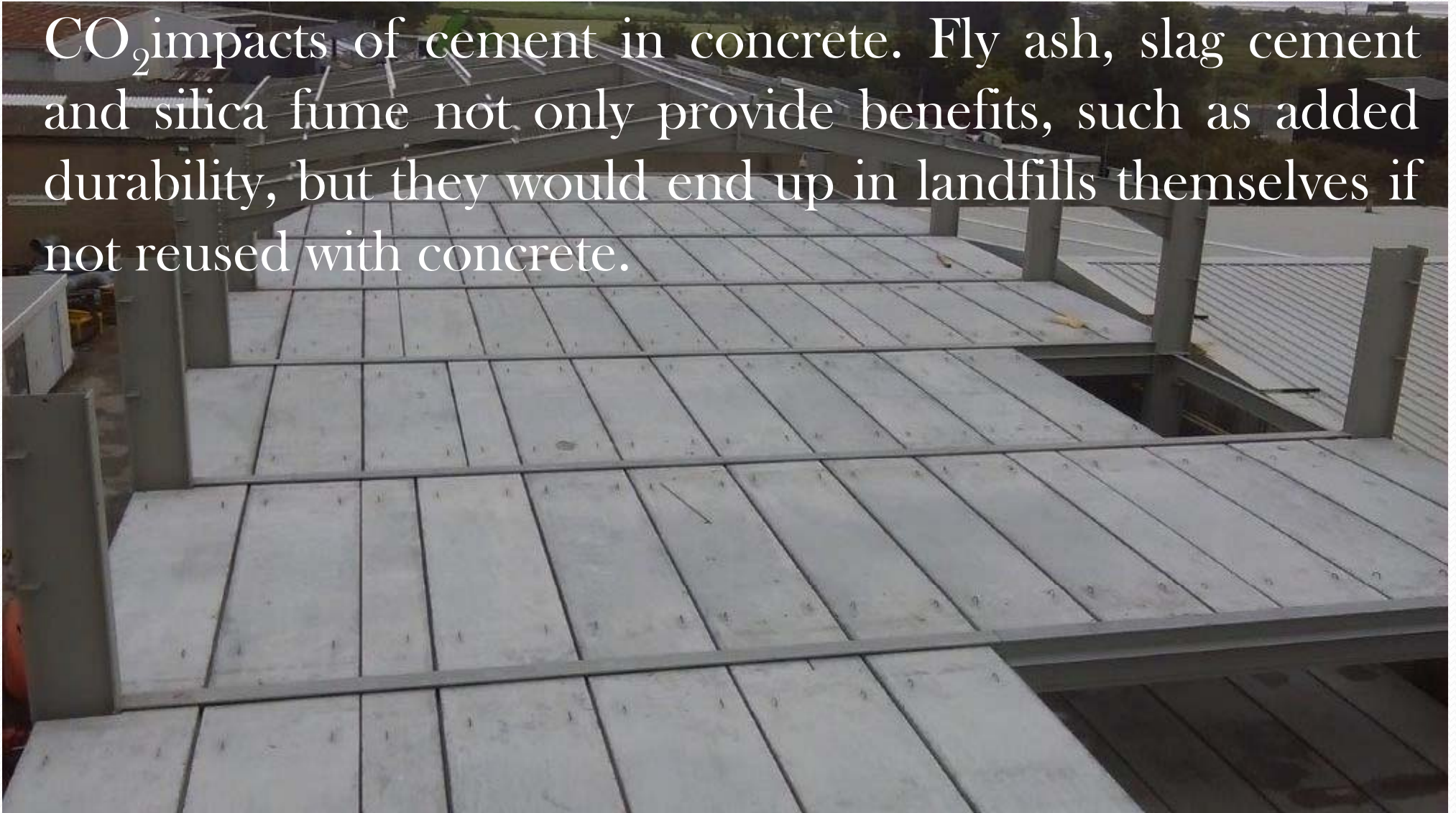
Precast concrete provides reflective surfaces that minimize the urban heat-island effect, which result from solar radiation being absorbed by horizontal surfaces such as roofs, pavements and parking lots. Concrete provides a relatively high reflective surface compared to other materials. Lighter or white colors also help reflect solar heat.


3. Abundant Constituent Materials

Concrete contributes to a sustainable environment because it does not use scarce resources. It consists of only a few ingredients, primarily cement, water, large and small aggregates and admixtures, all of which are abundant locally.



In addition, three additives often are used to replace Portland cement in concrete to reduce the energy and CO₂ impacts of cement in concrete. Fly ash, slag cement and silica fume not only provide benefits, such as added durability, but they would end up in landfills themselves if not reused with concrete.





The use of local materials reduces the transportation needs for heavy building materials, along with the associated energy and emissions. Most precast concrete plants are within 200 miles of a building site. The cement, aggregates and reinforcing steel used to fabricate precast concrete components, along with the raw materials used to manufacture cement, are usually obtained or extracted from sources within 200 miles of the precast concrete plant.


Precast concrete elements are usually shipped efficiently because of their large, often repetitive sizes and the ability to plan their shipment during the normal course of the project.




4. Minimized Production Needs

The production of precast concrete has many environmental benefits, including:

- Less material is required because precise mixture proportions and tighter tolerances are achieved.
- Optimal insulation levels can be incorporated into precast concrete sandwich wall panels.
- Waste materials are more likely to be recycled because concrete production is in one location.
- Gray water is often recycled into future mixtures.
- Hardened concrete is recycled (about 5 percent to 20 percent of aggregate in precast concrete can be recycled concrete).

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- Sand and acids used for finishing surfaces are reused.
 - Steel forms and other materials are reused.
 - Less dust and waste are created at the construction site because only needed precast concrete elements are delivered.
 - There is no debris from formwork and associated fasteners.
 - Fewer trucks and less time are required for construction because concrete is made offsite, which is particularly beneficial in urban areas where minimal traffic disruption is critical.

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- Precast concrete units are normally large components, so greater portions of the building are completed with each activity.
 - Less noise is generated at the construction site because concrete is made offsite.
 - Less concrete generally is used in precast buildings compared to other concrete buildings because of the optimization of materials. A properly designed precast concrete system will result in smaller structural members, longer spans and less material used onsite. This creates economic and environmental savings.

5. Energy Savings

Energy conservation is a key tenet of sustainability and a major benefit of using precast concrete components. Precast concrete's inherent capabilities to provide energy efficiency rely on the high thermal mass of the material, which benefits exterior wall applications. Precast concrete walls provide benefits because they delay or reduce peak loads, reduce total loads in many climates and work well regardless of the placement of mass.



6. Improved Indoor Air Quality:

Concrete contains low to negligible Volatile Organic Compounds that off-gas from new products. The VOCs in concrete construction can be reduced further by using low-VOC materials for form-release agents, curing compounds, damp-proofing materials, wall and floor coatings and primers, membranes, sealers and water repellants.

Precast concrete components also aid indoor air quality standards because they are delivered to the site in modules that do not require fabrication, processing or cutting at the construction site, thereby reducing dust and airborne contaminants on site. Concrete is not damaged by moisture and does not provide nutrients for mold growth.



The concrete industry has LEED-experienced professionals available to assist teams with concrete applications and help maximize points for concrete. An additional point is available if a principal participant of the project team is a LEED-Accredited Professional.



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