

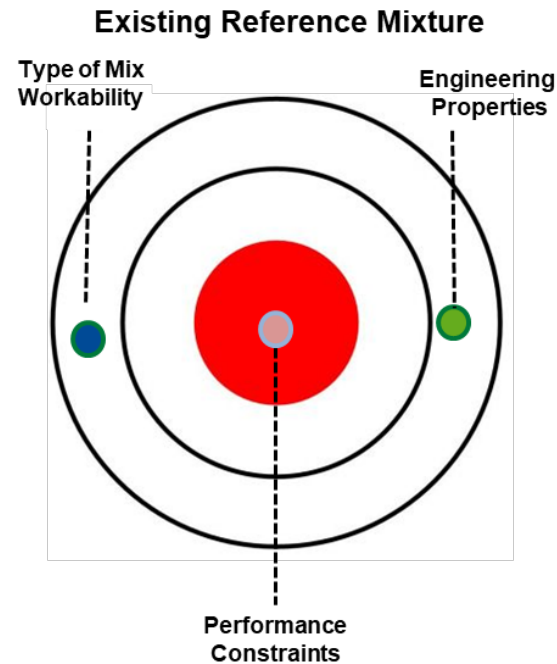


Low Carbon Concrete Case Studies

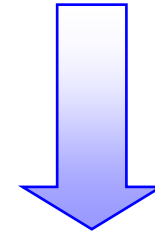
Mark Bury FACI
Master Builders Solutions

Advanced Mix Optimization

Sustainable Green Concrete – an environmentally preferable, cost-effective, advanced series of concrete mixes in which recycled materials are used with unique chemical admixtures to exceed engineering and environmental performance targets.



Advanced Level of Mix Optimization		
Region	Chemistry	Recipe



Customized Specific Concrete Mixture Design

Low-Carbon Concrete Projects



GREENSITE
project of the year

One World Trade Center won The Concrete Producer
"Readers Choice" 2010 Green Site Award
for use of
High-Performance Green Concrete

Environmental Impacts	Environmental Savings
Energy (kWh)	25,402,200 kWh savings
Resource consumption (lb) savings	2,774,650 lb (1,259,691 kg)
Fossil fuel consumption (lb)	1,110,050 lb (503,963 kg) savings
Greenhouse gas (lb CO ₂ eq)	34,886,050 lb (15,838,267 kg) CO ₂ reduction

Owner: Port Authority of New York/New Jersey

- Up to **74% replacement** of portland cement using fly ash, slag cement & silica fume



Owner: City & County of San Francisco

LEED® Platinum

- Up to **70% replacement**
- CO₂ Emissions - 7.4 M lb [3.4 M kg] net savings



432 Park Ave., NYC

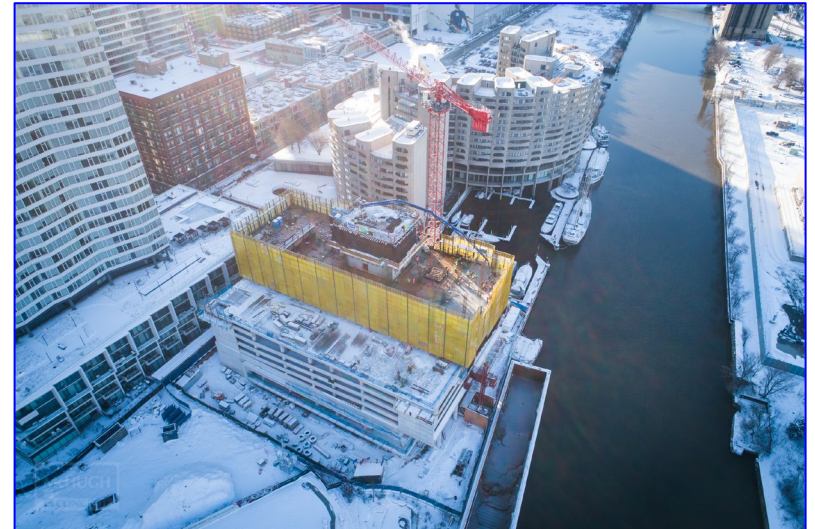
Up to 72% replacement

Environmental Impacts	Environmental Savings
 Energy usage	822,000 kWh (2,959,200 MJ)
 Greenhouse gas emissions	21,120,000 lb CO ₂ eq (9,579,000 kg CO ₂ eq)
 Water emissions	191,500,000 gal (724,900,000 L)
 Solid waste	605,000 lb (274,400 kg)

Based on 90,000 yd³ (69,000 m³) of concrete developed for four compressive strengths.

Reed High-Rise Building Employs Low-Carbon Concrete

- The Reed, a new 41-story, 440-unit luxury residential tower designed by Perkins and Will for Lendlease's Southbank development in Chicago.
- Cement replacement in concrete mixtures ranged from **65% to 73%**. (28,000 yd³ [21,410 m³] or approx. 3,110 trucks)
- “low-carbon concrete, and sustainable features in general, are highly marketable. **Increasingly, clients and investors are seeking sustainable building construction**; they are often even willing to pay more for it.” – Ted Weldon, executive manager of development at Lendlease Chicago; Construction Dive March 15, 2022.





Embodied Carbon (CO₂e) Savings: The Reed Residential Tower; Southbank, Chicago



Equivalent to the CO₂ emissions from:



68,353 gal [258,740 L] of gasoline consumed or 8 tanker trucks' worth of gasoline



73,892,312 number of smartphones charged



Equivalent to the greenhouse gas emissions avoided by:

26,294 trash bags of waste recycled instead of landfilling

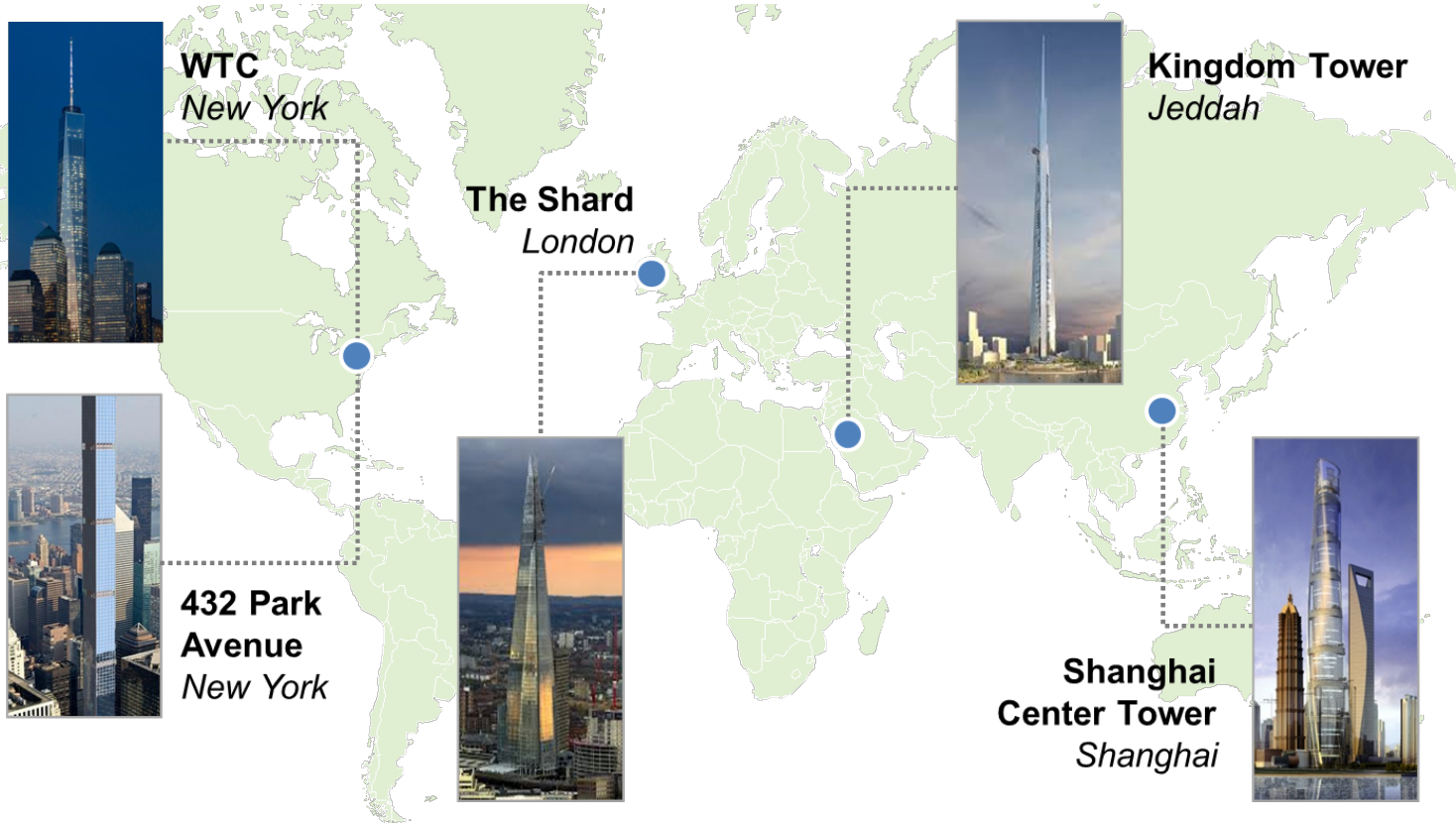


Equivalent to the carbon sequestered by:

10,044 tree seedlings grown for 10 years

Signature Projects Around the World

Advanced Mix Optimization



50 - 72% Cement Replacement

Concrete Mix Optimization

- Uses recycled waste materials
- Specially formulated HRWR
- Improves ease of constructability
- Increases the service-life
- Optimized economics