

Low cement concrete for wind turbine bases - Khobab Wind Energy Facility

Resources		Comments					
Raw materials	Sand	Aggregate	Cement	Slag	Add mixture	Water	Curing compound
Nature of raw materials	Virgin	Virgin	Processed Virgin	Reused	Processed Virgin	Reused	Processed Virgin
% of raw materials in the final product	52%	29%	6%	6%	0%	8%	0%
% of recycled content				90-100%		0-5%	
Location of resource extraction	Regional (<500km)	Onsite	Regional (<500km)	Regional (<500km)	Regional (<500km)	Onsite	Regional (<500km)
Type of transport used to move the raw materials to the place of manufacturing?	Truck	N/A - onsite	Truck	Truck	Truck	N/A - onsite	Truck
Additional environmental benefits/Innovation	<p>The significant innovation here is the reduction of cement in the production of concrete. This is accomplished largely through the use of slag, a waste product from the steel industry supplied by PPC. It is used as a catalyst for the production of concrete, thereby reducing the required amount of cement. The significance of this, is that it results in an average <u>saving</u> of $\pm 87.6 \text{ kg CO}_2/\text{m}^3$ per base, as opposed to a standard mix design with a carbon footprint of $\pm 188.3 \text{ kg CO}_2/\text{m}^3$. Each base is $\pm 360\text{m}^3$ of concrete with 61 bases on the Khobab wind energy facility. Thus the overall carbon footprint saving of the wind turbine bases, as a result of the low carbon concrete, is $\pm 1\,923\,696 \text{ kg of CO}_2$.</p>						
Manufacturing		Comments					
% use of energy from renewable resources	0						
Energy use per ton of product	43,920 kwh/yr	Diesel for generator					
Water use per ton of product	81.63 kL/ton						
Has any of the following been implemented:							
Environmental Policy/Management system	Yes	Risk assessments as part of the health and safety protocol. In addition the Environmental management program required several method statements to be compiled. One of the method statements related to concrete batching.					
Cleaner Production System	No						
Green Procurement Policy	No						
Environmental Awareness Policy	Yes	Environmental induction of batch plant and construction staff was undertaken.					
Waste Management Policy	Yes	Waste management method statement detailing how all waste is to be managed on site. A settling sump system was also in operation at the batch plant to settle out cement fines that were then removed to the quarry. The water was recycled back to the batch plant for reuse.					

CSI Projects	Yes	Security Officer Training; Establishment of antisubstance abuse programme; Loeriesfontein Primary School Teacher Support; Early Childhood Development Capacity Building Programme; Read Ready Literacy Programme; Emergency Water Scheme; Youth Development Programme; ABET Programme; Entrepreneurial Capacity Building Programme; Establishment of local security company; Information & Communications Technology for Health Care Facilities; Teacher Capacity Building Programme and Community Wellness Day.		
Is the project manufactured in South Africa?	Yes	The product was manufactured on the neighbouring site at the Loeriesfontein wind energy facility for use at the Khobab wind energy facility.		
Additional environmental benefits/Innovation	The cement wastewater settling sump enabled water to be separated, which enabled the collection of water, for reuse, thus saving water and reducing the volume to be disposed of. The site is also located in a water scarce area.			
Product		Comments		
Does the product use electricity?	No			
Does it increase energy efficiency or reduce energy consumption?	N/A			
% of reduction of water use	N/A			
Harmful emissions during use?	No			
Does the product contain Volatile Organic Compound (VOC)?	No			
Additional environmental benefits/Innovation	N/A			
Packaging & Distribution				
Materials used for packaging	N/A - no packaging			
Distance from manufacturing plant to market of final product	Locally (100km)			
Type of transport used to move the product from the manufacturing plant to market	Truck			
Additional environmental benefits/Innovation	None			
End-of-life/Recyclability				
Expected lifespan of product	>20yrs			
Can the product be easily separated into its single components for repair, re-use or recycling?	Recycling			

% of the product that can be reused	0	
% of the product that can be recycled	90%-100%	
Support or take back system for re-processing or responsible disposal of product	No	
Any emissions or harmful substances released into the environment during the disassembly or degradation of the finished product?	No	
Additional environmental benefits/Innovation	None	