ABSTRACT Sustainability has increasingly become a prominent topic in the field of construction, and as such, it is necessary to explore means of reducing the overdependence on the use of cement in construction works. This study investigated the effects of calcium carbide residue (CCR) as a partial substitute for cement in sandcrete blocks. Due to the high pH value of calcium carbide residue, its disposal in landfills increases the alkalinity of the environment. From raw material extraction through final product disposal, the construction industry is integrally involved in every stage of the lifecycle of greenhouse gas emissions. In this study, cement was partially substituted using CCR at 0% and 12% by weight replacement. The sandcrete blocks were of 450 mm × 225 mm × 225 mm dimensions and made from a Cement-CRR mix ratio of 1:6 and water-cement ratio of 0.6. Preliminary tests such as consistency, setting times, soundness, and specific gravity tests were carried out on cement and cement + 12% CCR. The thermal properties, which include thermal conductivity (k), heat transfer coefficient (U), specific heat capacity (Cp) and diffusivity (α) of the sandcrete blocks were determined. The thermal tests were carried out after the 28th day of curing. The result showed that CCR increased the water demand by the sandcrete blocks, hence reducing its workability. The sandcrete block samples made with 12% CCR replacement showed improved compressive strength. The k for 0% and 12% replacement was 0.5497 W/mK and 0.3978 W/mK, respectively, while the U was 54.974 W/m2K and 39.784 W/m2K, respectively for the 0% and 12% replacement. On the other hand, the Cp for 0% and 12% was 0.0003364 J/kg°C and 0.0001598 J/kg°C, respectively, while the diffusivity was 636.54m2/s and 1113.94m2/s for 0% and 12% replacement, respectively. As such, we can infer that 12% CCR replacement of cement gives more energy-efficient and sustainable sandcrete blocks.