



Recycled Construction Materials

John Babafemi

CIVIL ENGINEERING: Unit for Construction Materials (UCM)



Prof Riaan
Combrinck



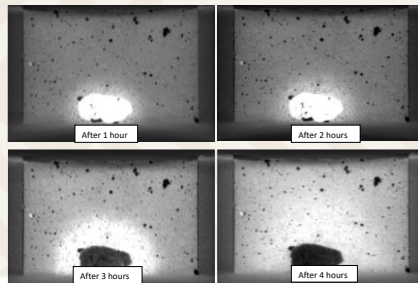
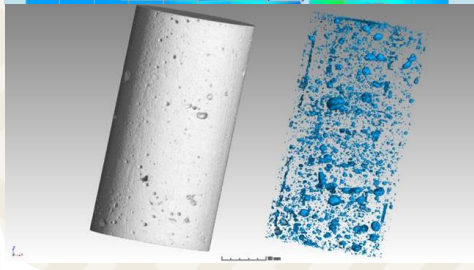
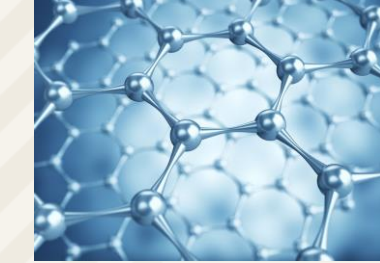
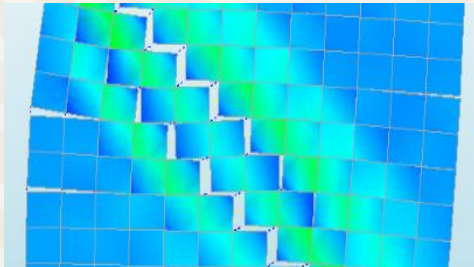
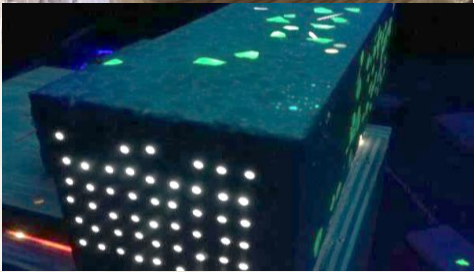
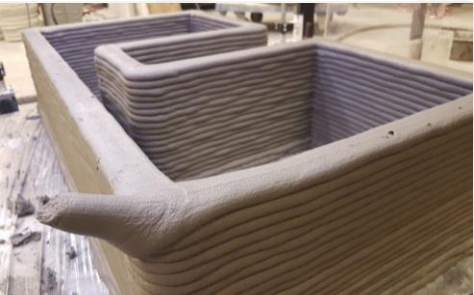
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de Villiers



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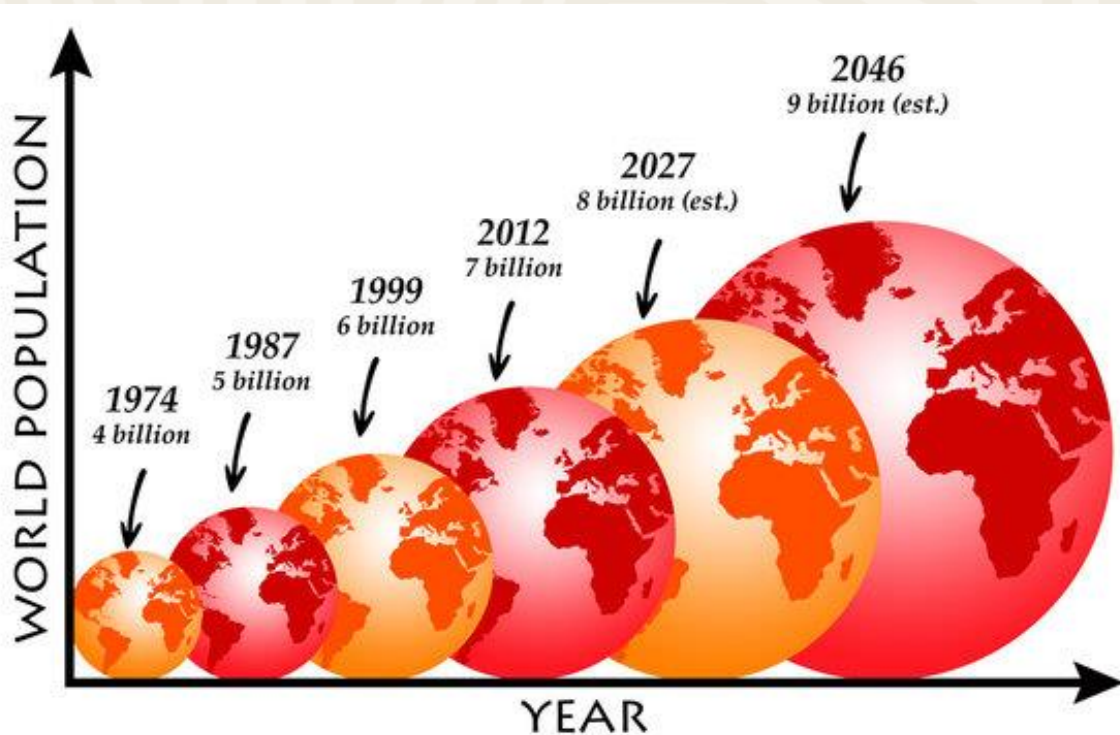
CIVIL ENGINEERING: Unit for Construction Materials (UCM)



- Sustainable & Alternative Construction Materials
- Behaviour of Fresh and Young Concrete
- 3D printing of concrete
- Fibre reinforced, Self-compacting and high-performance concrete
- Geopolymer concrete
- Hempcrete
- Masonry Modelling and Regulation
- BIM for Construction Materials Circularity
- Nano technology and materials
- Cement production and compatibility
- Concrete admixtures and waterproofing
- Alternatives for cement and steel reinforcement

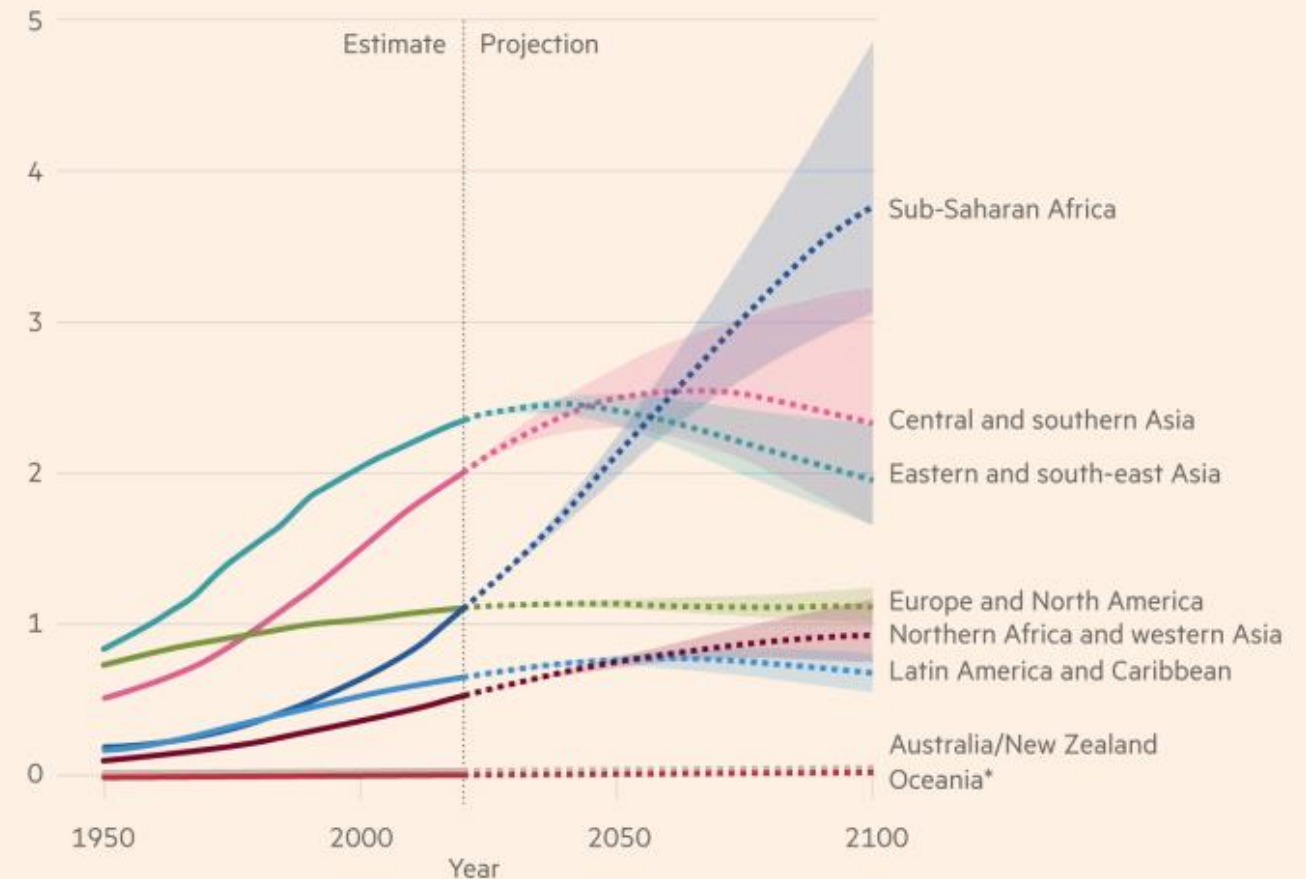
Population growth

- Global growth
- Sub-Saharan growth



Only Sub-Saharan Africa set to sustain rapid population growth

Total population by sustainable development goal region (bn)



*Excluding Australia and New Zealand

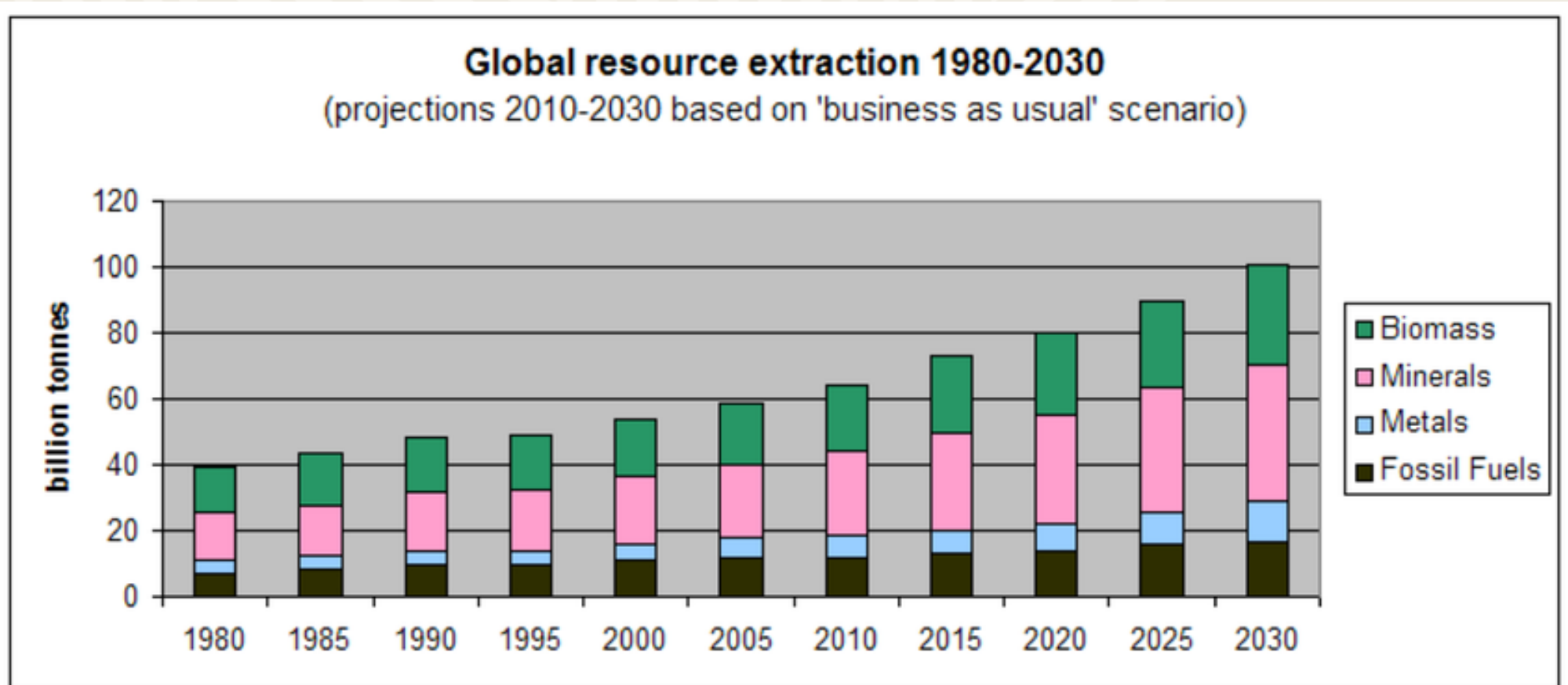
Source: United Nations Department of Economic and Social Affairs

Demand for infrastructure



Extraction of Earth's resources

- ❑ Extraction of earth's resources on the rise with population increase



Its Impact



Climate change

Resource depletion



Waste generation

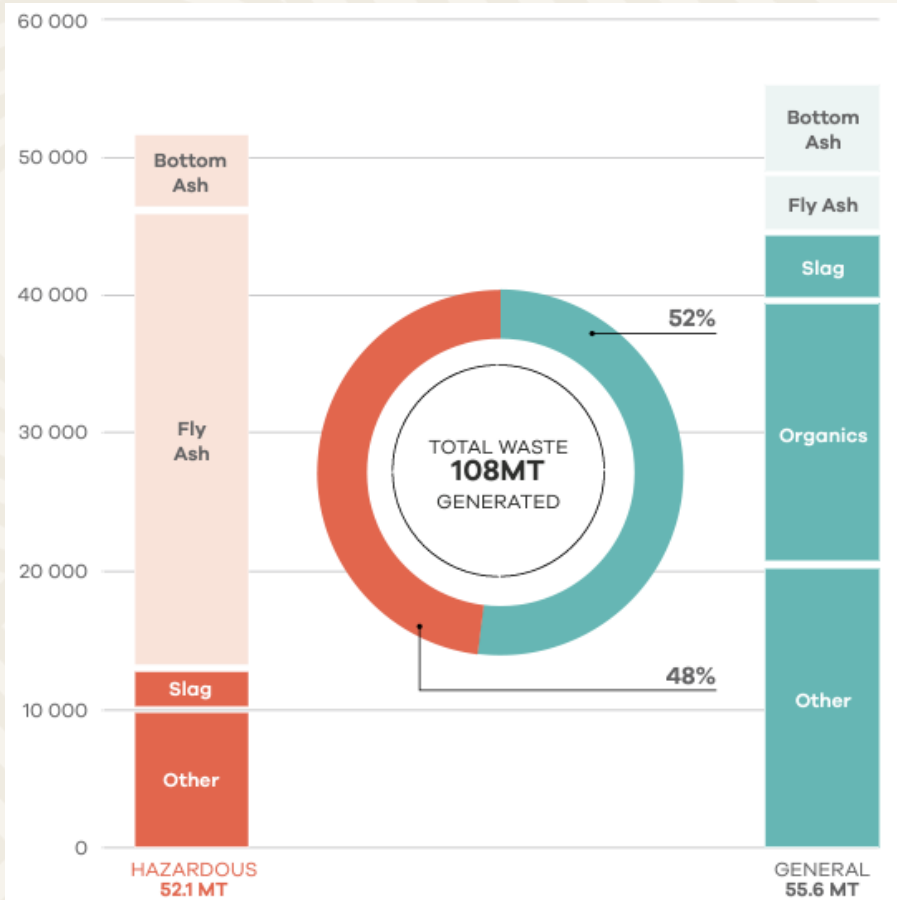


Figure 2: Total waste generated in South Africa in 2017 by classification
 Source: Modified from South Africa State of Waste Report 2018 (DEA, 2018)

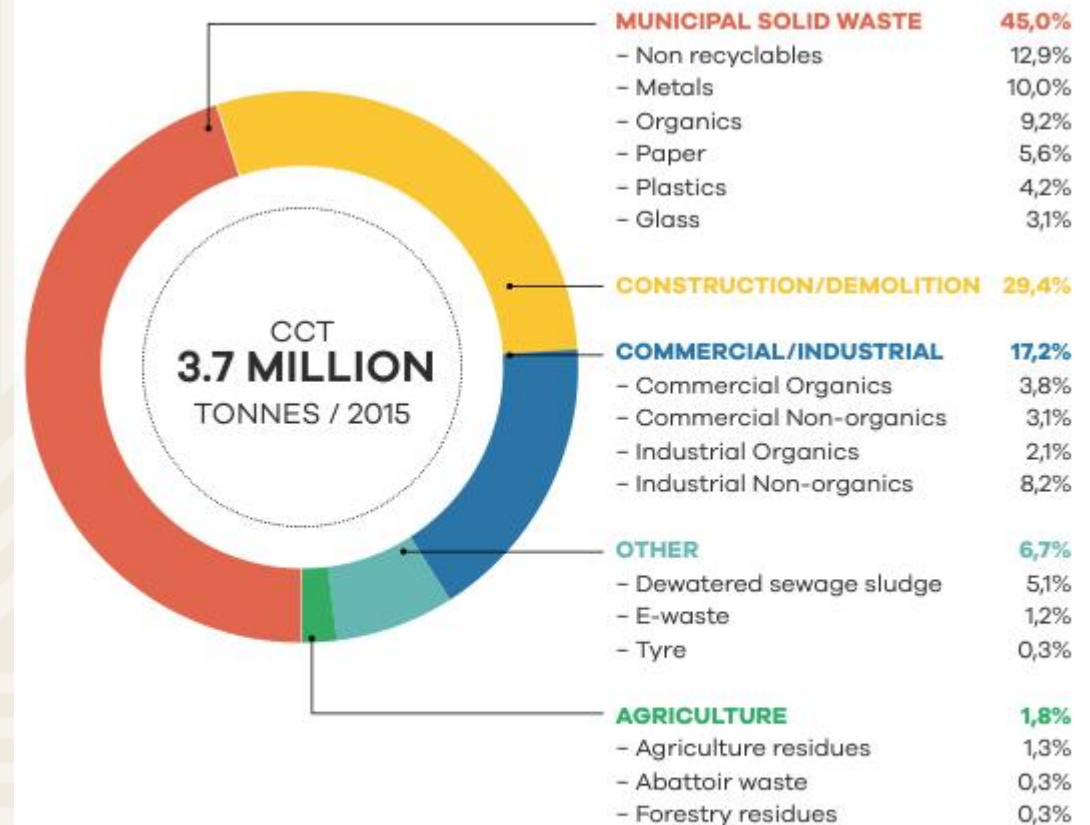


Figure 5: The City of Cape Town waste generated characterisation in 2015

Source: DEDAT (2016)

Waste generation

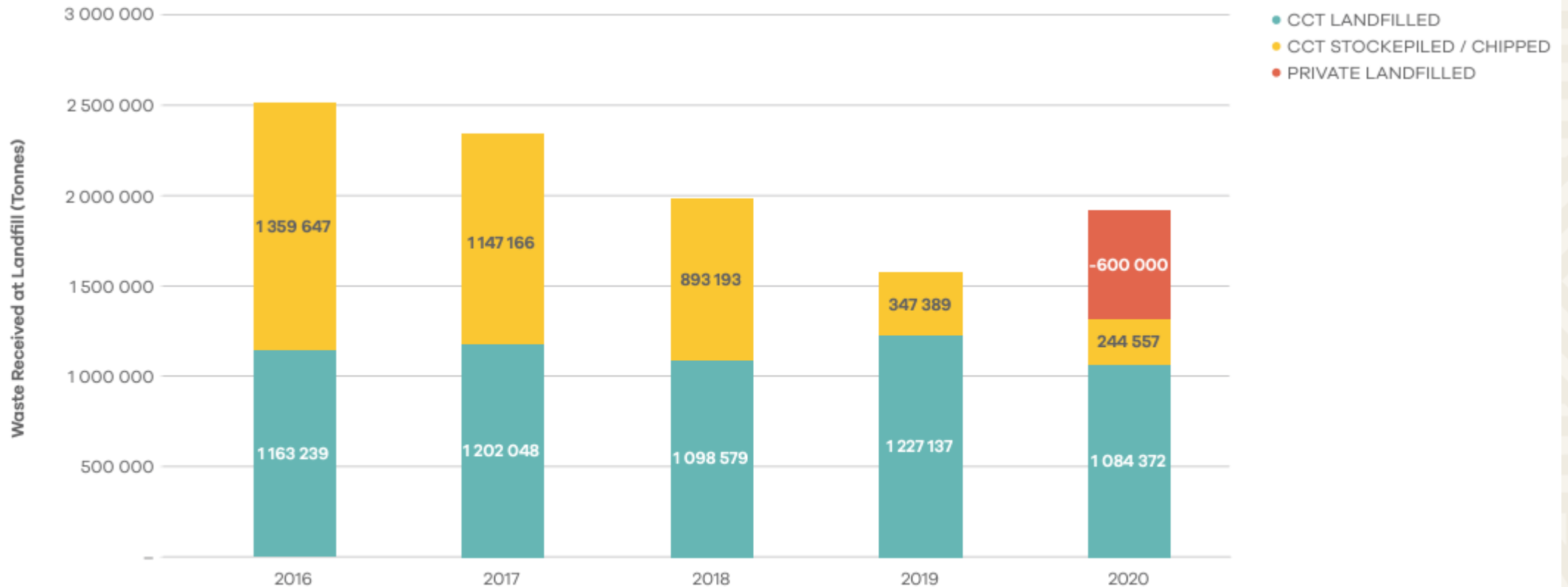


Figure 6: Waste landfilled / stockpiled at Cape Town landfills between 2016 and 2020

Source: CCT online data portal and engagements with private sector

Opportunities

Cement replacement materials



Aggregate replacement materials



Conventional cement-based concrete

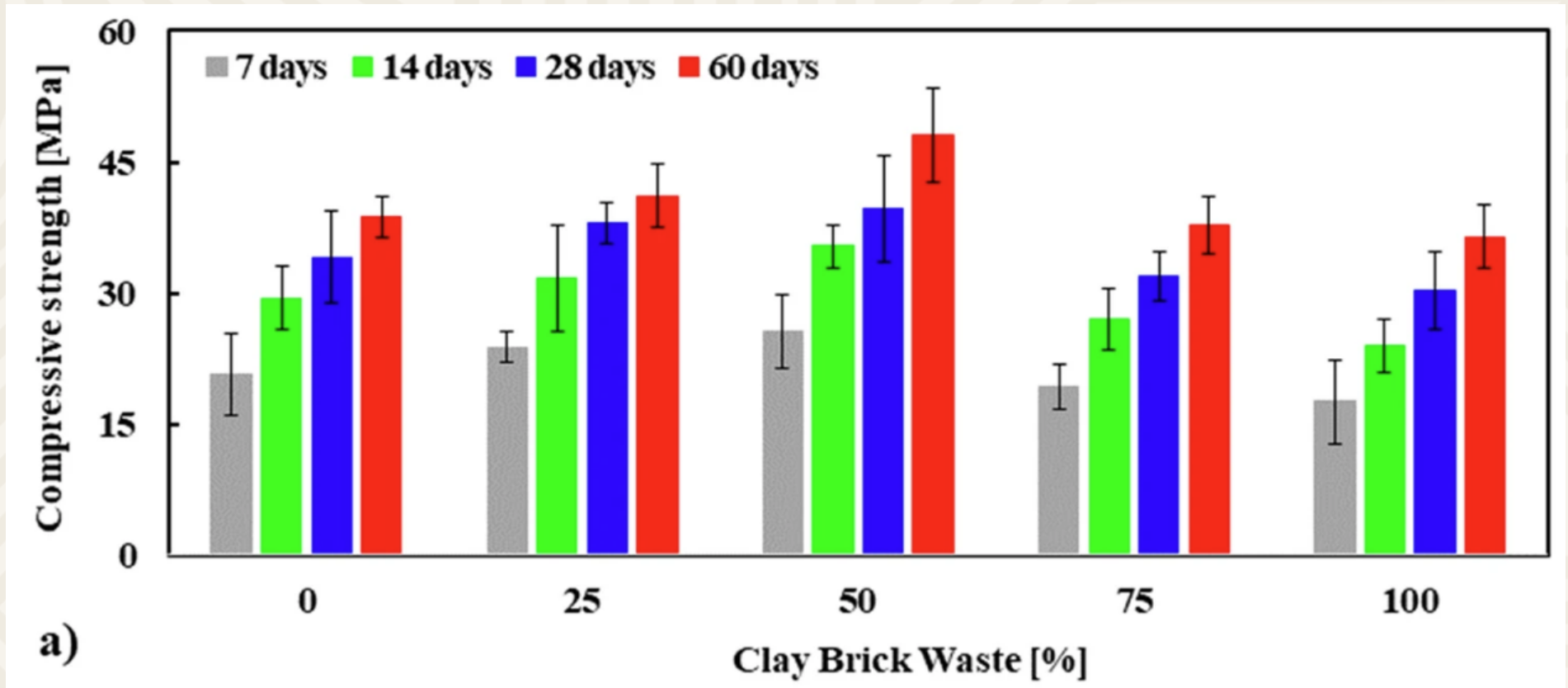
- SCM-based concrete
- LC³-based concrete

Zero cement-based concrete

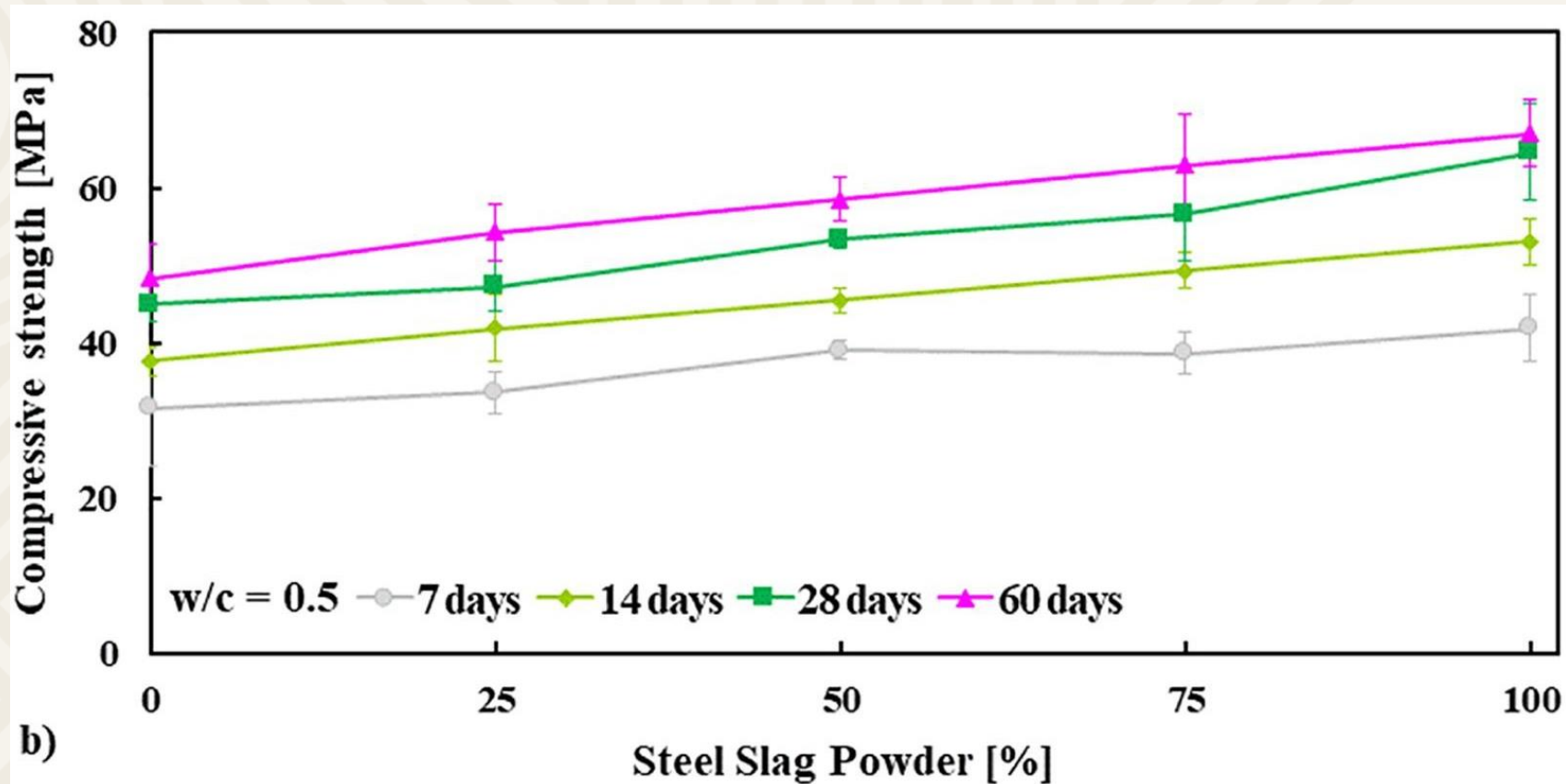
- Geopolymer concrete
- Alkali-activated concrete

3D printed concrete

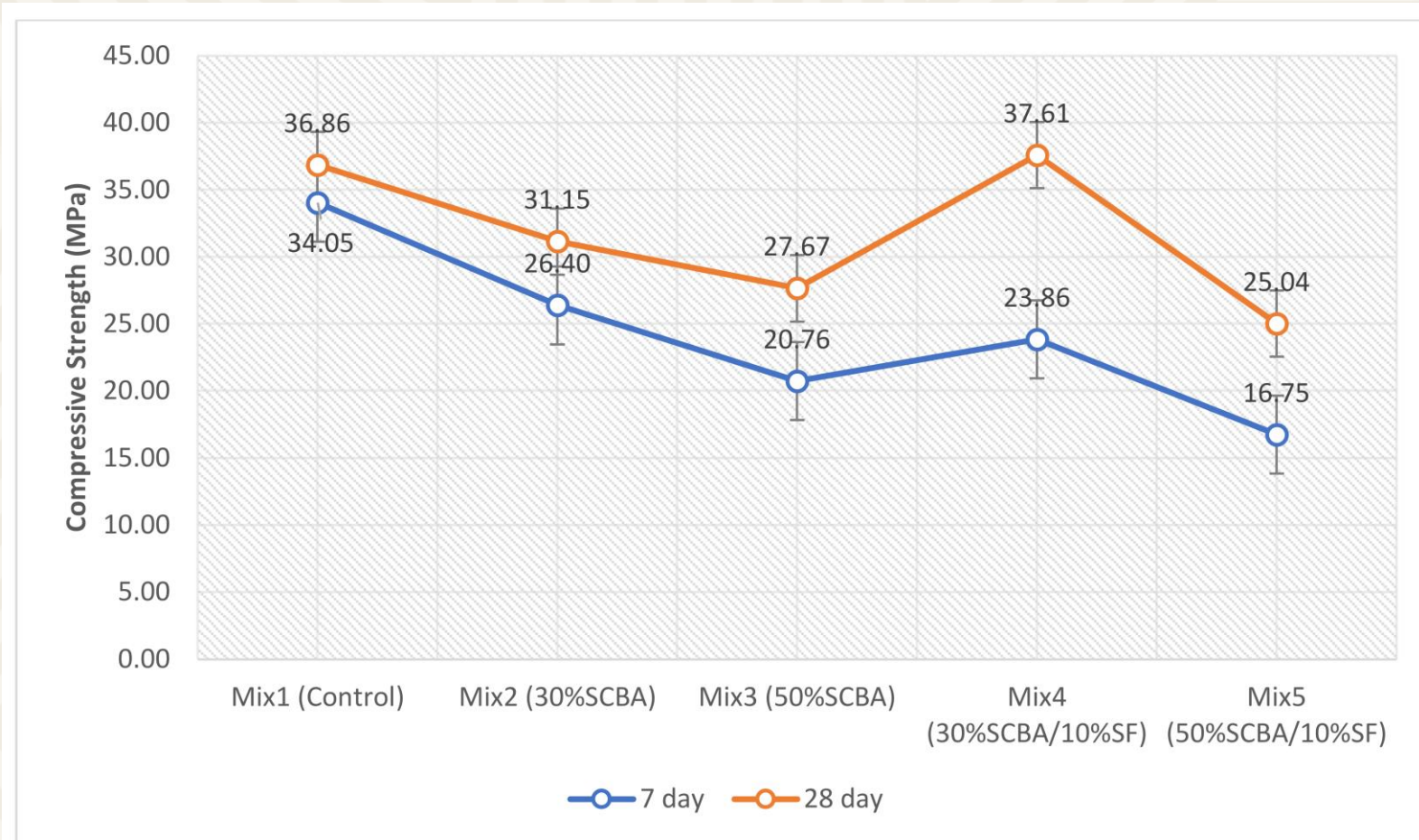
Waste burnt clay bricks as fine aggregate in concrete



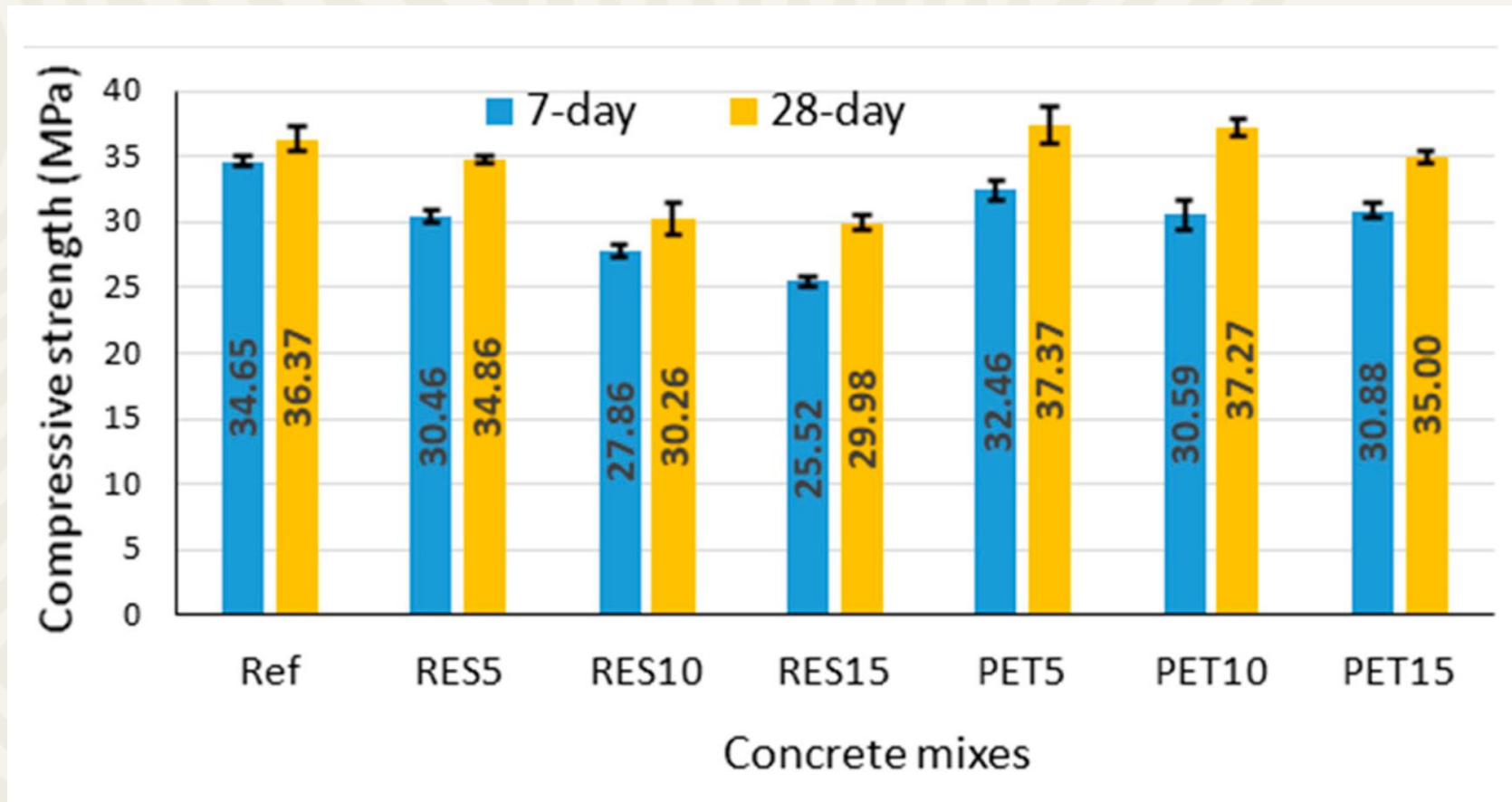
Waste steel slag as fine aggregate in concrete



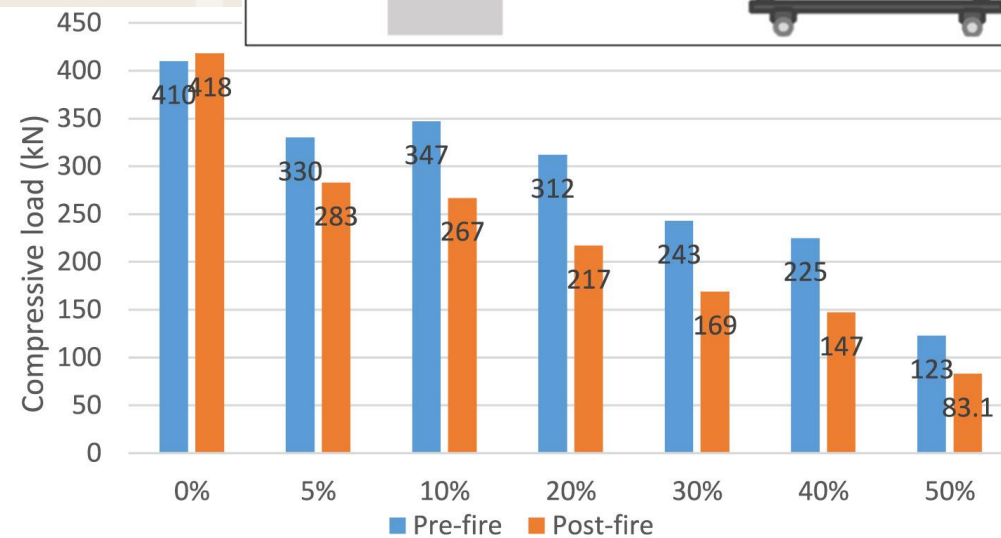
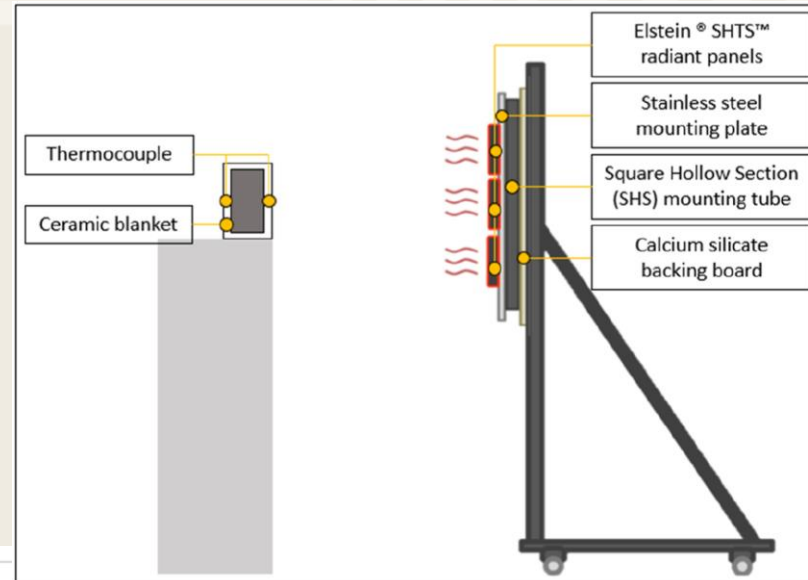
Waste SCBA and SF as SCM in concrete



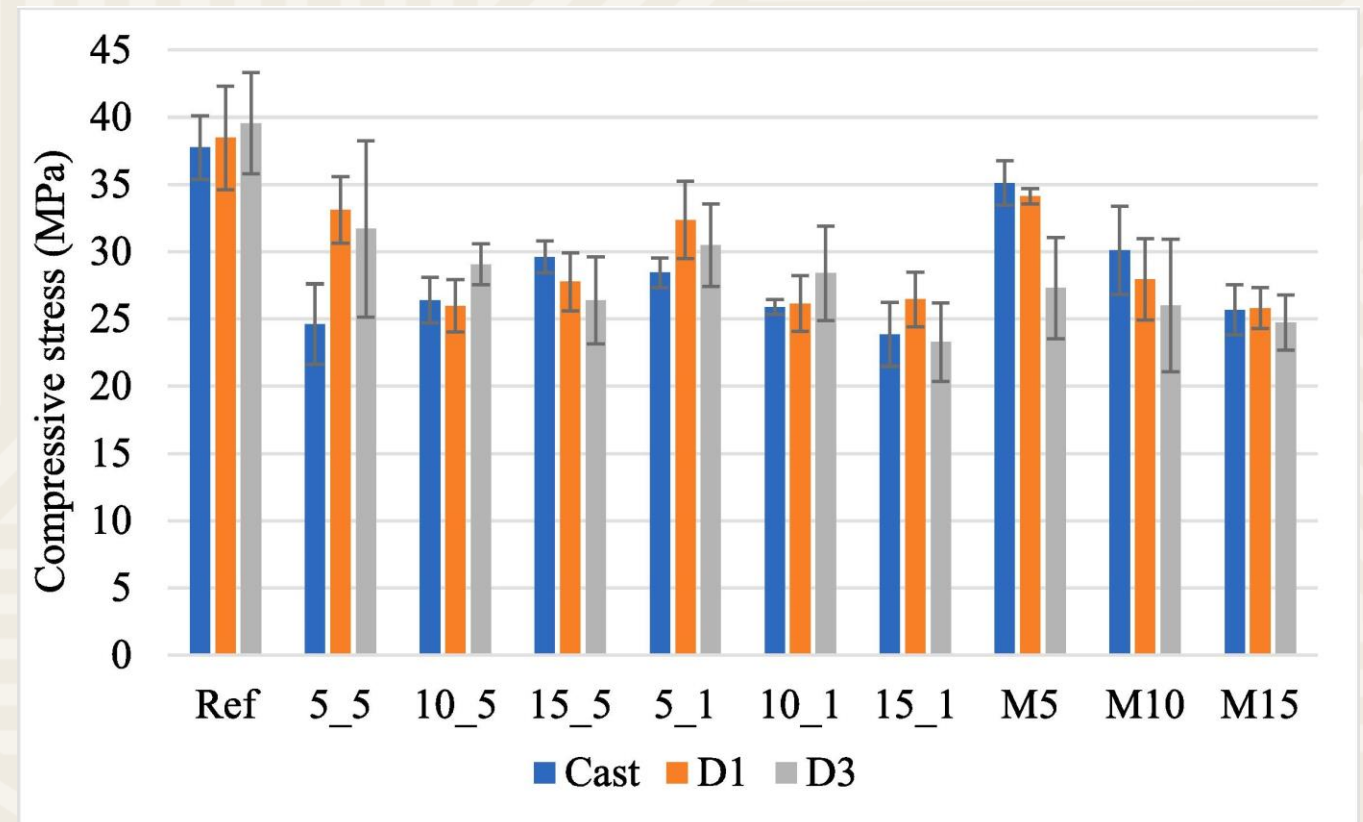
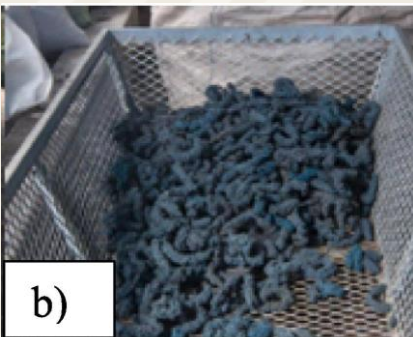
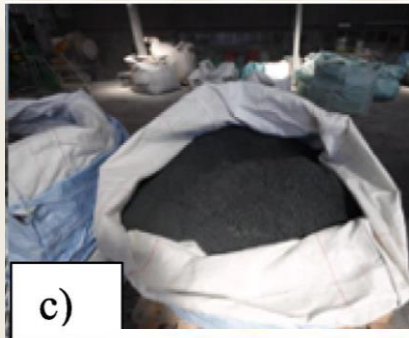
Waste plastic (RESIN8 & PET) as fine aggregate in concrete



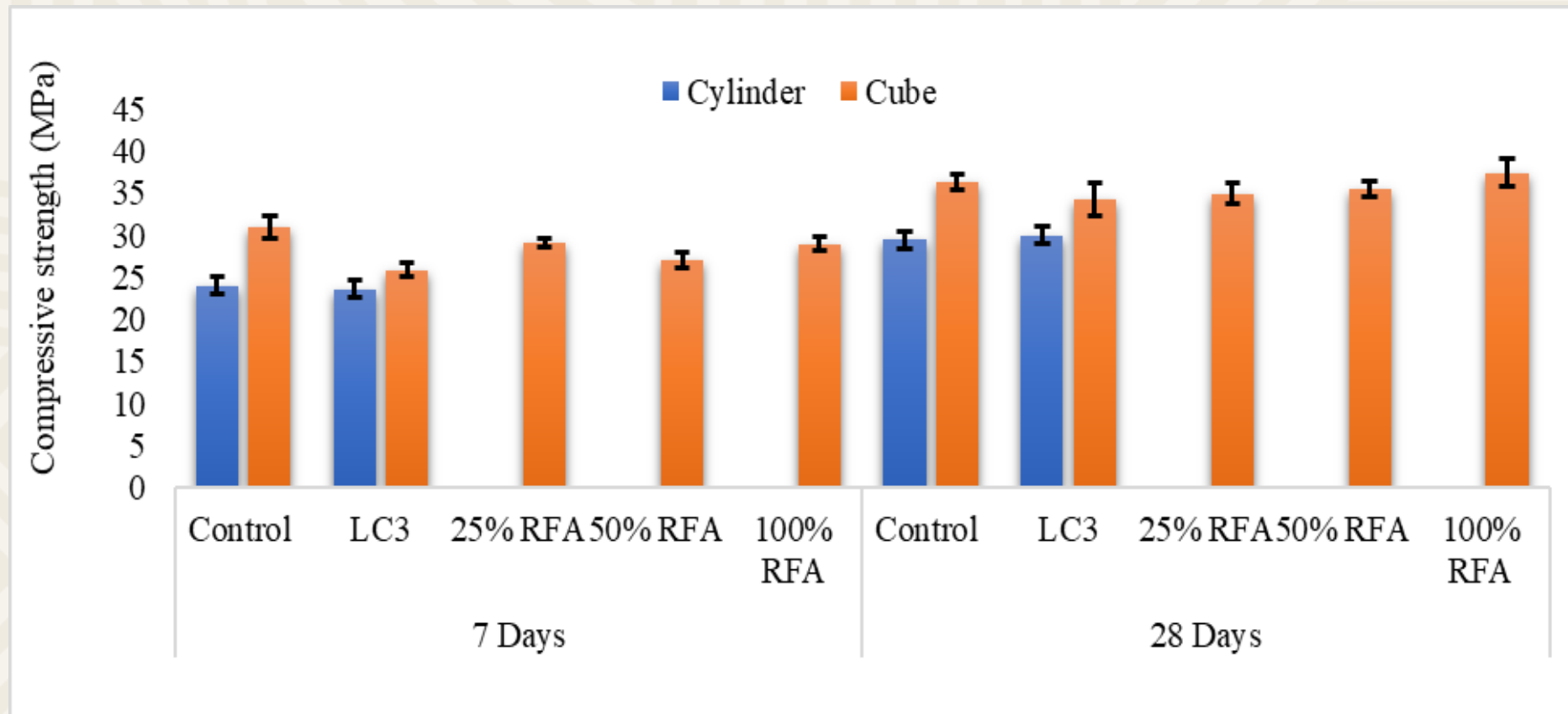
Waste plastic in bricks



Waste plastic (RESIN8) in 3DPC



CDW as fine aggregate in concrete



Applications

