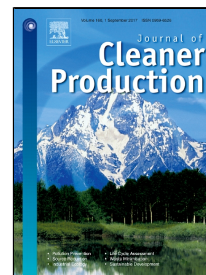


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A study on energy use for excavation and transport of soil during building construction

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1 **WORD COUNT: 9343**

2 **A STUDY ON ENERGY USE FOR EXCAVATION AND TRANSPORT OF**  
3 **SOIL DURING BUILDING CONSTRUCTION**

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5

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8

9 **ABSTRACT:**

10 The building life cycle consists of production, on-site construction, operation and demolition  
11 phases. The energy use due to construction (i.e. materials and on-site construction) represents a  
12 significant component of life cycle energy in case of naturally ventilated or partially air-conditioned  
13 buildings. Earthmoving is one of the major parts of construction processes and it involves the use of  
14 heavy equipment. This study presents the influence of technological, operational and site related  
15 parameters on the performance of earthmoving operations using five case studies. The energy use due  
16 to 'excavation' and 'excavation and transport of soil' is in the range of 14 - 89 MJ/cu.m. and 19 - 135  
17 MJ/cu.m. respectively. The choice of equipment selection and its influence on the time (duration),  
18 cost, energy use and emissions of earthmoving operations are presented using trade-off analysis. It is  
19 observed that the cost of transporting soil could be higher than the excavation cost if the truck is not  
20 utilized effectively. A procedure for incorporating sustainability metrics into earthmoving operations  
21 during the planning phase is presented. The practical application of this work in industry practice is  
22 also demonstrated. The findings are expected to be useful for construction planners in decision  
23 making including sustainability metrics.

24

25 **Keywords:**

26 Buildings, embodied energy, on-site construction, earthmoving, excavation, transport, construction  
27 planning

28

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