



Tendering Based on Life Cycle Cost and Life Cycle Analysis

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Abstract

Construction projects have high social and environmental costs by nature. A tendering procedure including estimation of the environmental life cycle cost in awarding a contract can facilitate best engineering solutions along with least damage to the environment. Basing the award criteria to the life cycle cost (LCC) and life cycle analysis (LCA) can be made by calculating the total CO₂e emissions of a project, then pricing and including this cost in the tender price. As application of sustainability principles is crucial at the design stage, it is proposed to include cost of CO₂ in the BOT projects and public residential projects where there is a developer-contractor responsible from the design as well as the construction of the facility, so an effort will be made to reduce bid price, hence CO₂ price and emission. In this study, effect of CO₂ price level on different types of projects are investigated to understand applicability of the procedure for public projects.

Keywords: Green procurement; carbon pricing; life cycle analysis (LCA); life cycle cost (LCC), environmental tendering; environmental bidding; sustainable construction.

1 Introduction

Incorporating sustainability into construction industry is very crucial, as the construction industry is found to be responsible for about 50% of the global resource use [1]. For private owners in industrial and commercial buildings, sustainability has the benefits of reducing the maintenance costs of a building, while promoting reputation of the company. Therefore, private owners are more interested in developing sustainable buildings. However, for residential constructions and for infrastructure projects, the owners are seeking the minimum cost and delivery time for a project, since the future owners/users are not involved within the decision process shaping the project. Therefore, the costs that will be incurred by the future owners are not considered in decision making.

Mass residential developments, where there is public involvement and public infrastructure projects can be best candidates for enforcing sustainable construction. Mass residential projects are usually carried out on the basis of land right sharing model, where the developer/constructor pays for the construction and returns a share of the development to the owner(s). Hence, it is kind of design-build-transfer type of construction where the developer/constructor has full control over the design. Similarly, many infrastructure projects are realized with the build-operate-transfer (BOT) model, where the contractor/investor has full control over the design. Therefore, bringing sustainability into projects must be implemented at the tendering of such projects, to direct the investors/contractors to make the design to the sustainability requirements.