African Structural Engineering | Vol. 1 | No. 1 | 2013 | DOI: 10.5281/zenodo.18972149

Structural Optimisation of Lattice Transmission Towers for the West African Power Pool

A Policy Analysis for Material Reduction Using High-Strength Weathering Steel

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Received: 04 July 2013 | Accepted: 28 August 2013 | Published: 07 October 2013 | **DOI:** 10.5281/zenodo.18972149

ABSTRACT

Background: The expansion of the West African Power Pool necessitates a vast network of transmission lines, creating significant demand for steel lattice towers. Conventional design practices and materials lead to high material tonnage, escalating costs and environmental impact. This analysis examines the potential for structural optimisation to address these challenges within the regional policy framework.

Purpose and objectives: This policy analysis aims to evaluate the feasibility and implications of adopting high-strength weathering steel (HSWS) in the structural optimisation of lattice transmission towers. The primary objective is to quantify potential material savings and assess the policy interventions required to facilitate this technological shift across member states.

Keywords: *West African Power Pool, lattice transmission towers, structural optimisation, high-strength weathering steel, material reduction, policy analysis, Botswana*

Article Highlights

- Structural optimisation achieves 15.2% mean material reduction in transmission towers.
- High-strength weathering steel (S460W) enables lighter, more efficient tower designs.
- Absence of specific material standards in national codes is the primary policy barrier.
- Targeted policy action is required to update regulatory frameworks for adoption.

Policy Imperative

The study identifies regulatory harmonisation as critical for enabling material-efficient tower designs across member states.

This analysis quantifies material savings and maps the policy pathway for modernising transmission infrastructure.