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Tamunosaki Douglas, Akuro Big-Alabo

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## A generic algorithm of sustainability (GAS) function for industrial complex steam turbine and utility system optimisation

Tamunosaki Douglas<sup>a,\*</sup>, Akuro Big-Alabo<sup>b</sup>

<sup>a</sup>*Sokoto Energy Research Centre; Department of Pure and Industrial Chemistry, Faculty of Science, University of Port Harcourt, P.M.B. 5323, East-West Road Choba, Port Harcourt, Rivers State, Nigeria.*

<sup>b</sup>*Department of Mechanical Engineering, Faculty of Engineering, University of Port Harcourt, P.M.B. 5323, East-West Road Choba, Port Harcourt, Rivers State, Nigeria.*

### ABSTRACT

The GAS-function methodology is introduced in this paper in order to identify the sustainability objective function for optimisation of multiple interconnected complex steam turbines and utility network (ICSTUN) systems. Also, the complex steam turbine was modelled based on induction machine operation which enhances its performance. The boiler models were identified as the sustainability objective function which was further investigated under given operating constraints for optimisation of the ICSTUN system. The validated results show that relative error between field operation and simulation data were less than 1% on average, which is acceptable for engineering applications. The optimisation results indicate that contrary to previous authors' results and by comparing with actual field operational data information, coal flow rates for total site utility system of this investigated ICSTUN can be significantly reduced. It was therefore concluded that a significant reduction in the coal flow rate amounts is practicable in order to significantly reduce operating costs as well as the environmental and social issues associated with utilising fossil-fuels, while still satisfying the demand-side management objectives for the plant.

*Keywords:* GAS-function methodology; Mathematical programming; Process system engineering; Energy systems; Applied thermodynamics.

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\*Corresponding author. Tel.: +2348125045418  
E-mail address: [tamunosakidouglas@gmail.com](mailto:tamunosakidouglas@gmail.com) (T.Douglas)

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