

## EMISSIONS CONSTRAINED MULTI-CRITERIA-BEST GENERATION MIX USING FUZZY DYNAMIC PROGRAMMING

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**ABSTRACT.** *This paper proposes a new approach for solving long-term best generation mix problem considering air pollution constraints ( $SO_X$ ,  $NO_X$  and  $CO_2$ ) and multi-criteria under uncertain circumstances by using fuzzy dynamic programming. A characteristic feature of the proposed approach can handle not only fuzziness in fuel and construction cost, load growth, reliability and air pollution but also considering many constraints of best generation mix problems. This approach can accommodate an arbitrary shape of a membership function and the pumped-storage hydro generator operation. The effectiveness of the proposed approach is demonstrated by applying it to solve the multi-years best generation mix problem on the KEPCO-system which contains nuclear, coal, LNG, oil and pumped-storage hydro power plants in Korea.*

**Keywords:** Gas emission constraints, Best generation mix, Kyoto Protocol, Fuzzy dynamic programming

1. **Introduction.** There is a global trend towards liberalization and privatization of the electricity supply industry. This is both of growing environmental awareness and increasing prospects ratification of the Kyoto Protocol [1]. Electricity is the indispensable form of energy for modern societies. Its demand has been rapid increasing the quantity, quality and reliability at minimal production cost. Electricity utilization is environmentally benign, clean and safe in delivery. It causes no pollution or environmental emissions at the point of end user. But, electricity production can cause local and regional environmental impact and may also have long-lasting detrimental global consequences. Some of these impacts like the emissions of sulphur oxides ( $SO_X$ ), nitrogen oxides ( $NO_X$ ) and solid particulates, which all have detrimental air quality implications, can be controlled by