Energy Security: a Robust Programming Approach and Application to European Energy Supply via TIAM

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Abstract. Energy supply routes to a given TIAM region (say E.U.) are subject to randomness, resulting in partial or total closure of a route (corridor). For instance: a pipeline may be subject to technical problems that reduce its capacity. Or, oil supply by tanker may be reduced for political reasons or because of equipment mishaps at the point of origin, or again by a conscious decision by the supplier in order to obtain economic benefits. This chapter uses the approach of Robust Optimization to model uncertainty on the energy supply constraints for Europe in the economy-energy model TIAM. The resulting formulation provides several interesting features regarding the security of EU energy supply and has also the advantage, and not the least, to be numerically tractable.

Keywords. Energy supply, Robust Optimization, Ambiguous Chance Constraint Programming, TIAM.