A tight MIP formulation of the unit commitment problem with start-up and shut-down constraints

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Abstract— This paper provides the convex hull description of the single thermal Unit Commitment (UC) problem with the following basic operating constraints: (1) generation limits, (2) start-up and shut-down capabilities, and (3) minimum up and down times. The proposed constraints can be used as the core of any unit commitment formulation to strengthen the lower bound in enumerative approaches.We provide evidence that dramatic improvements in computational time are obtained by solving the self-UC problem and the network-constrained UC problem with the new inequalities for different case studies.

Index Terms— Unit commitment (UC) · Mixed-integer programming (MIP) ·Facet/convex hull description

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