

Operational mode switching of chlor-alkali electrolysis: A novel strategy for demand side management in the chlorine industry

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Flexible operation of switchable chlor-alkali electrolysis (CAE) is a novel strategy for demand side management in the chlorine industry. A bifunctional electrode that can replace uni-functional electrodes allows for adjusting the plant operation to fluctuations in electricity prices by switching between two modes, namely H₂ mode and O₂ mode. Such a flexible operation enables improving the plant economics as well as contributing to power grid stabilization. We solve a mixed-integer nonlinear program (MINLP) to determine optimal operation and (if necessary) oversizing of the switchable chlor-alkali plant. We found that the switchable operation can reduce a large amount of electricity and operating costs while the high investment cost for retrofitting the plant for employing switchability could prolong the payout time.