# Introducing Learning Algorithms within an Operational State Aggregation Method for Transmission System Planning

The transition towards a sustainable power system introduces considerable challenges in planning and operation, attributed to the stochastic nature of renewable energy sources. This study proposes a methodological framework aimed at discerning representative operational states pivotal for transmission planning. These states are subsequently consolidated into a reduced set of representative periods.

We utilize neural networks to facilitate efficient feature extraction from input data, prioritizing variables based on their impact on the solution of the planning problem. The obtained features are subsequently used in a classical clustering framework to obtain representative periods for the planning problem. Our developed methodology an enhancement in computational efficiency when compared to conventional feature extraction, while maintaining commensurate levels of accuracy.

The implications of this approach are substantial, empowering system planners to harness multi-decadal datasets for refined planning models. Furthermore, it provides decision support for substantial infrastructure investments on large scale systems.