N-SIDE

Advanced Grid Expansion Planning

Optimize your grid expansion plan by considering storage and flexibility as an alternative to conventional grid reinforcement.

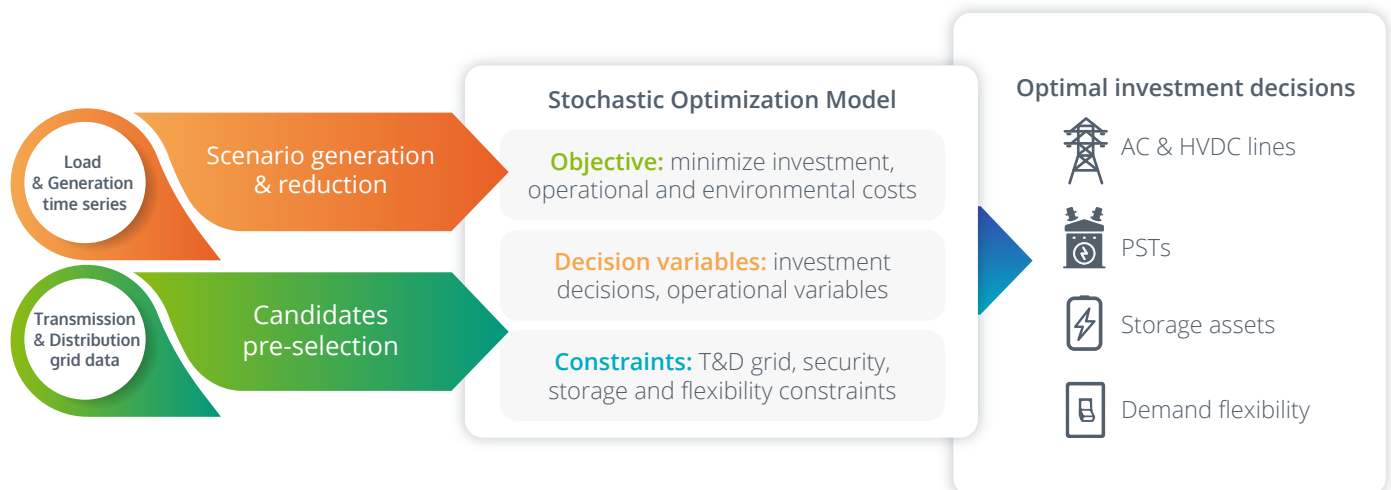| Improve RES Integration	Reduce CAPEX and OPEX	Reduce Environmental Impact	Ensure Grid Adequacy

Our Solution

With the goal to help grid planners assess multiple network reinforcement alternatives in a simple way, N-SIDE has developed a simulation toolbox able to optimize the long-term grid expansion plan over several decades with different investment times.
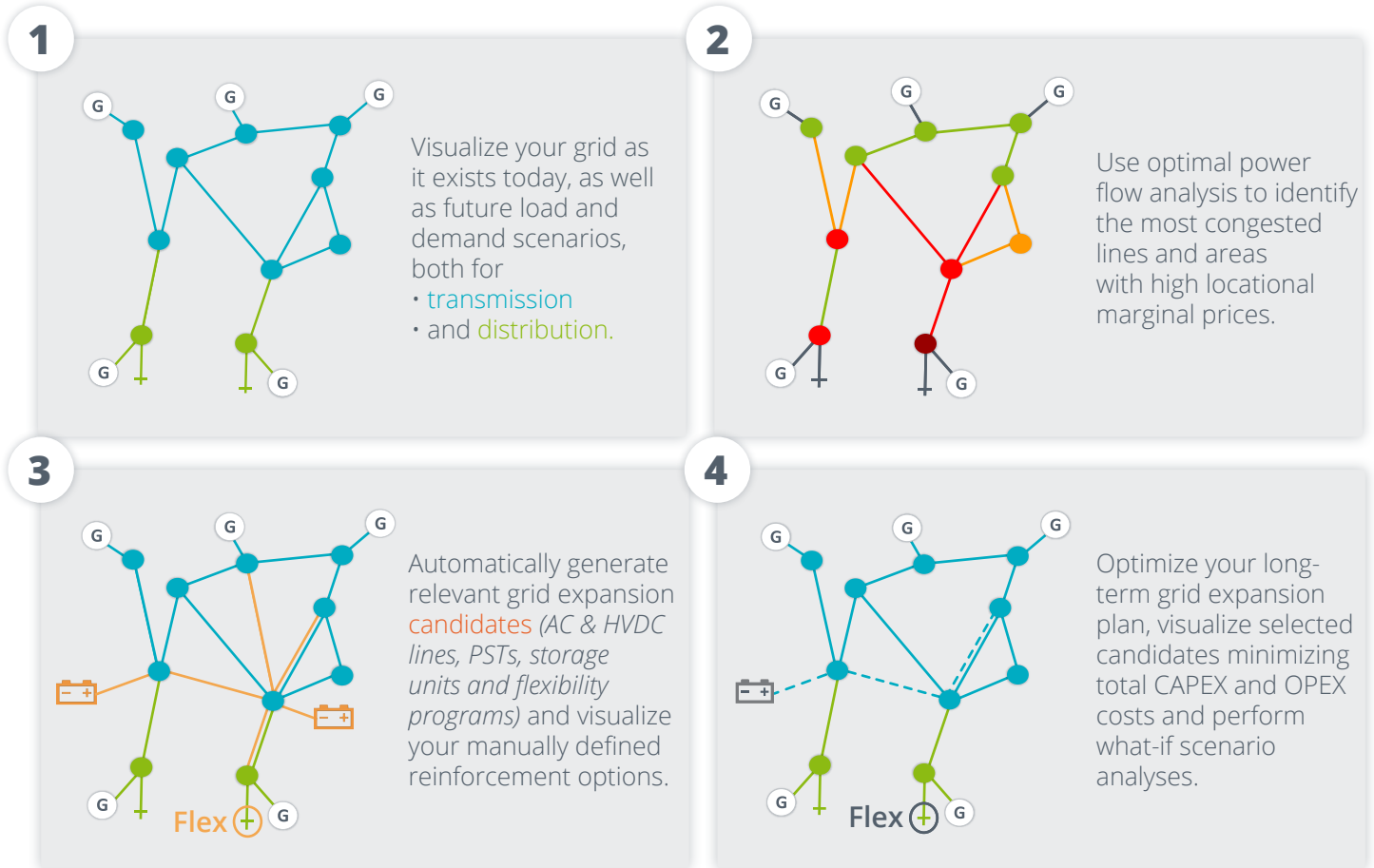
Based on a cost benefit analysis, it evaluates the best planning strategy by simultaneously analyzing a large number of expansion candidates and selecting the best reinforcement options, including installation of storage capacities and implementation of demand flexibility programs. This decision-helping software uses stochastic optimization and is therefore able to consider the variability of renewable energy sources by accounting for multiple load and generation scenarios in a probabilistic way.

The toolbox is working for combined transmission and distribution grid planning and also includes environmental and contingency analyses.

Load & Generation time series → **Scenario generation & reduction**

Transmission & Distribution grid data → **Candidates pre-selection**

Stochastic Optimization Model

Objective: minimize investment, operational and environmental costs

Decision variables: investment decisions, operational variables

Constraints: T&D grid, security, storage and flexibility constraints

Optimal investment decisions

- AC & HVDC lines
- PSTs
- Storage assets
- Demand flexibility

The 4 steps of the Advanced Grid Expansion Planning methodology

1

Visualize your grid as it exists today, as well as future load and demand scenarios, both for
- transmission
- and distribution.

2

Use optimal power flow analysis to identify the most congested lines and areas with high locational marginal prices.

3

Automatically generate relevant grid expansion candidates *(AC & HVDC lines, PSTs, storage units and flexibility programs)* and visualize your manually defined reinforcement options.

4

Optimize your long-term grid expansion plan, visualize selected candidates minimizing total CAPEX and OPEX costs and perform what-if scenario analyses.

The proven benefits of Advanced Grid Expansion Planning

The Advanced Grid Expansion Planning methodology is currently being applied on six regional cases, covering nearly the whole European grid and is showing strong benefits compared to classical grid planning methodologies.

Improve RES Integration

Avoid load and generation curtailment by covering production and demand peaks thanks to the optimal placement of storage units and flexibility programs.

Reduce CAPEX and OPEX

Reduce the total expenditures to manage your grid by considering both grid investments and operational costs in a single cost benefit analysis.

Reduce Environmental Impact

Enhance your analysis by considering different environmental criteria such as air quality, carbon footprint and landscape impact.

Ensure Grid Adequacy

Size your grid to cover all future scenarios by considering multiple load and generation variants in your planning exercise.