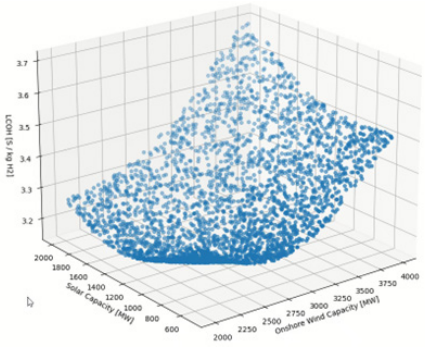
YOUR TRUSTED ADVISOR ON THE
JOURNEY TO A SUSTAINABLE FUTURE

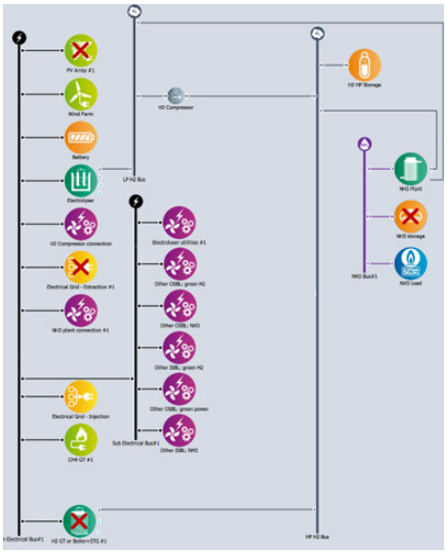
GENESIS

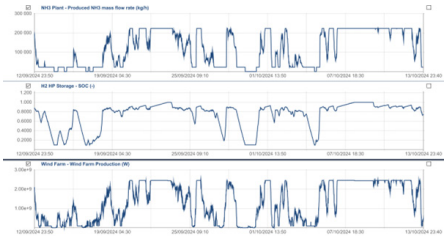
Odyssey: Genesis Energy Architecture Optimization Tool

Odyssey is a dynamic simulation software with strong techno-economic optimization capabilities across the entire Power-to-X value chain. The software creates an end-to-end, real-time simulation that calculates the life cycle performance of all facility building blocks down to component level and helps optimize defined parameters with given technical and economical constraints and priorities. It provides decision makers with accurate KPI information and confidence when making their investment decisions.

Odyssey (Energy Architecture Optimisation Tool)







HOW WE CAN HELP

Genesis can provide a techno-economic optimization of the architecture sizing that is leveraged at the screening and conceptual stage to help define the relevant sizing of green Power-to-X projects.

Due to the intermittent nature of renewable wind and solar production, sizing of main units cannot be established based on technical parameters only. For instance, aligning the electrolyser size to the maximum renewable power output would lower the utilization factor of equipment. Curtailing electricity (i.e. accepting a production loss at maximum renewable power output) could be a more cost-effective solution than investing in under-utilized hydrogen and ammonia production capacity.

Sizing of the main units can be based on typical ratios benchmarked on previous projects. However, this method cannot capture the specificity of the local production and storage profiles, constraints, and other technical parameters of the project.

HOW WE ADD VALUE

Odyssey, the Genesis Energy Architecture Optimization Tool, combines **technical and economic modeling** to allow identification of the range of main unit sizes that should minimize production costs (if it is the main driver of the study) for different architectures and different sets of constraints like input parameters or operational philosophy. It allows consideration of the expected production profiles as well as the preliminary technical definition of the project. Our optimization tool also provides a **digital twin** of the energy system through dynamic simulations with insight into the operation and performance over the project lifetime.

WHAT SETS US APART

The Genesis Odyssey tool provides:.

- Modeling of the entire Power-to-X architecture from power source to end-product, keeping track of molecules and electrons.
- Rapid development of optimal concept sizing through genetic algorithm (AI learning).
- Optimization of single or multiple criteria e.g. LCOH/LCOA, Min CAPEX, unmet demand, etc.
- Techno-economic dynamic simulations with input of technical and economic design parameters:
    - Input of real historical wind and solar time series data
    - Efficiency degradation / replacement rates
    - Efficiency improvements / technical learnings for future prediction
    - CAPEX / OPEX outputs based on entire project lifetime
    - Economies of scale
- Output of various design parameters (CAPEX / OPEX / NPV / LCOH / LCOE / LCOA / hydrogen production / power production / revenue / etc).
- Solutions to power intermittency challenges

Build and simulate entire Power-to-X architecture

Incorporate technical and economic modeling for each component

Optimize entire system based on multiple criteria

Calculate project metrics and produce outputs versus time plots