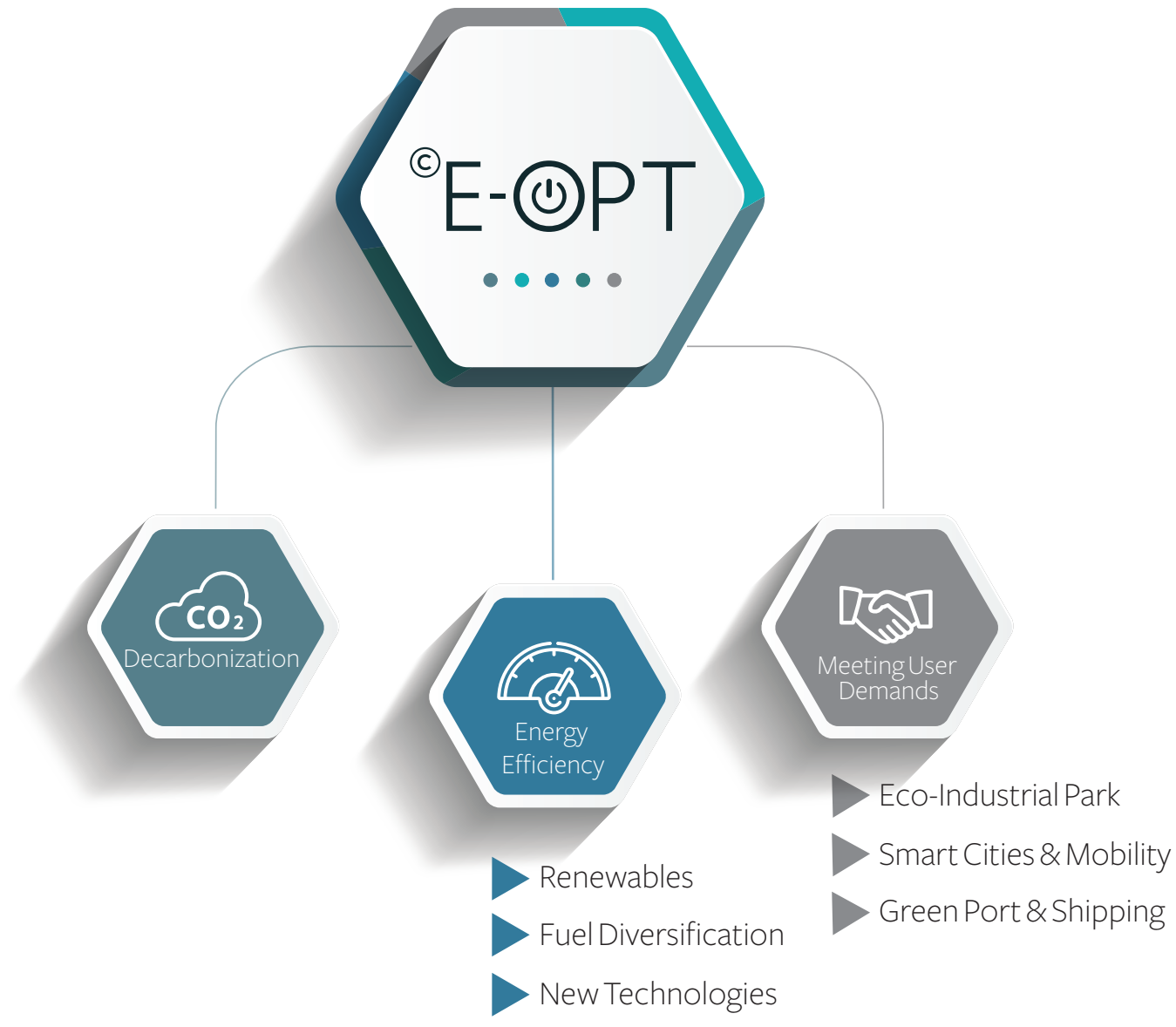


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1. Motivation



Master planning & design of Greenfield projects and retrofitting of Brownfield projects are often characterized by highly integrated energy-mix and different end-user demands.

Optimal integration and operations performance of components (CCHP, renewables, electrochemical and thermal storage) are thus crucial for overall system reliability and flexibility

A highly integrated system offers an opportunity to achieve primary energy savings, reduce operating & capital expenditure and reduce CO2 emissions

2. The Optimal Planning Tool

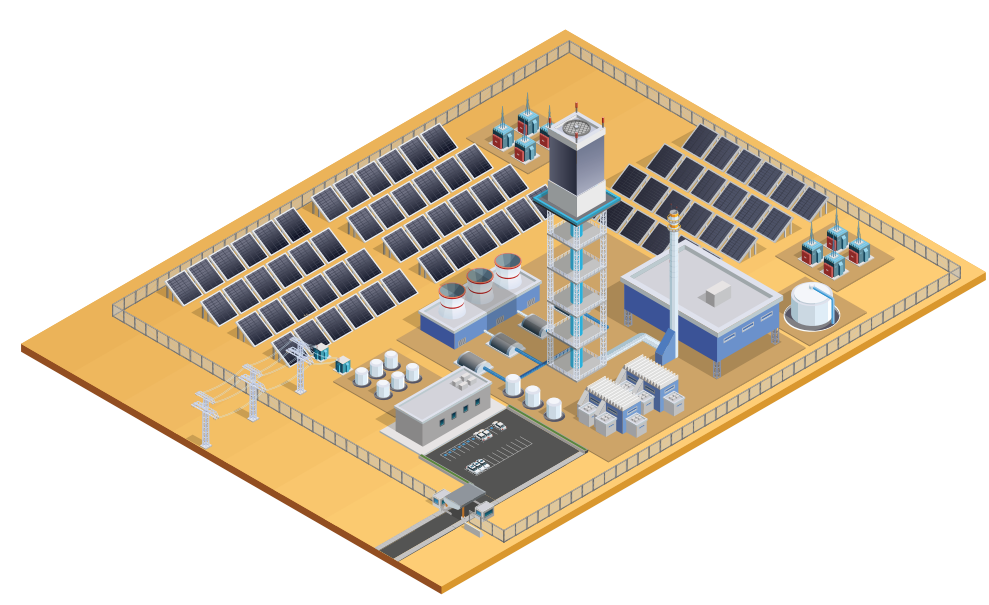




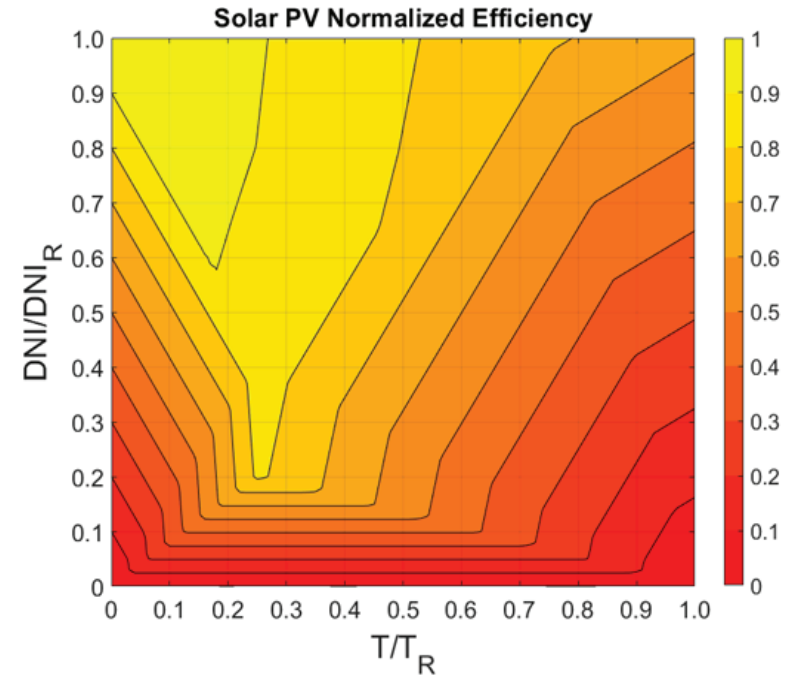
- ✓ Friendly User Interface
- ✓ Online and Offline Mode
- ✓ Fast and Robust Computations
- ✓ Easy to customize

3. Modelling & Design

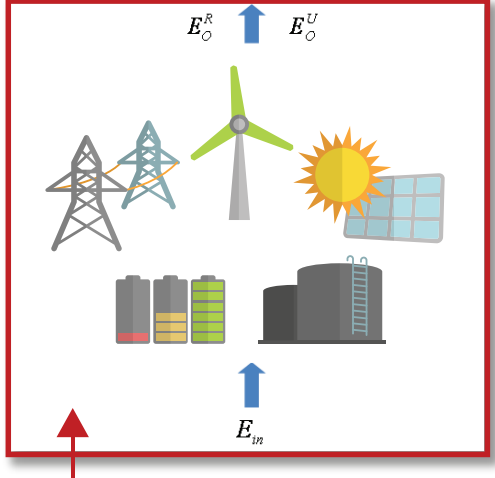
In-built database of components in the market



Embedded off-design component maps for accurate system behaviour

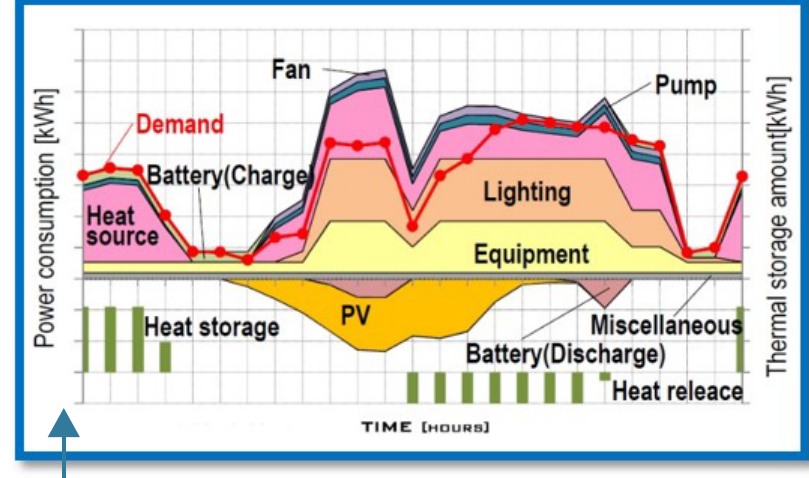


Definition of Plant Arrangement



➤ Sizes
➤ Capex

Unit Commitment + Optimal Dispatching



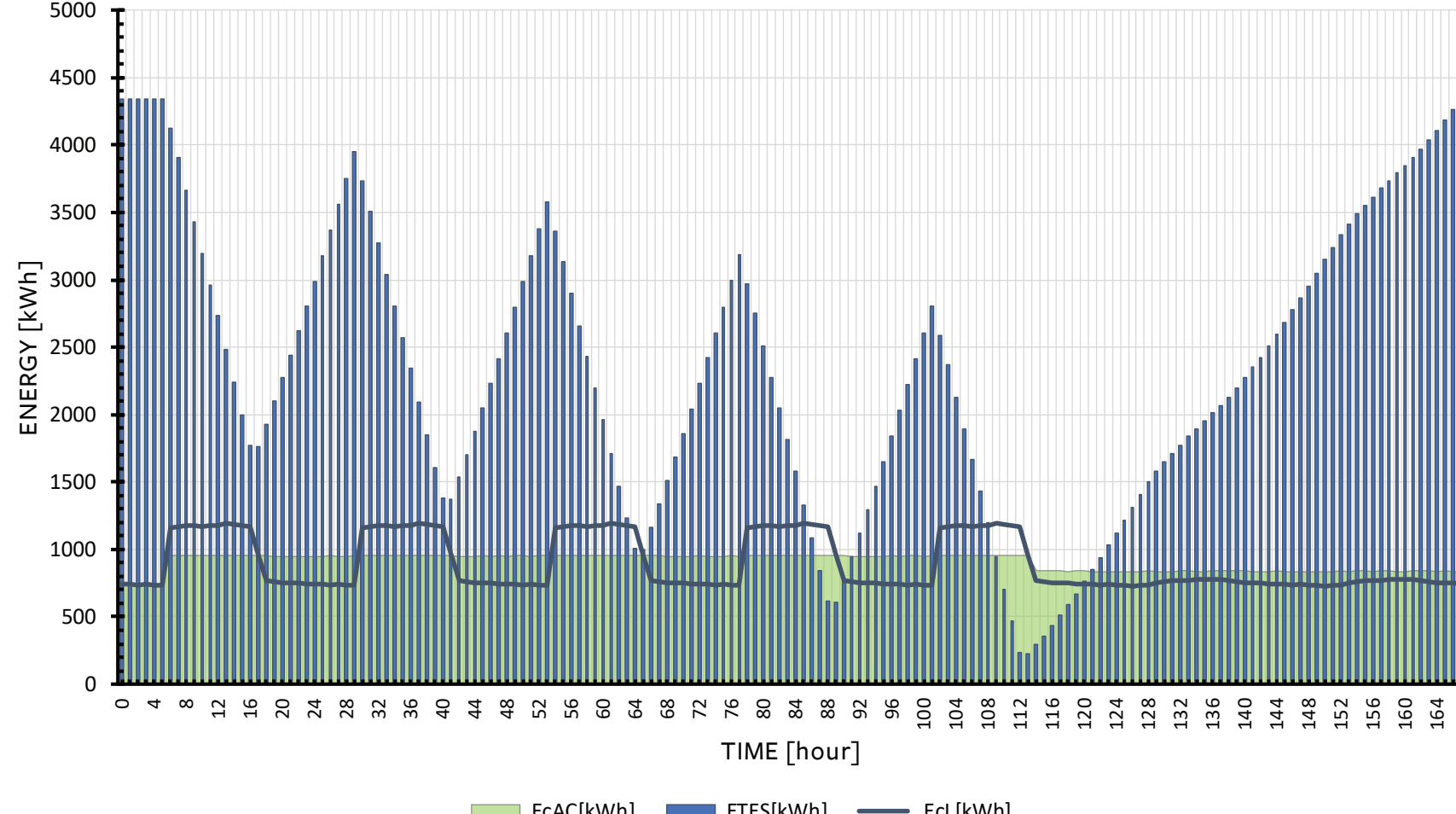
➤ Performance
➤ Opex

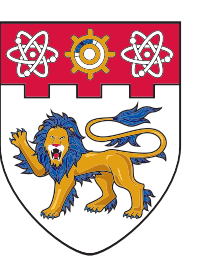
Supervisory Algorithm
Optimal Layout & Components Selection

Simultaneous Algorithm
Plant Simulator

4. Case Study


COGEN + Thermal Storage retrofit at Jurong Point site



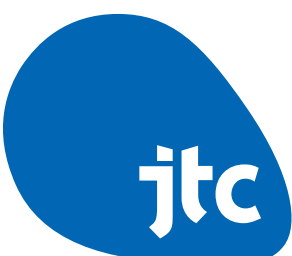


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Board

- ✓ Up to 15% Primary Energy Savings
- ✓ Up to 18% CO2 reduction