

Techno-Economic Analysis

Effective planning and design of the power system in line with financial objectives

Power utilities and industrial facilities are facing the complex challenge of upgrading and developing their power systems while assuring an optimal return on their investments and their long-term viability.

The CYME Techno-Economic analysis module facilitates the evaluation of the feasibility and the profitability of a project, based on the factual system model, leading to a realistic planning in line with technical, service reliability and financial objectives.

Whether planning maintenance, replacements, improvements or expansions to a power system, the Techno-Economic Analysis module is intended to help electric utilities and large industries invest into that infrastructure by analyzing impacts of modifications made and the cost and gains they entail over the years.

For each study, costs can be associated to any modification to the power system model, whether it is the cost resulting from the installation or relocation of an asset or from a load transfer like a phase balancing operation. In addition to the asset cost, economic parameters such as operation and maintenance cost, salvage value and depreciation can be defined and taken into account by the analysis.

The reports created present load flow results in terms of benefits following from reduction in losses and mitigation of abnormal

conditions. The economic results include an income statement, a cash flow statement and a capital budgeting. When used with the CYME **Reliability Assessment** module, mitigation valuation can be based on improvements of a single reliability index, or a combination of multiple indices.

The techno-economic analysis can be performed on a project created using the CYME **Advanced Project Manager** module. It allows the individual or collective analysis of mitigation projects that are planned for different moments in time. The integration of the two modules brings the analysis to another level by including the technical impacts of concurrent future approved projects, and by allowing a more detailed load growth that combines organic growth, active growth and load transfers.



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Features - Technical

- A library of costs for each equipment type and network operation can be created and subsequently applied to the relevant modifications on the power system.
- The impact of corrective measures is assessed on the following: loss reduction, abnormal conditions reduction (voltage violations and overloads). Reliability indices improvement is proposed by the analysis with the Reliability Assessment module installed.
- These impacts are valued based on the library of costs and expressed in terms of worth per kWh, abnormal condition or improvement in point of index.

Features - Economic

- Economic settings such as the discount rate, the inflation rate and the tax rate are applied on all costs to determine the present value of future cash flows.
- The investment activities (i.e. the costs of the modifications) related to the corrective measures are compared to their economic revenues and gains.
- The analysis can be performed on a calculation period that considers an estimated or forecasted global or detailed load growth.
- The economic results include the Net Present Value (NPV), the Internal Rate of Return (IRR), the Return On Investment (ROI), the estimated payback period and estimated discounted payback period.

- The return on investment is calculated taking into account objectives such as losses reduction, mitigations of abnormal conditions and, in option, the improvement in reliability.
- Asset depreciation over the span of the analysis can be considered with the possibility to consider the half-year rule and/or to include the salvage value and tax.

Reports

The technical results are available for a base case (i.e. prior to modifications) and for the study/project where the planned measures are applied, for easy comparison.

- The technical results are presented per year for the simulation period.
- The technical results used for valuation, i.e. system losses, abnormal conditions and/or reliability indices, are shown with their absolute value and as a reduction compared to the base case.
- The impact of the corrective measures on the power and energy losses (kw and Kwh), on the under- and over-voltage conditions, on the overload condition and/or on the selected reliability indices are shown for each year.
- The modifications contained in the study/project for which costs have been defined are also tabulated.

The economic information shown in the reports includes:

- An income statement (revenues and gains, expenses and losses) for the period simulated.
- A cash flow statement (operating activities, investing activities) for the period simulated.
- A capital budgeting report that gives an overview of the economic indicators such as the NPV, IRR, ROI and the payback period.
- The details of the depreciation calculations related to the figures printed in the income statement are also presented.



Eaton

1000 Eaton Boulevard
Cleveland, OH 44122
United States
Eaton.com

CYME International T&D

1485 Roberval, Suite 104
St. Bruno, QC, Canada J3V 3P8
P: 450.461.3655 F: 450.461.0966
P: 800.361.3627 (Canada/USA)
CymelInfo@eaton.com
www.eaton.com/cyme

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Printed in Canada
Publication No. BR 917 069 EN
March 2017

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