

The TERA Approach

A Methodology for Technoeconomical, Environmental and Risk Analysis of Multidisciplinary Systems

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What is TERA?

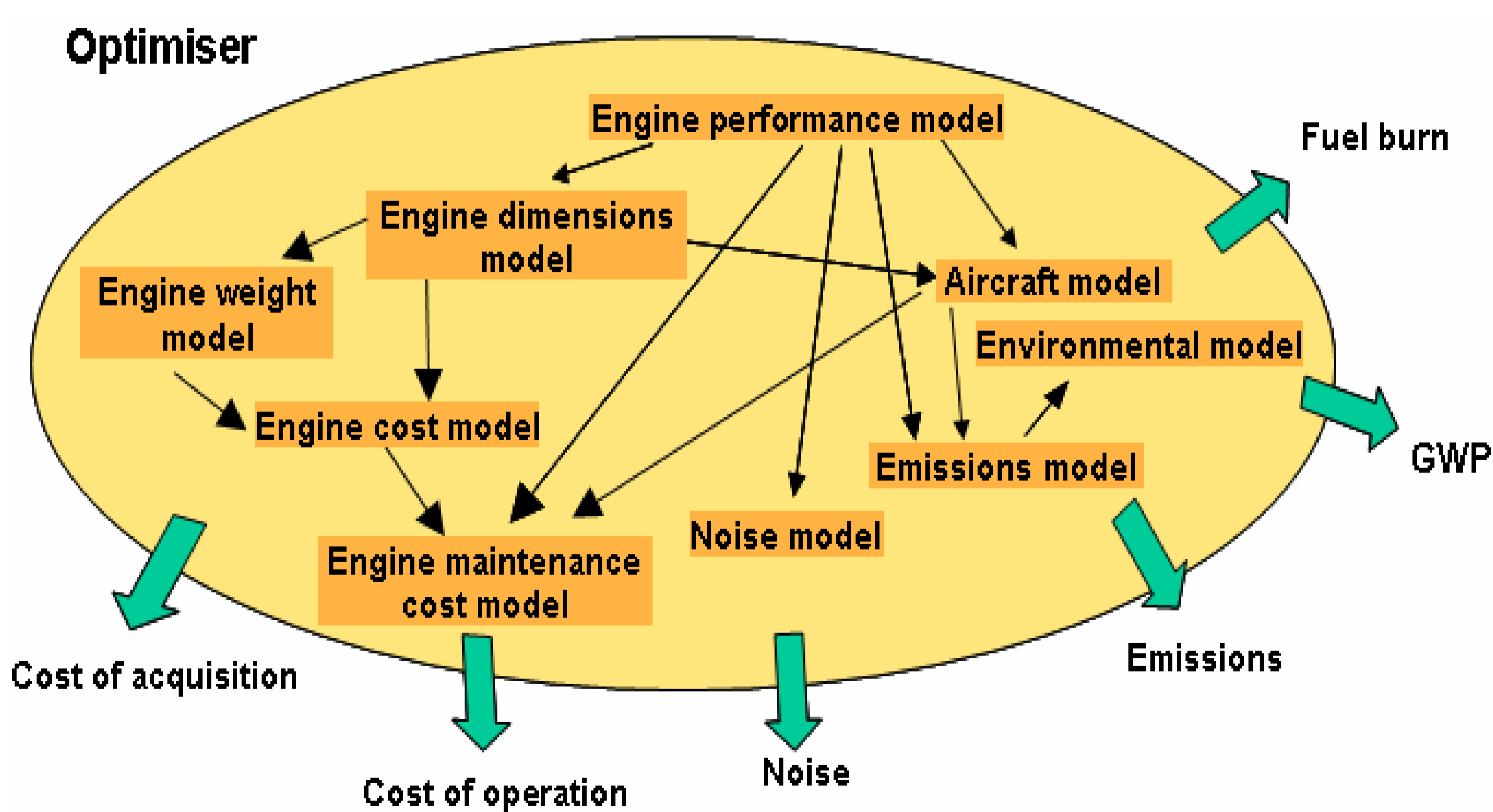
TERA is an adaptable decision support system for preliminary analysis of complex mechanical systems [1].

A TERA approach during the preliminary design process of complex mechanical systems will soon become the only affordable, and hence, feasible way of producing optimized and sound designs, if the whole spectrum of possible impacts (economic, environmental etc) is to be taken into account [1].

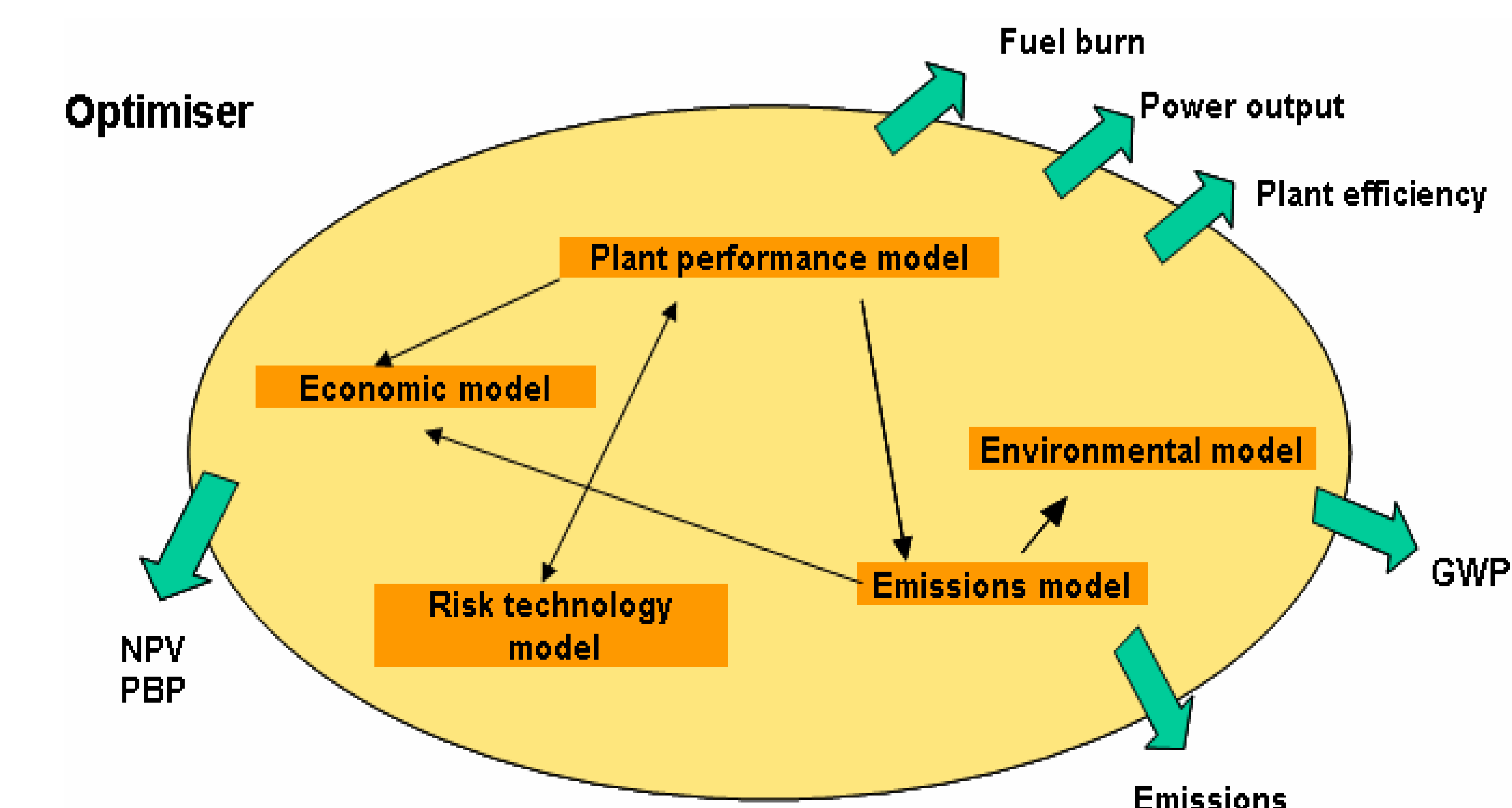
Rationale

TERA can be used to radically explore the design space available in every new engine design. TERA will point out to the most promising novel technologies while providing an initial engine design point; more complex optimization tools can then be introduced to refine the initial engine design.

TERA for Aero Gas Turbines

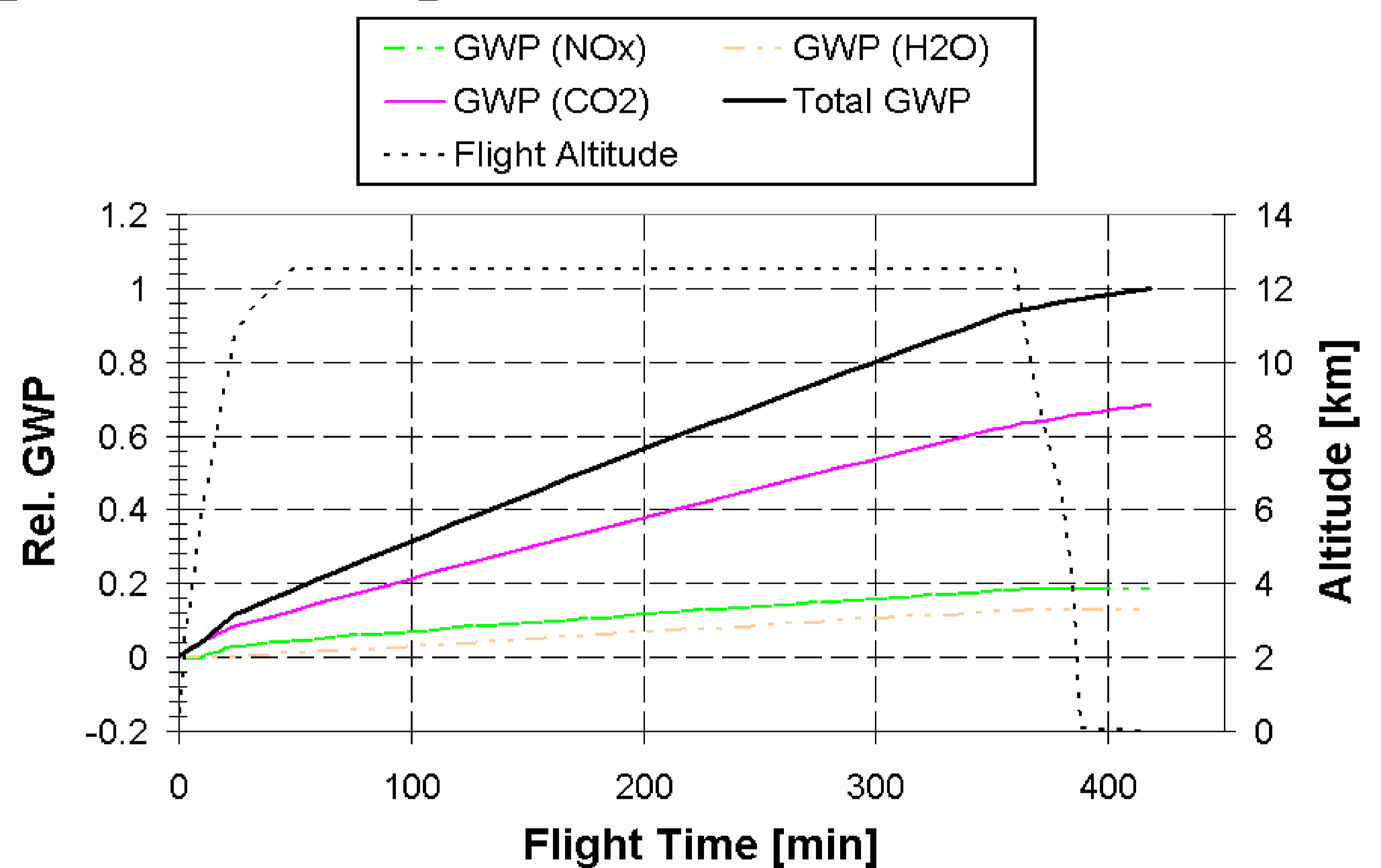


TERA for Power Gas Turbines



Results

The tool was used successfully for identifying those gaseous pollutants and flight phases that contribute the most to global warming.



(Graph as taken from Ref [1])

Future Work & Conclusions

The TERA approach can be used effectively for assessing novel propulsion cycles and advanced power generation schemes.

Future work will focus on improving computational speed; a major requirement for future application of technology risk analysis in gas turbine multidisciplinary design [2].

[1] Kyprianidis, K.G., Colmenares Quintero, R.F., Pascovici, D.S., Ogaji, S.O.T., Pilidis, P., and Kalfas, A.I., 2008, "EVA - A Tool for Environmental Assessment of Novel Propulsion Cycles", ASME TURBO EXPO 2008, Paper GT-2008-50602, June 9-13, Berlin, Germany.

[2] Di Lorenzo, G., Friconneau, V., Brandt, P., Lonneux, V., Marinai, L., Pilidis, P., and Ruiz-Olalla, G., 2007, "Technoeconomic Environmental Risk Analysis - Technological Perspective Application To Low Carbon Plant", Proceedings of the Fourth IDGTE Gas Turbine Conference "Gas Turbine Technology in a Carbon Constrained World", Paper 6, 13-14 November, United Kingdom.