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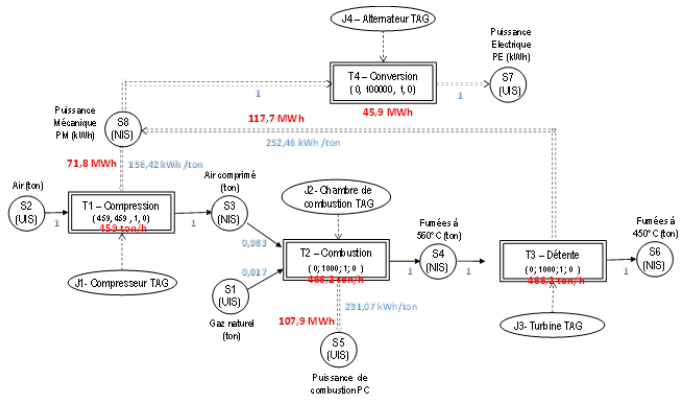
# TOWARD A WASTE HEAT SUPPLY CHAIN: DESIGN AND IMPLEMENTATION OF A DECISION MAKING TOOL FOR THE SELECTION AND THE OPTIMIZATION OF WASTE HEAT RECOVERY IN THE PROCESS INDUSTRY

*Vers une chaîne logistique de la chaleur fatale : conception et implémentation d'un outil d'aide au choix de la filière de valorisation énergétique des effluents dans l'industrie des procédés*

Efforts to improve industrial energy efficiency usually focus on reducing the energy consumed by the equipment used in industrial processes. However, a valuable alternative approach to improving overall energy efficiency would be to capture and reuse the lost or «waste heat» that is intrinsic to all industrial manufacturing. In such processed, as much as 20 to 50% of the energy consumed is ultimately lost via waste heat contained in streams of hot exhaust gases and liquids, as well as through heat conduction, convection, and radiation.




*ERTN (partial) of gas turbine*

Recent work in PSE department aim to develop and implement a computer aided methodology (COOPERE methodology) dedicated to the energy audit and the development of energy efficient solutions on industrial sites. In the audit process, COOPERE Methodology identifies and evaluates and quantifies waste heat in terms of energy and exergy flows; Unfortunately, it does not permit to select the most appropriate recovery, reusability and recycling technology taking into account the environment for the technical, economical and environmental constraints that are strongly dependent on the considered region.

In this context, the main purpose of this thesis is to develop and implement a decision making tool dedicated to the synthesis, optimization and planning of the entire waste heat recovery process including all steps of the supply chain (localization and characterization of waste heat deposits, technologies for waste heat recovery, transport, storage and reuse).

The methodology will likely require the use of different levels of modeling: a detailed modeling (based upon thermodynamic models) for simulation of recovery systems and an aggregate modeling needed for the planning of the entire chain, from valuation of the «production» of fatal heat to consumption on the «client» site. On the other hand, the tool will incorporate an optimization phase based upon criteria such as profitability and exergy efficiency. It will also exploit decision support and knowledge capitalization methodologies such as CBR «Case Based Reasoning.»