



ENER/FP7/296003/EFENIS

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SEVENTH FRAMEWORK PROGRAMME

Project no.: 296003

Project full title: Efficient Energy Integrated Solutions for Manufacturing Industries

Project Acronym: EFENIS

Deliverable no.: 9.4

Title of the deliverable: Incorporation of the EFENIS activities/results into Academic Partners' curricula

Contractual Date of Delivery: Month 36

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Lead beneficiary: MOL (P3)

Author(s): indicated for each lecture separately

Participant(s): P1 (UNIMAN), P3 (MOL), P10 (UNIPAN)

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Dissemination Level

PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

1 Scope

MOL Group is a leading integrated Central & East European oil and gas corporation with an extensive international Upstream portfolio. Market capitalisation was over USD 8.4 bn at the end of 2012 and MOL shares are listed on the Budapest, Luxembourg and Warsaw Stock Exchanges. MOL is committed to maintaining and further improving efficiency, exploiting potential in its captive and new markets and to excellence in its social and environmental performance and active portfolio management. The Danube Refinery analysed in the framework of the EFENIS program is located in the adjacent region of the Capital city Budapest. The refinery capacity is 8.1 Mt/y. The refinery is a complex site having no fuel oil output since it has and operates a Delayed Coker unit for maximising the efficiency in producing motor fuels, thus using all available side products.

The refinery has three pressure levels in its steam system. Let-downs as well as backpressure and condensation turbines expand steam from the higher to the lower levels. An evaluation has been considered of the technical and economic potential of using HP steam for power generation by adding either back pressure turbine or condensing turbine. Since it has been established that LP steam is in excess, further LP steam generation from by expanding MP steam is not considered. Therefore installing only condensing steam turbine is evaluated further in this report. MP steam is fully utilised to generate power with minimal energy loss to the environment.

This report provides an analysis on how much maximum power can be produced based on certain value of maximum flowrate of MP steam. In the analysis, the economic evaluation of the turbine is performed as well, by evaluating the capital cost and the payback period.

In the second part of 6.5 Task (Retrofit Upgrade) a heat-integration was carried out at all Atmospheric and Vacuum distillation units. According to this examination an unexplored energy optimization possibility was revealed. Currently a project was started which aims at improving the efficiency in DCU3 (Atmospheric and Vacuum distillation Unit-3) by utilising the process heat in pre- and main-column overhead condensers for crude preheating, which will result in higher outlet temperature of the crude heat-exchanger train. This project is in the implementation phase, heat-exchangers are under design, the implementation end is planned during next year.

2 Identified improvements and savings

Using the set up steam system balance UNIPAN highlighted the potential for steam saving and utilisation, which indicates that more detailed examination has high potential to save emissions and costs. With implementation of a condensing type steam turbine, HP steam can be utilised. Total Site Analysis based on process-level Pinch Analysis has also been performed on the Danube Refinery. A rather effective Heat Integration has been carried out in all Atmospheric and Vacuum distillation units.

The results show a clear opportunity for recovering about 0.5 PJ/y of energy translating to 8.43 M€/y energy cost savings, 0.019 Mt/y GHG savings and related 0.576 M€/y GHG related cost savings. Of those technically/economically feasible are measures for recovering about 0.175 PJ/y of energy translating to 2.95 M€/y energy cost savings, 0.005 Mt/y GHG savings and related 0.152 M€/y GHG related cost savings.