



Deliverable D2.4

Simulation and design of co-axial heat exchangers with regard to performance and costs

WP2

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Dissemination Level

PU	Public	
CO	Confidential, only for members of the consortium (including the Commission Services)	X
CI	Classified, as referred to in Commission Decision 2001/844/EC	

Summary

The document D2.4, *“Simulation and design of co-axial heat exchangers with regard to performance and costs”* is a confidential document delivered in the context of WP2, Task 2.4: *“Innovative solutions for better performing or less costly Co-axial Heat Exchangers”*.

This deliverable includes the simulations and evaluations carried out in order to improve the costs and reliability of different solutions for coaxial heat exchangers. Two different innovative solutions of coaxial heat exchangers were analyzed in this task and are presented as the Co-axial Metallic Heat exchanger (CMHE) and the Co-axial Plastic Heat Exchanger (CPHE).

CMHE were first studied and developed as part of the activities carried out in the European project CHEAP-GSHPs. The achieved results were positive and a series of derived future activities were established and included as part of the new developments of GEO4CIVHIC. Task 2.4 of this project, has built further on this concept, enlarging the application field to more types of ground and in urban areas (where gravel and unconsolidated deposits are rather common) using the new head and machine developed in tasks 2.2 and 2.3. The heat exchangers has been enhanced by means of improvements of the metallic fittings in order to provide better responses from the point of views of reliability, installation methods and sealing of the pipes with the drill bit assembly after installation (HYDRA, TKI, GEOGREEN).

The ratios between external and internal diameters of the pipes , some of the most important factors for heat efficiency and heat transfer, has been also analyzed and optimized attending to the parameters related to size, installation speed and depth, overall cost of the installation and pumping costs (UNIPD-DII, RED, CRES). For this reason, it is crucial to carry out a comparative analysis considering not only the thermal efficiency but also the pumping losses associated to the differences in diameters and morphologies to optimise the design and ratios according to the specifications of the innovative machinery and equipment designed in the framework of the project by HYDRA and TKI.

The CPHE is the second research line developed in this deliverable. The research on CPHE deals with the design, preparation, configuration and production of a new generation of plastic coaxial heat exchangers with optimized thermal properties in order to increase the thermal efficiency in an optimized system in terms of pressure loss. This is based on research results achieved in the GEOCOND project and focuses on the preparation of enhanced plastic master batches. Different geometrical configurations of possible CPHE have been simulated and modelled to infer the possible behaviour in real environments and scenarios producing very promising results.

Finally, after the preliminary cost/benefit analysis, demonstrating the economic feasibility of the CPHE, the most plausible configuration was produced at lab scale (prefeasibility checks done by UPV at the university facilities). Then a complete full scale CPHE is being produced at this moment and will installed at CNR demo site during next months in order to study the performance at larger scale in controlled and real conditions coupled to a heat pump as part of the demo activities