

# Indus3Es Project

New technologies for utilization of heat recovery in large industrial systems



Enjoy reading the Indus3Es newsletter!

## “Updates on the second year project results”

The Indus3Es project started in October 2015 and is a Research and Innovation Action funded in the frame of Horizon 2020 TOPIC EE-18-2015: New technologies for utilization of heat recovery in large industrial systems, considering the whole energy cycle from heat production to transformation, delivery and end use.

The Indus3Es consortium is developing an Absorption Heat Transformer (AHT) for revalorization of low temperature waste heat from industries, to transform it to high temperature source possible to be reused in the process. Currently, large quantities of waste heat are continuously rejected from industries indeed. Most of

this waste energy, however, is of low temperature and it is not practical or economical to recover it with current technologies. Therefore, the Indus3Es system will have a relevant impact making possible an energy efficiency increase and reduction of primary energy consumption of most energetic intensive industries in Europe.

During the second year of project activities several progresses have been made in developing the several innovations that will be implemented in the system. This newsletter provides an overview of the main activities performed and the results achieved during the second year of project life.

### Development of AHT prototype and Lab Scale testing

By the end of the second year, four new AHT configurations have been designed and manufactured for the Breadboard prototype.

Two alternative designs have been considered for the high-pressure vessels (absorber and evaporator) and the low-pressure vessels (generator and condenser). All four vessels can be interconnected so that both high-pressure vessels are able to be connected with both low-pressure vessels. This gives the project the opportunity to test the different designs and measure their impact when working in different configurations.

Testing phase will determine the optimum design for the demo that will be installed in a petrochemical plant, in TÜPRAS. Based on the requirements specified by the users and the experiences gained in the test rig at TU BERLIN, also a control strategy for the AHT unit has been predefined. Moreover, an innovative system for removal of non-condensable gases is under analysis.



## Analysis of material performance in highly corrosive ambient

Common working fluid used in absorption technologies is usually a LiBr aqueous solution, which has favorable thermo-physical properties, but it can cause serious corrosion damage in the structural materials, affecting therefore, to AHT's long life. In relation to this, TECNALIA has led a corrosion analysis and tested several coatings to understand their performance not only on the corrosion but also on their thermal and wettability potential. Most of these coatings are based on sol-gel technique.

As a conclusion, the corrosion performance of Cu tubes in high temperature LiBr aqueous solutions, improves considerably after treating the material with SiO<sub>2</sub>-based and epoxy-based coatings. These two coatings are therefore potential candidates for the further improvement of the corrosion properties of the Cu tubing material for absorption technologies in general, and AHTs in particular.

## Exploitation and Dissemination of project results



Partners are also working on issues related to IPR and market development for the exploitation of the technology in different levels. Industrial partners have the interest of evaluating the technology and its applicability (technical and economic feasibility) due to the promising savings that will be obtained. Therefore, all innovations are being designed and developed bearing in mind the methodology approach elaborated by the partner CiaoTech/PNO. This methodology is based on the evidence that different phases need to be considered to orient the innovation towards the right

exploitation route (i.e. from competitive intelligence and benchmark to market trends and technology valorisation, from dissemination to technology transfer/potential spin-off).

Secondly, the consortium is engaged in performing analysis of market potentials, applications perspectives, risk and opportunities for the Indus3Es system. Therefore, actions are being taking to gather stakeholder interest and prepare a future penetration in the market. Additionally, several actions coordinated with SPIRE were also prepared to explain the technology and its potentiality to a wide spectrum of industries.

Finally, the project dissemination is implemented very actively by the consortium. Indus3Es participated in many international and national events, fairs, congresses and workshops by displaying informative posters and by giving accurate oral sessions about the state of the project. The list of the main international events attended can be found below:

- **12th IEA Heat Pump Conference** - May 15-18, 2017, Rotterdam
- **4th International Conference on Heat Transfer and Fluid Flow (HTFF'17)** - June 8-10, 2017, Rome
- **10th edition of the National Congress of Engineering Thermodynamics(CNIT)** -June 28-30, 2017, Lleida
- **International Sorption Heat Pump Conference** - August 7-10, 2017, Tokyo
- **ISES 2017** - October 16, 2017, Tel Aviv

Have a look at the abstracts and presentations given by partners at <http://www.indus3es.eu/resources/>

For more info about the project visit the Indus3Es website at: [www.indus3es.eu](http://www.indus3es.eu)



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