

4<sup>th</sup> International Conference on  
**GREEN ENERGY & EXPO**  
&

6<sup>th</sup> International Conference on  
**RECYCLING: REDUCE, REUSE & RECYCLE** November 06-08, 2017 | Las Vegas, USA

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**Thermal waste recovery by thermal energy storage and by heat energy transportation over long distance**

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Industrial activities have a huge potential for waste heat recycling. Recovery of heat and cold including low temperature is a very important strategy for improved energy efficiency in industry. Heat and cold recovery technologies are instrumental for intra-plant optimization and inter-plant integration to enable cascade use of heat (or cold) between cross-sectoral plants in industrial parks and with district heating/cooling networks. In spite of its high potential, industrial waste heat is currently underutilized. This may be due, on one hand, to the technical and economic difficulties in applying conventional heat recovery methods and on the other hand the temporary or geographical mismatch between the energy released and its heat demand. Thermal energy storage is a technology which can solve the existing mismatch by recovering the thermal waste and storing it for a later use. The heat energy often needs to be transported because the supply of heat is usually located apart from the demand. However, how to efficiently transport the heat energy over long distance is a real challenge. At the same time, there is a great deal of low-grade and middle-grade heat energies, such as solar energy, geothermal energy and waste heat from industries and power plants, kept unused due to the relatively low thermal grade and long distance to the user sites. Therefore, developing efficient methods to overcome the transportation problems of the low-grade and middle-grade heat over long distance would contribute significantly to the reduction in energy consumption. The case study presented focuses on the possibility of heat waste recovery by thermal energy storage technology and by a new heat transportation concept over long distances.

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