



## SCIENTIFIC & RESEARCH PROJECTS

**Project No.: 04**      **Year: 2022**

**Project Field: Total Site**

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### Project Title:

**Total site integration considering wind /solar energy with supply/demand variation**

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### Abstract:

Energy integration using pinch technology in a Total Site (TS) has been widely used for optimization and energy saving. In this paper, wind and solar energy are integrated into a TS system using pinch concepts to reduce environmental pollution. A new procedure of Total Site Heat Storage Cascade (TS-HSC) construction is proposed, which is shorter than the current method. A strategy for estimating wind power economy in different wind turbine capacities is also presented, which includes parameters of Feed-in tariff (FiT) rate and Levelized Cost of Electricity (LCOE). A TS case study with energy supply/demand variations is considered to illustrate the proposed procedures. In the case study, a central solar heating plant with daily/seasonal storage and different solar thermal collector areas is used to compare the external hot utility requirements. The results showed that by increasing the area from 100 to 700 m<sup>2</sup>, the heating requirement reduction with daily/seasonal storage changes from 37.89% to 94.27%. Also, by increasing the wind turbine capacity from 1.5 to 2 MW, the reduction percentage of power grid usage changes from 54.23% to 79.97% and using a 2 MW wind turbine is more cost-effective than other wind turbine capacities with a 32.21% reduction in costs.