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Biogas to integrated system

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A trigeneration system uses only one source of primary energy to provide power, heating and cooling simultaneously, having the potential to increase access to the benefits achievable from electrical generation and to reduce emissions and costs. In this research, a study is developed for a trigeneration system with different sections: A steam plant to produce electricity, a boiler for biogas combustion, a heat recovery plant, a compression heat pump, and an absorption heat pump with LiBr-H2O. The biogas is combusted to produce electricity and steam at low pressure, sent to the absorption chiller and to heat recovery plant. The innovation is that the heat at low temperature produced by the absorption chiller is used in the compression heat pump which receives the process water at low temperature from the heat recovery plant. Then the hot process water is sent to production system of electrical energy and to heat recovery plant. Simulations are carried out by ChemCad software; the electrical, thermal, cooling power are equal to 925 kW, 2523 kW, 3920 kW respectively. The value of P.E.R. is 1.04. Overall 1914 tep/years of white certificates and 191400 €/years of economical incentives are obtained so the process is economically feasible with a van equal to 371.000 €. A sensitivity analysis is carried out: P.E.R. has a positive effect on electrical power and a negative effect on cooling capacity. Future researches should address the greater integration of processes in order to have a more energy saving for the construction of pilot plant.

Biography

Grazia Leonzio is a PhD student from L'Aquila University. She published three articles and participated in several international and national congresses about environmental and energy aspect of chemical processes. Several articles are under review. She wrote an article about waste management in Italian regions and published in Columbia University web-side. She participated to MUN conferences and she is a member of several associations: AIDIC (Italian Association of Chemical Engineering), SCI (Italian Chemical Society), ISSNAF (Italian Scientists and Scholars in North America), ECAS (European Commission Authentication Service). She is a referee of *Chemical Engineering* Journal, *Journal of Energy and Power Engineering* and *Modern Environmental Science and Engineering*.

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