The feasibility to meeting the energy demands of single building with solar energy and biomass

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In order to meet the energy demands of electricity, heating and cooking gas continuously, a study was conducted with solar energy and biomass, which is abundant in Northwest China. In this study, a 117 m² single building was considered and a renewable energy system was integrated with the photovoltaic array, solar thermal collector and thermostatic biogas digester in Minqin County, Gansu province, China. The performances of CHPB were experimentally studied and the economic and environmental benefits were evaluated. During the whole heating period, the system meets 69% of building heating and when the daily average ambient temperature is higher than 3°C, the system can meet building heating completely. While the accumulated daily solar radiation is less than 14 MJ/m², the system cannot meet the energy demands for building heating. And it was observed that the total biogas produced by system during test is 110.71 m³, with an average methane content of 54.74%, which always meets the cooking fuel demands of the residents. The electricity generated daily is always higher than the consumed amount by the system itself, hence, the system can meet the electricity demands partly in the heating periods, and meet completely in the non-heating periods. Every year, the system saves 3556 kg standard coal, and meets 79.3% total energy demands of the building. Thus, the system leads to 9317 kg CO₂ reduction, 30.2 kg SO₂ reduction and 26.3kg NOₓ reduction, 9.2 m³ sheep manure recycle and 11 m³ organic fertilizer productions. It is also confirmed that the static payback period of this system is 6.75 years.

Biography
Li Jinping after getting his Doctorate degree from Shanghai Jiao Tong University in the year 2005 has been doing his research in the development of the Renewable Energy System totally focusing on solar energy and biomass, which should be self-sufficient and able to meet the overall energy needs of the users. Now, he is a Professor in Lanzhou University of Technology, China. He has more than 60 papers published and also serves as the Dean of Key Laboratory of Complementary Energy System of Biomass and Solar Energy and the Dean of Collaborative Innovation Center of Key Technology for Northwest Low-Carbon Urbanization, Gansu Province, China.

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