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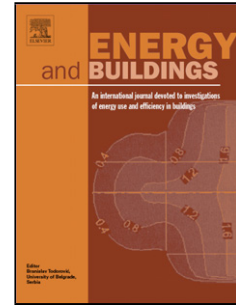
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Building Integrated Renewable Energy to Achieve Zero Emission in Bahrain

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Abstract:

Bapco company in Bahrain created a zero emission lounge having PV (4 kW), wind turbine (1.7 kW) and hydrogen fuel cell (1.2 kW). The system produced a daily 13 kWh and 30% of the expected theoretical output.

The performance of this lounge for 200 days shows it produced 2,909 kWh which indicates that if each house in Bahrain is equipped with a 4 kW PV, then its monthly amount of solar electrical will be 360 kWh, i.e. 12% of the monthly average used electrical energy per household; saving 748 GWh (1GWh = million kWh) of conventional electricity, annually, which is equal to CO₂ emission of 672,892 tone.

Herein, the economic aspects of using Building Integrated Renewable Energy (BIRE) - based on the actual cost of this lounge is projected to reach 225,137 in 2030. It is found that BIRE may contribute to 13% of total electricity produced in Bahrain by 2030 and has the potential to create hundreds of green jobs. This project is an incentive for Bahrain to establish the Bahrain Green Council.

It is found that (BIRE) in Bahrain would have a positive environmental impact and meet the goals of Bahrain Vision 2030.

Keywords: PV, wind energy, solar energy, fuel cell, Bapco, Building Integrated Photovoltaic (BIPV), Bahrain.

1. Introduction

The Kingdom of Bahrain is an archipelago composed of around 40 islands located in the Arabian Gulf between latitude 25° 32' to 26° 20' North and longitude 50° 20' to 50° 50' East. The total area of Bahrain is 762 km² with 126 km of coastline and 3,000 km² of territorial waters. Bahrain population has increased by about 10 folds compared to 1940 (Fig.1) which has had an impact on energy consumption and production [1]. The share of electricity production from renewable in Bahrain, in 2011, was 0.006 % [2].

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