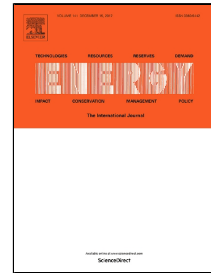


Accepted Manuscript

Grid-Independent Residential Buildings with Renewable Energy Sources

Matthew D. Leonard, Efstathios E. Michaelides



PII: S0360-5442(18)30196-8
DOI: 10.1016/j.energy.2018.01.168
Reference: EGY 12280
To appear in: *Energy*
Received Date: 02 June 2017
Revised Date: 24 November 2017
Accepted Date: 29 January 2018

Please cite this article as: Matthew D. Leonard, Efstathios E. Michaelides, Grid-Independent Residential Buildings with Renewable Energy Sources, *Energy* (2018), doi: 10.1016/j.energy.2018.01.168

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Grid-Independent Residential Buildings with Renewable Energy Sources

Matthew D. Leonard and Efstathios E. Michaelides

Department of Engineering, TCU, Fort Worth, TX, 76132, USA

Matt.Leonard@tcu.edu, E.Michaelides@tcu.edu

Abstract

The proliferation of grid-dependent, zero-energy buildings in a region will alter the diurnal electric power demand to a U-shaped demand curve that limits the role of base-load power plants and the flexibility of the electric grid to meet the power demand. Zero-energy buildings that are also grid-independent (GIB-ZEBs) ensure that carbon emissions are curtailed and that the electricity grid will retain its flexibility to make appropriate use of large, base-load power production units. Such buildings incorporate a reliable system for energy storage that supplies the needed energy when the renewable energy source does not. This paper offers a detailed analysis of the power needs, the seasonal energy usage, and the seasonal energy storage requirements of two GIB-ZEBs. The first is located in the South-West part of the USA, where the air-conditioning demand is very high and the second in the North, where the heating demand is very high and the irradiance/insolation is less. Hydrogen storage and battery storage systems were considered for the energy storage requirements of the buildings. Calculations for the two buildings include: the hourly electric power and total energy demand of the building throughout the year; the hourly energy production by a system of photovoltaics; the hourly energy storage needed throughout the year; the photovoltaics area requirements; the overall capacity and seasonal use of the energy storage system needed; and the effects of the various components and systems performance on the power production and storage parameters.

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات