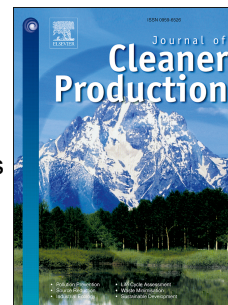


Accepted Manuscript

Novel home energy management system using wireless communication technologies for carbon emission reduction within a smart grid

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PII: S0959-6526(16)30866-6

DOI: [10.1016/j.jclepro.2016.06.179](https://doi.org/10.1016/j.jclepro.2016.06.179)

Reference: JCLP 7550

To appear in: *Journal of Cleaner Production*

Received Date: 4 March 2016

Revised Date: 26 June 2016

Accepted Date: 28 June 2016

Please cite this article as: Elkhorchani H, Grayaa K, Novel home energy management system using wireless communication technologies for carbon emission reduction within a smart grid, *Journal of Cleaner Production* (2016), doi: 10.1016/j.jclepro.2016.06.179.

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1 **Novel Home Energy Management System Using Wireless Communication**
2 **Technologies for Carbon Emission Reduction within a Smart Grid**

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8 **Abstract:** Home energy consumption is increasing, and renewable energy sources are
9 being deployed. The use of renewable energy sources as an alternative to fossil fuels
10 and nuclear energy is a significant opportunity for reducing CO₂ emissions. However,
11 carbon emissions from electricity generation are dependent on the type of renewable
12 energy source and the quantity of the electricity that is produced. With the emergence of
13 the smart grid, residents are able to reduce their electricity consumption by shedding the
14 power usage in their homes. The objective of this study is to smooth power peak
15 demand and diminish CO₂ emissions. This paper describes the power shedding benefits
16 of reducing energy consumption and CO₂ emissions. This reduction of CO₂ emissions
17 eliminates the need for auxiliary power plants in the grid in the case of peak demand
18 points and the need to switch to renewable energy sources. In this study, we prove that
19 emerging information and communication technology can reduce energy use and CO₂
20 emissions. Wireless communication architecture is introduced in this study to increase
21 grid flexibility and rapidity in the data flow among all of the components in the
22 proposed system. Our proposed system with local renewable generation can reduce CO₂
23 emissions nearly 72 % of all CO₂ emissions when all appliances are supplied with the
24 grid. With our load shedding algorithm, the CO₂ emissions decrease nearly 91%. The
25 yearly estimation shows that our system can reduce 62 % of CO₂ emissions and 37 % of
26 consumed power. In this paper, we introduce an efficient architecture of a smart home
27 energy management system and propose a shedding algorithm for home energy usage.
28 This system is based on wireless communication among home appliances, a home
29 management and control system, a grid management and control system and domestic
30 renewable energy sources. Our proposed system, which employs wireless

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