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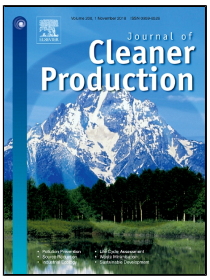

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PII:	S0959-6526(18)32731-8
DOI:	10.1016/j.jclepro.2018.09.019
Reference:	JCLP 14154
To appear in:	*Journal of Cleaner Production*
Received Date:	28 March 2018
Accepted Date:	03 September 2018

Please cite this article as: Yu Wang, Haiyang Lin, Yiling Liu, Qie Sun, Ronald Wennersten, Management of household electricity consumption under price-based demand response scheme, *Journal of Cleaner Production* (2018), doi: 10.1016/j.jclepro.2018.09.019

Word count: 7260

Management of household electricity consumption under price-based demand response scheme

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Abstract

The increasing electricity demand in the residential sector creates growing pressure on energy supply. The price-based demand response has been considered the most effective scheme to match supply and demand in residential sector. This paper established a multi-agent system framework to simulate the various types of energy demands in a multi-occupant household under the price-based demand response scheme. The results showed that the total electricity consumption and related costs could be reduced by 7% and 34%, which amount to 3.42 kWh and 4.63 RMB, without interruption to the household indoor comfort or degradation of their living quality. The different levels of electricity price sensitivity are responsible for 1.97 kWh electricity consumption curtailment and 4.30 RMB cost curtailment difference in a single day. Among the various types of loads, the shiftable loads have the largest price-based demand response potential, while the biggest contribution to energy saving is made by the sheddable loads. Cost savings are mainly delivered by the shiftable loads, followed by the sheddable loads and on-demand loads. In addition, EVs represent huge potential of load shifting and a large pool of energy storage, given the availability of the technique vehicle to grid. The multi-agent system model provides a generic framework for planning, simulating and optimizing complicated energy systems, which n help policy makers, power generators and

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