SURABAYA, INDONESIA APRIL 09-11, 2021

ISBN : 978-1-6654-0514-0

EIConCIT

PROCEEDINGS

THE 3RD EAST INDONESIA CONFERENCE ON COMPUTER AND INFORMATION TECHNOLOGY (EICONCIT) 2021

INSTITUT SAINS DAN TEKNOLOGI TERPADU SURABAYA

IEEE INDONESIA SECTION

2021 3rd East Indonesia Conference on Computer and Information Technology (EIConCIT) | 978-1-6654-0514-0/20 $31.00 ©2021 IEEE | DOI: 10.1109/EIConCIT50028.2021.9431929

The 3rd 2021 East Indonesia Conference on Computer and Information Technology (EIConCIT)

9 – 11 April 2021
Surabaya, Indonesia
(Virtual Conference)

ISBN : 978-1-6654-0514-0

Editor

Rayner Alfred, Haviluddin, Aji Prasetya Wibawa, Joan Santoso, Fachrul Kurniawan, Hartarto Junaedi, Purnawansyah, Endang Setyati, Herman Thuan To Saurik, Esther Irawati Setiawan, Eka Rahayu Setyaningsih, Edwin Pramana, Yosi Kristian, Kelvin, Devi Dwi Purwanto, Eunike Kardinata, Prananda Anugrah

2021 3rd East Indonesia Conference on Computer and Information Technology (EIConCIT) | 978-1-6654-0514-0/20/$31.00 ©2021 IEEE | DOI: 10.1109/EIConCIT50028.2021.9431924

2021 3rd East Indonesia Conference on Computer and Information Technology (EIConCIT) | 978-1-6654-0514-0/20/$31.00 ©2021 IEEE | DOI: 10.1109/EIConCIT50028.2021.9431918

3rd 2021 EIConCIT Welcome Editorial Remarks

The 2021 3rd East Indonesia Conference on Computer and Information Technology (2021 3rd EIConCIT) was held in April 9-11, 2021 in Surabaya, Indonesia as virtual conference with the support of IEEE Indonesia Section. This conference is held with partnership with East Universitas Mulawarman, Universitas Muslim Indonesia, Universitas Negeri Malang, Universitas Islam Negeri Maulana Malik Ibrahim Malang, Universitas Ahmad Dahlan, Universitas Hasanuddin, Universitas Cokroaminoto Palopo, Politeknik Negeri Samarinda, Politeknik Negeri Bali.

This year conference takes on the theme of "***The Future of Innovation and Digital Transformation Technology***". We are pleased to announce the 2021 3rd EIConCIT of Proceeding have been finalized and submitted to IEEE Publisher.

The 3rd 2021 EIConCIT generally attracts more than 288 authors from 12 countries. Number of papers accepted to be published is 85 papers out of 238 papers submitted with 35.7% of acceptance rate. Additionally, we would like to warmly thank all the authors who have presented their presentations to the lively exchange of scientific information that is so vital to the endurance of scientific conferences.

We would like to thank to all keynote speakers; Assoc. Prof. Dr. Rayner Alfred (Universiti Malaysia Sabah), Emeritus Prof. Kondo Kunio (Tokyo University of Technology), Assoc. Prof. Leonel Hernandez (Corporación Universitaria Reformada , Barranquilla, Colombia), and Assoc. Prof. Dr. Endang Setyati (Institut Sains dan Teknologi Terpadu Surabaya) who gratefully delivered their speech and shared knowledge.

Also, we would like to thank to all reviewers who have contributed their valuable advices and encouraging comments and all the members of 2021 3rd EIConCIT Editorial Team who have made this publication possible. We really hope you enjoy the Proceeding and look forward to seeing you in the next conference.

The next event, the 2022 4th EIConCIT, will be hosted by Universitas Islam Negeri Maulana Malik Ibrahim Malang and Universitas Negeri Malang, in 2022. We invite and welcome all participant to come in Malang, East Java, Indonesia.

May 2021

3rd 2021 EIConCIT Editorial Team

2021 3rd East Indonesia Conference on Computer and Information Technology (EIConCIT) | 978-1-6654-0514-0/20/$31.00 ©2021 IEEE | DOI: 10.1109/EIConCIT50028.2021.9431904

ORGANIZING COMMITTEE

ADVISORY BOARD

Prof. Ir. Arif Nur Afandi, ST, MT, IPM., MIAEng., MIEEE., Ph.D,
Ir. Arya Tandy Hermawan, MT.
Dr. Ir. Gunawan, M.Kom.
Ir. Herman Budianto, MM.
Ir. FX Ferdinandus, MT.

GENERAL CHAIR

Dr. Ir. Endang Setyati, MT.

GENERAL CO-CHAIR

Dr. Hartarto Junaedi, S.Kom, M.Kom
Assoc. Prof. Dr. Rayner Alfred
Ir. Haviluddin, S.Kom, M.Kom, IPM., Ph.D.

TECHNICAL PROGRAM COMMITTEE CHAIR

Dr. Joan Santoso, S.Kom., M.Kom
Aji Prasetya Wibawa, ST., M.MT., Ph.D.
Dr. Ir. Fachrul Kurniawan, ST., M.MT, IPM

TREASURER

Hendrawan Armanto S.Kom, M.Kom.
Yuliana Melita, S.Kom, M.Kom.

REGISTRATION AND SECRETARIATE

Dr. Esther Irawati Setiawan, S.Kom., M.Kom
Eka Rahayu Setyaningsih, S.Kom, M.Kom

PUBLICATION

Herman Thuan To Saurik S.Kom, M.T

PROCEEDING

Kelvin S.T, M.M
Eunike Kardinata S.SI, M.Kom
Devi Dwi Purwanto S.Kom, M.Kom

INFRASTRUCTURE

Iwan Chandra, S.Kom, M.Kom.

SESSION AND EVENT

Ir. Edwin Pramana, M.AppSc., Ph.D.
Dr. Yosi Kristian, S.Kom, M.Kom.

HOSTED BY
Institut Sains dan Teknologi Terpadu Surabaya, Jawa Timur, Indonesia

TECHNICALLY CO-SPONSORED BY
IEEE Indonesia Section

PARTNERSHIP WITH
Universitas Mulawarman, Indonesia
Universitas Muslim Indonesia, Indonesia
Universitas Negeri Malang, Indonesia
Universitas Islam Negeri Maulana Malik Ibrahim Malang, Indonesia
Universitas Ahmad Dahlan, Indonesia
Universitas Hasanuddin, Indonesia
Universitas Cokroaminoto Palopo, Indonesia
Politeknik Negeri Samarinda, Indonesia
Politeknik Negeri Bali, Indonesia

SUPPORTED BY
Ministry of Education, Research and Technology (KEMDIKBUD-RISTEK) Indonesia

CONTACT DETAILS
Institut Sains dan Teknologi Terpadu Surabaya (ISTTS)
Surabaya, Jawa Timur, Indonesia, 60284
Telp: (+62 31) 5027920,
Email: eiconcit@istts.ac.id,
Website: https://eiconcit.org

2021 3rd East Indonesia Conference on Computer and Information Technology (EIConCIT) | 978-1-6654-0514-0/20/$31.00 ©2021 IEEE | DOI: 10.1109/EIConCIT50028.2021.9431848

Table of Content

2021 3rd East Indonesia Conference on Computer and Information Technology (EIConCIT)
April 09-11. 2021, ISTTS Surabaya, Indonesia

Scheduling Control of Air-Conditioning System Based on Electricity Peak Price

2021 3rd East Indonesia Conference on Computer and Information Technology (EIConCIT) | 978-1-6654-0514-0/20/$31.00 ©2021 IEEE | DOI: 10.1109/EIConCIT50028.2021.9431919

1st Marwan Marwan
electrical engineering department
polytechnic state of Ujung Pandang
Makassar, Indonesia
marwan@poliupg.ac.id

2nd Ahmad Rizal Sultan
electrical engineering department
polytechnic state of Ujung Pandang
Makassar, Indonesia
rizal.sultan@poliupg.ac.id

3rd Alvian Bastian
electrical engineering department
polytechnic state of Ujung Pandang
Makassar, Indonesia
alvianbastian@poliupg.ac.id

4th Muhammad Dihyah Marwan
dept of electrical eng.and informatics
The University of Gadjah Mada
Yogyakarta, Indonesia
muhdihyah@mail.ugm.ac.id

***Abstract*—Today, due to large population growth and rising income, the number of air conditioning units installed globally has increased to high levels. Meeting the increased demand for air conditioning has required billions of dollars of infrastructure investment and produced billions of tons of carbon dioxide emissions. The proposed study describes scheduling control of air conditioning systems based on peak electricity price. To achieve this goal, a demand response model was applied to set up scheduling according to the peak price through a load aggregator. The aggregator allows negotiation of the electricity price with market operators located within their corporate borders. The proposed method can concurrently accommodate on-site renewable energy sources. Finally, an analysis example simulates if the proposed scheduling is effective to avoid electricity peak price.**

Keywords—air conditioning, aggregator, peak price, scheduling

I. Introduction

Increasing population contributes to increase demand for home air conditioning (AC) units to be installed. Energy demand for the AC will be one of top drivers of electricity demand and prices globally. The implication is not just for the electricity providers and consumers but also for the environment. The utility needs a billion dollars for infrastructure investment to meet the demands of the AC. In addition, the government need a new policy to solve the problem of carbon dioxide emissions produced by the AC. Therefore, growing of electricity demands of the AC is one of the most critical blind spots today and in the future.

According to [1] the AC contributes around 30% of peak demand during the summer season. In Singapore, the AC system contributes 24–60% of electricity demand in building [2]. The total electricity use for cooling of buildings accounts for around 20% worldwide [3]. Author in [4] investigates consumption of electricity for households average spend at 35-40%. In addition, urban electricity consumption during a summer day accounts for more than 40% in China [5]. Based on the data above, the cooling energy use in building is growing faster than other energy service. Some research have been conducted to solve electricity peak demand for the AC, For example: level data analysis [6], electricity peak cut method [7], centralized and decentralized strategies [8]. This example describes some solutions to meet peak demand due to the AC load. However, each study illustrates different method with a different result, as illustrated in the following explanation.

Firstly, Ref [6] illustrates level data analysis to reduce demand of the AC during summer days. This research investigates some data by monitoring significant level consumption appliance in Sydney, Australia. The contribution of the AC was analysed during the peak summer demand. To achieve the goal, K-mean clustering method was applied to define the load of the AC for several households during peak periods. The load profile combined with some scenarios has been applied to estimate possible demand reduction for the AC. The result of this research found that around 9% of total peak demand can be minimized.

Secondly, the electricity peak cut method has been considered to reduce peak demand of the AC [7]. The proposed method simulates peak-cut operation in building during the summer season. In this paper, control of cooling power method is used to monitor the power consumption every thirty minutes. The cooling power controlled under demand response to define a target value of power considering the outside temperature. The results indicated the proposed scheme can reduce the electricity demand and maintain a comfortable room temperature for consumers.

Thirdly, Author in [8] illustrates centralized and decentralized strategies to reduce peak demand for the AC. This paper illustrates the potential control of the AC to reduce peak electricity demand in Austin, Texas, USA. In this study, an economic model predictive control was applied to simulate variation of wholesale electricity market prices for around 900 homes. To achieved this goal, centralized and decentralized strategies were applied to shift electricity consumption. As a result, both methods can reduce the peak by 8.8% and 3.1% for centralized and decentralized, respectively.

However, the proposed method was not similar to the previous method mentioned above. This method develops scheduling control of the AC based on the electricity price. To control the AC, a load aggregator is needed to schedule the AC to be switched on and off for an appropriate time. The aggregator load is only a consideration for the electricity peak price. The rest of this paper is organized as follows: section 2 is the literature review, section 3 is methodology, section 4 is analysis and results and section 5 concludes the conclusion.

II. Literature Review

Previously, some research has prompted discussion of the electricity peak price, demand response model and load aggregator.

A. *Electricity peak price*

In general, the electricity price is an accumulating cost spent by the utility to build, maintain and operate generation electricity and transmission/distribution. The electricity price varies based on the local or government policy. The electricity price can also differ depending on the customer-base, typically by residential, commercial and industrial connections. Therefore, the electricity price can vary by locality within a country.

In addition, electricity peak price occurs in the summer season when the total demand is highest due to increased cost for generation to meet peak demand. According to [9] electricity peak price is an abnormal price value which significantly impacts consumers. Author in [10] investigated that an abnormal price can rise to 100 or 1000 times higher than a normal price. The electricity price spike can occur with some factors, such as: transmission and generation contingency, peak demand, cost of power plant and environment factor e.g., temperature. Fig. 1 illustrated an example of the electricity peak price and peak demand that occurred in Queensland between 19 January to 20 January 2021.

B. *Demand response model*

Ref [11] DR is a program to reduce electricity consumption when the electricity price is expensive. The DR program serves consumers with a competitive market price, enhanced reliability of the system, and mitigates potential market power, etc. Accordingly, the benefits of the DR program can be categorized as: economic, pricing, risk management and reliability, impact to market efficiency, a lower cost electrical system and cost, customer service and the environment.

Previously, some studies have discussed the DR program to reduce electricity peak demand. For example: Ref [12] investigated the DR program for home energy management. The proposed model applied Reinforcement Learning (RL) and Fuzzy Reasoning (FR) to evaluate the energy management system for residential homes. In this study, there are 14 household appliances to control under this system. As a result, the proposed model can smoothly reduce power consumption. Other research has been developed by [13] to mitigate the supply-demand imbalance in the electricity market. In this paper, an incentive-based program is used to develop multiple energy carriers considering the behavioural coupling effect of consumers. This research also extends to evaluate the effect of energy storage units. As a result, the total cost can be cut down and can improve the utilization of energy storage units.

Author in [14]-[16] illustrates that the DR program is divided to two main programs: time based and incentive-based programs. These kinds of time-based programs are divided into four categories, namely: time of use (TOU), real-time pricing (RTP), critical peak pricing (CPP) and critical peak rebates. In addition, the specific model of incentive-based programs contains some categories, such as: direct load control, the emergency demand response model, capacity market program, interruptible/curtailable service. demand bidding and ancillary markets. Fig. 2 illustrated the categories of the DR program.

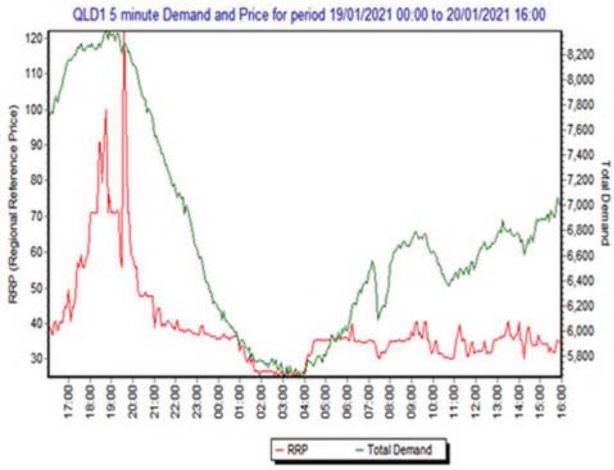

Fig. 1. An example of electricity peak price

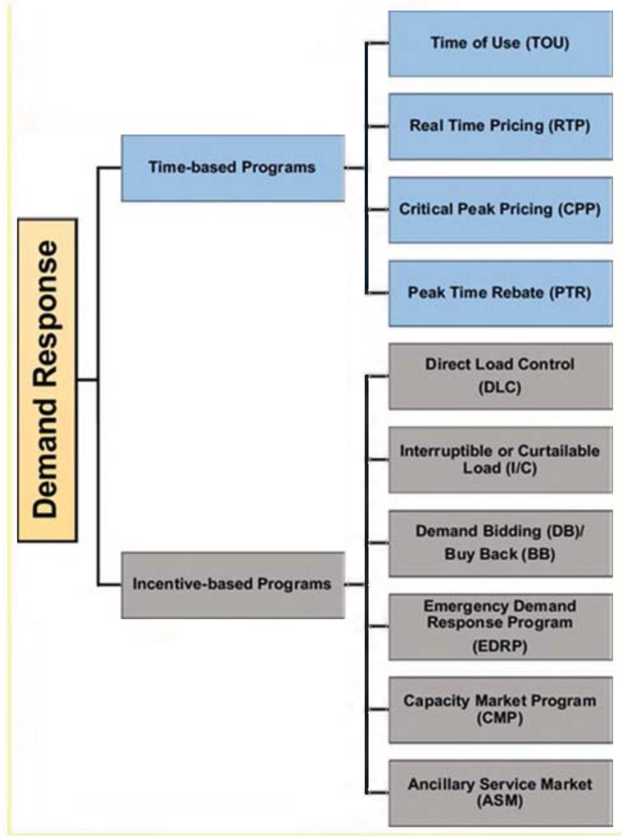

Fig. 2. Categories of DR program [14-16]

C. *The load aggregator*

According to [11] the load aggregator (LA) is an agent who manages the DR program. Ref [17], [18] LA is independent organisation which integrates the response between the consumer and the electricity market operator. The LA can be defined as a company which provides electricity service for consumers who want to purchase electricity by negotiation [17]. According to [19], [20] the LA task is to offer load reduction to consumers and compete with a set of generating companies in a market environment to maximize its profit. Fig. 3 illustrated the load aggregator.

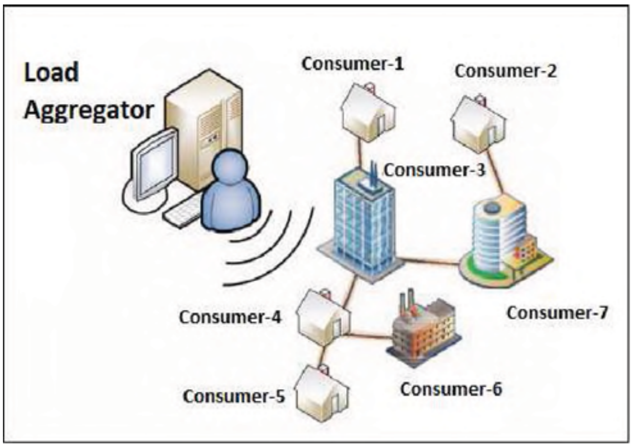

Fig. 3. Load aggregator [21]

III. PROPOSED MODEL

To achieve this goal, the following illustrates architecture design and load aggregator model.

A. Architecture design

Fig. 4 illustrated the architecture design of the proposed method. In the DR model, the control system was required to be switched on and switched off for the AC. The other function of the control system is to make connected information from the user and aggregator regarding the scheduling control of the AC and/or monitoring electricity price at any time. To implement the control system that a shell script under Linux operation system is used to execute with each interaction. The control design contains a programmable internet router, web-relay and software application and external switches. Every consumer applied a home computer to set up their preference of energy sources and scheduling for the AC. In this research, there are two kinds of energy source to support this model: generation from the power grid and on-site renewable energy. The primary energy is implemented when the electricity price is lower. In contrast, on-site renewable energy as a secondary power is connected to the AC when the electricity price is higher than normal. The control system arranges the time to connect to the primary grid and/or secondary power is based on the electricity price information from the aggregator. The pseudo code of the controller is illustrated in Fig. 5.

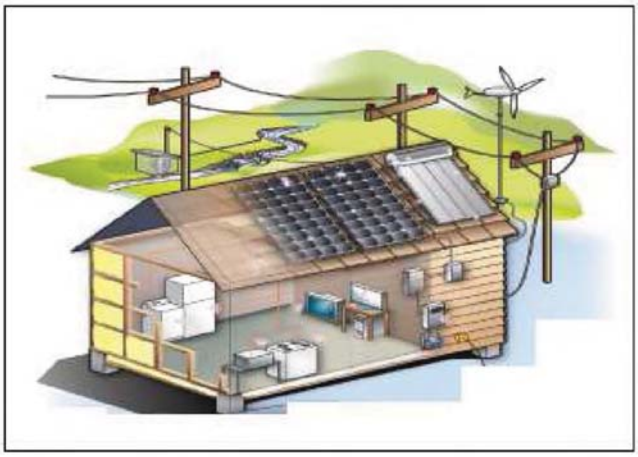

Fig. 4. Architecture design

```
echo $name
echo $startAfter
echo $finishBefore
        if[$startAfter-lt $nowSec -b$finishBefore];then
                air condition1)relay1=1
                air condition2)relay2=1
                air condition3)relay3=1
                air condition4)relay4=1
        else
                air condition1)relay1=0
                air condition2)relay2=0
                air condition3)relay3=0
                air condition4)relay4=0
        fi
done
```

Fig. 5. Pseudo code for control loop

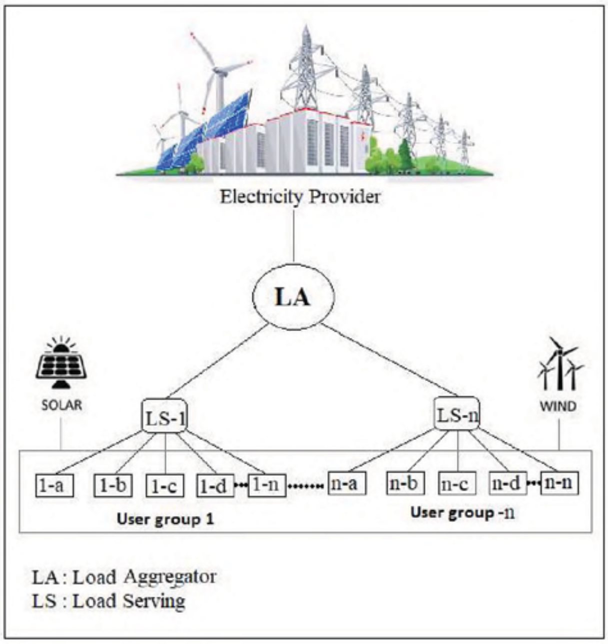

Fig. 6. The load aggregator model

B. The load aggregator model

The load aggregator model is presented in Fig. 6. The DR model proposed is divided to become multi- tiered where load aggregator is responsible for managing the overall network and particularly to schedule control of the AC. In the proposed method, the control system within a certain geographical area can be considered as the second tier of the overall network. The second-tier network will introduce more flexibility to network management. To simplify, peer to peer communication will be able to be applied for sharing information regarding the electricity consumption and network usage information. This kind of peer-to-peer communication is based on the consumer group, for example: geographical area, e.g., house in the same street or suburb, institutional consumer e.g., school or university, small-industrial consumer, farm consumer, etc. Therefore, the aggregator as a representative of consumer control station only concentrated to manage the local needs of the second-tier ad hoc networks, not to manage smart controlling of each individual house. In addition, on-site renewable energy is just controlled by the individual consumer. If the consumer participates in the DR program, the consumer consumption $d(t)$ for a maximized benefit can be calculated according to [15], [22]:

$$d(t) = do(t)\left\{1 + \beta(t,t)\frac{[r(t) - ro(t)]}{ro(t)}\right\} \quad (1)$$

Where:
do (t): Nominal demand level (kWh)
β (t): Elasticity parameter
r (t): The rate of customer pays for electricity at the time t (kWh)
ro(t): Nominal rate for electricity consumption ($/kWh)

IV. ANALYSIS AND RESULT

In this paper, we analyzed the change of the electricity price based on the time of operation of air conditioners. There are three analyses of different scenarios applied on this proposed model. The first is keeping a comfortable living space. To analyze the effect of the proposed scheme on electricity energy savings the electricity price in Queensland has been used. Fig. 7, 8 and 9. illustrated an example of the impact scheduling control of the AC under DR model. In this case there are three scenarios have been conducted to avoid electricity peak price, namely:

A. Scenario A

Based on the information from the aggregator, residential consumers set-up the air conditioner based on the periodic times, e.g., switch on for 3 hours and then switch off for the next 3 hours. If the consumer was required to turn on the AC, the recommended times to switch on are 03:00 to 06:00, 09:00 to 12:00, 15:00 to 18:00 and 21:00 to 23:00. These schedules were set-up by the load aggregator for all consumers who wanted to participate in the DR program. Fig. 7 illustrates the operation system of this scenario.

B. Scenario B

Like the previous method, the load aggregator provides another option to set-up scheduling for the AC. In this scenario, the load aggregator sets-up the time to be three times periodically to turn on the AC, namely: 03:00 to 07:00, 11:00 to 16:30 and 21:00 to 24:00. Therefore, as a member of the DR program that all consumers should follow the scheduling to avoid the peak electricity price. As a result, the consumer will be rewarded by the load aggregator. Fig. 8 illustrates the operation of this scenario.

C. Scenario C

Another time option is provided by the load aggregator for all consumers. For example: 01:30 to 08:30 and 10:30 to 16:30. In this scenario only two times are provided periodically to turn on the AC. However, every period takes a longer time than the other scenarios. This option is recommended to all consumers who want to participate in DR program. Consequently, the consumer can avoid peak electricity price and get a reward from the load aggregator. Otherwise, a penalty will be applied. Fig. 9 illustrates the operation of this scenario.

D. Integrated onsite renewable energy

As a second power, on-site renewable energy will be connected to charge the AC if consumers need to turn on during a Switch OFF period. On site renewable energy is used to ensure that the AC can function for only several times. As a backup power for each individual home that the control system can arrange the schedule automatically. The appropriate time will be arranged based on commands from the control system. However, as a member of the DR program, that consumer should be participated to switch the AC ON/OFF based on the schedule from the load aggregator.

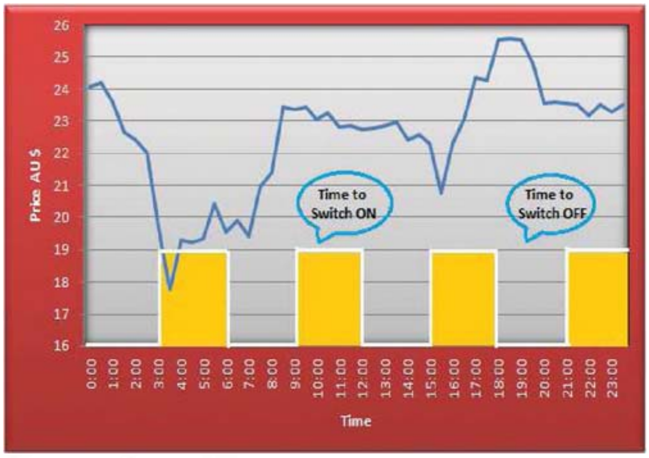

Fig. 7. Operation scenario A

Fig. 8. Operation scenario B

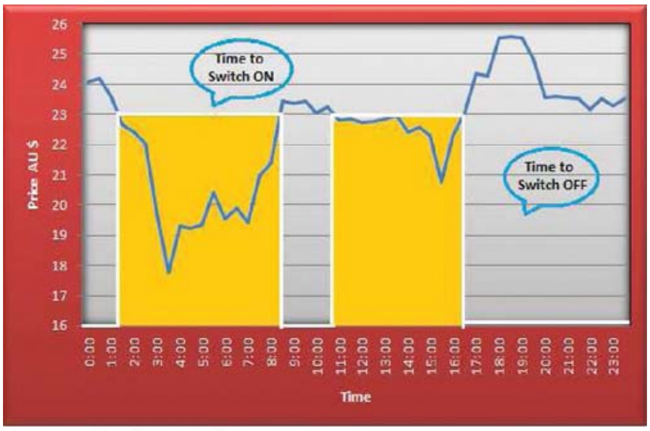

Fig. 9. Operation scenario C

As a member of the DR program, consumers will get a reward if they participate on the schedule program. In contrast, the penalty will accumulate when the consumers turn on the AC during the switched off period. To optimize the scheduling, the load aggregator arranges the schedule considering some parameters, such as: outside temperature, electricity peak price and peak season.

CONCLUSION

Based on the results, this research illustrated that the impact scheduling control of the AC under the DR model. In this research, there are three scenarios that have been created and scheduled under the load aggregator. Scenario A is designed to allow consumers to switch on and switch off the AC for 3 hours, namely: 03:00 to 06:00, 09:00 to 12:00, 15:00 to 18:00 and 21:00 to 23:00. Scenario B illustrated the consumer is required to participate in the DR program three times a day, namely: 03:00 to 07:00, 11:00 to 16:30 and 21:00 to 24:00. Scenario C gives another option to switch on the AC only twice periodically, namely: 01:30 to 08:30 and 10:30 to 16:30. To anticipate if consumers want to apply the AC during off periods, then the on-site renewable energy can be connected to charging as back-up power even for only a few times. As a result, the proposed method is an effective way to avoid the peak electricity price.

ACKNOWLEDGMENT

The authors would like to take this opportunity to thank the Ministry of Education and Culture of the Republic of Indonesia, Polytechnic State of Ujung Pandang Makassar and The University of Gadjah Mada Yogyakarta Indonesia.

REFERENCES

[1] Qi, N., et al. "Practical demand response potential evaluation of air-conditioning loads for aggregated customers", Energy Reports, Vol 6, pp.71-81.2020

[2] Utama, C., S. Troitzsch, and JagrutiThakur. "Demand-side flexibility and demand-side bidding for flexible loads in air-conditioned buildings", Applied Energy, Vol 285.2021

[3] Association, I.E. *The Future of Cooling. Opportunities for Energy-Efficient Air Conditioning*. 2018.

[4] Randazzo, T., E.D. Cian, and M. N.Mistry. "Air conditioning and electricity expenditure: The role of climate in temperate countries", Economic Modelling, Vol 90, pp.273-287.2020

[5] Xu, H., et al. "Peak shaving potential analysis of distributed load virtual power plants", energy Reports, Vol 6, pp.515-525.2020

[6] Malik, A., et al. "Appliance level data analysis of summer demand reduction potential from residential air conditioner control", Applied Energy, Vol 235, pp.776-785.2019

[7] Satake, A., J. Jike, and Y. Mitani. "Consideration of peak cut method by air conditioning equipment corresponding to demand for contract power reduction—Application of thermal radiative cooling/heating system", energy Reports, Vol 6, pp.768-774.2020

[8] Cole, W.J., et al. "Community-scale residential air conditioning control for effective grid management", Applied Energy, Vol 130, pp.428-436.2014

[9] Clements, A.E., R. Herrera, and A.S. Hurn. "Modelling Interregional Links in Electricity Price Spikes", Energy economics, Vol 51, pp.383-393.2015

[10] Xu, Y. and K. Nagasaka. "A Research on Spike Jump of Electricity Price in the Deregulated Power Markets", International Journal of Electrical and Power Engineering, Vol 3, pp.99-104.2009

[11] Muthirayan, D., et al. "Mechanism Design for Demand Response Programs", IEEE TRANSACTIONS ON SMART GRIDS, Vol 11, pp.61-73.2020

[12] Alfaverh, F., M. Denaï, and Y. Sun. "Demand Response Strategy Based on Reinforcement Learning and Fuzzy Reasoning for Home Energy Management", IEEE Access, Vol 8, pp.39310-39321.2020

[13] Zheng, S., et al. "Incentive-Based Integrated Demand Response for Multiple Energy Carriers Considering Behavioral Coupling Effect of Consumers", IEEE Transactions on Smart Grid, Vol 11, pp.3231-3245.2020

[14] Mohajeryami, S., P. Schwarz, and P.T. Baboli."Including the behavioral aspects of customers in demand response model: Real time pricing versus peak time rebate", North American Power Symposium Charlotte, NC, USA, 2015.

[15] Aalamia, H.A., H. Pashaei-Didanib, and S. Nojavan. "Deriving nonlinear models for incentive-based demand response programs", Electrical Power and Energy Systems, Vol 106, pp.223-231.2019

[16] Khan, I. "Energy-saving behaviour as・a・demand-side management strategy in・the・developing world: the・case of Bangladesh", International Journal of Energy and Environmental Engineering, Vol 10, pp.493-510.2019

[17] Tang, Q., et al.," Framework Design of Load Aggregators Participating in Electricity Market", 2nd IEEE Conference on Energy Internet and Energy System Integration, Beijing, China, 2018.

[18] Ciwei, G., et al. "Methodology and Operation Mechanism of Demand Response Resources Integration Based on Load Aggregator", Automation of Electric Power Systems, Vol 37, pp.78-86.2013

[19] Bruninx, K., et al. "On the Interaction Between Aggregators, Electricity Markets and Residential Demand Response Providers", IEEE Transactions on Power Systems, Vol 35, pp.840-853.2020

[20] Nekouei, E., T. Alpcan, and D. Chattopadhyay. "Game-Theoretic Frameworks for Demand Response in Electricity Markets", IEEE Transactions on Smart Grid, Vol 6, pp.748-758.2015

[21] Tsai, S.-C., Y.-H. Tseng, and T.-H. Chang. "Communication-Efficient Distributed Demand Response: A Randomized ADMM Approach", IEEE Transaction on Smart Grid, Vol 8, pp.1-11.2017

[22] Aalami, H., G.R. Yousefi, and M.P. Moghadam."Demand Response model considering EDRP and TOU programs",IEEE/PES Transmission and Distribution Conference and Exposition, Chicago, IL, USA, 2008.