

PAPER • OPEN ACCESS

Environmental monitoring action for community surrounding garbage center in Indonesia

To cite this article: S Sendari *et al* 2019 *IOP Conf. Ser.: Earth Environ. Sci.* **245** 012034

View the [article online](#) for updates and enhancements.



IOP | ebooks™

Bringing you innovative digital publishing with leading voices to create your essential collection of books in STEM research.

Start exploring the collection - download the first chapter of every title for free.

Environmental monitoring action for community surrounding garbage center in Indonesia

S Sendari¹, W Agustin¹, A S Faradyza¹, Y Rahmawati¹, H Rahmawati²,
T Matsumoto³ and I Rachman³

¹Department of Electrical Engineering, Faculty of Engineering, State University of Malang, Indonesia

²Department of, Psychology, Faculty of, Psychology, State University of Malang, Indonesia

³Department of Life and Environmental Engineering, Faculty of Environmental Engineering, The State University of Kitakyushu, Japan

Email: siti.sendari.ft@um.ac.id, matsumoto-t@kitakyu-ac.jp

Abstract. The aims of the paper are to describe improving environmental monitoring action to create sustainable societies especially for they who live near garbage center in Cities of East Java, Indonesia. Garbage center is to be considered as the object of this research because there are potentially conflicts interest between communities and government. In Indonesia, the garbages are mostly placed in a wide-open area called landfill, where carbon dioxide and methane gas could be produced by decomposition process. It could bring out increasing the GHG. Here, environmental monitoring action for community was studied to improve the awareness by sharing data of monitoring environment conditions to the community surrounding garbage center.

1. Introduction

Due to rapid population growth, increasing the municipal solid waste (MSW) collected in garbage centers year by year could be problems to be handled. Ministry of Environment and Forestry (LHK) reported that garbage tonnage in Indonesia could be 65 million tons per year in 2017 [1]. According to Central Bureau of Statistics, 84.51 % of MSW in Indonesia was disposed of without shorting process [2], which means that awareness to manage the garbage is still low. Furthermore, the garbages are mostly placed in a wide-open area called waste landfill, where carbon dioxide and methane gas could be produced by decomposition process, which bring out increasing the GHG. These waste landfill sites could be major source of land, air, ground and surface water pollutions and very harmful for communities who reside surround landfill sites. According to the situations surrounding landfill sites, there are big potentially conflicts in communities.

Considering the convention to prevent GHG, low-carbon society (LCS) is proposed [3], which are involved in mitigating GHG and decreasing carbon [4]. Nowadays, the term of (LCS) has emerged and spread out rapidly around the world for tackling climate change, which has become more apparent and deliberate the human existence. Hence, in this research, environmental monitoring action was studied to improve the awareness by developing low carbon society. The society will be able to share data of monitoring environment conditions. The situations of environment surrounding garbage center



can be informed to the communities by developing environmental monitoring system to reduce their worries, especially a demand to monitor the environmental effect to the health condition [5]. Gas production can be monitored for current status, prospect and policy implication to reduce potential conflict in communities [6]. Thus, sustainable societies can be created by improving environmental monitoring action, especially for they who live near garbage center in Cities of East Java, Indonesia.

2. Research Methods

The aim of this paper is to describe improving environmental monitoring action to create sustainable societies. This research will be done by improving the environmental monitoring action for communities surrounding the garbage center in Indonesia.

2.1. Developing Low Carbon Society

Low-Carbon Community can be defined as a community that attempts to mitigate greenhouse gas (GHG) emissions and decrease its carbon emissions in food, energy, transport and the solid waste sector through promoting a number of strategies of sustainable lifestyles [7]. There are two main concepts in building a low carbon society (LCS), i.e., (1) low-carbon behavior and (2) low-carbon awareness [4]:

2.1.1. Low Carbon Behavior (LCB). LCB can cause a substantial impact on CO₂ emissions directly. Studies about LCB showed that there are some relationships occurred between residents' low-carbon behaviours and CO₂ emissions by calculating an individual's carbon footprint.

2.1.2. Low Carbon Awareness (LCA). LCA is about environmental value, attitude and knowledge. The value is known as a vital life objectives or guidelines that serve as managing standards in an individual's life. LCA is attitude toward low-carbon issues, which vary with low-carbon values and personal situations. Low carbon knowledge is another important dimension of awareness

2.2. Improving Environmental Monitoring Action

In order to improve environmental monitoring action, collaboration between the State University of Malang and State University of Kitakyushu is proposed as shown in Figure 1. State University will give a treatment for improving awareness of community surrounding garbage center in Indonesia. Here, to develop appropriate model considering local culture, agents are selected from community surrounding the garbage center. The State University of Malang and the University of Kitakyushu will arrange a workshop for agents from communities. Then, agents proposed a method to share the knowledge to LCS to improve awareness. Thus, the sustainable society could be created.

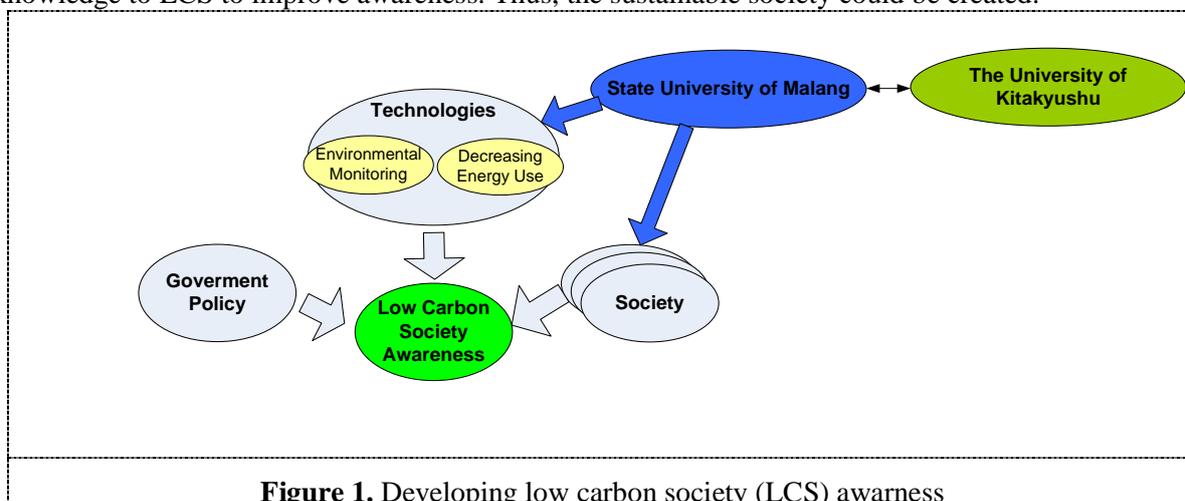
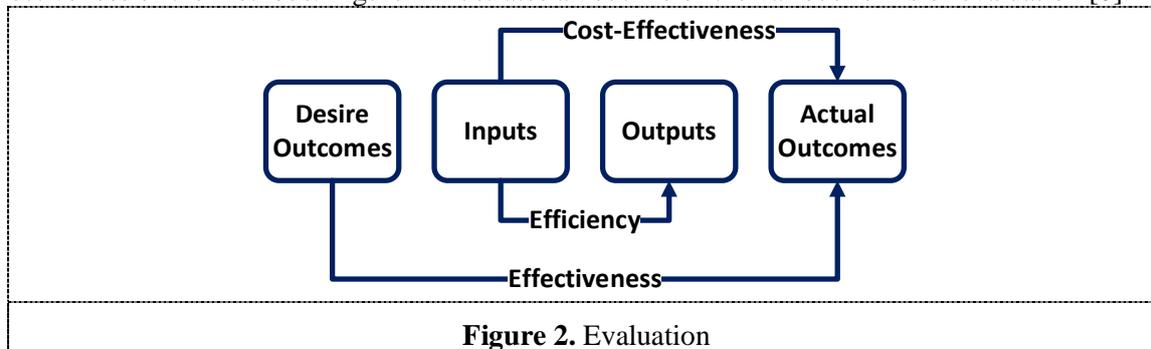


Figure 1. Developing low carbon society (LCS) awareness

2.3. Evaluating

The implementation of the program which is done by changing behavior and mindset of communities considering environment and reducing potential conflicts must be analyzed to observe the effectiveness of the methods. Figure 2 illustrates an outline of the various forms of evaluation [8].



There are three levels of evaluation identified: (1) effectiveness - the extent to which outcomes in practice achieve desired outcomes or objectives, (2) cost-effectiveness - the relationship between inputs and outcomes expressed in dollar terms, (3) efficiency - the extent to which the investments are minimised for a given level of outputs, or to which outputs are maximised for a given level of inputs [8]. This research will focus on the effectiveness of the implementation program. Thus, only the relationship between desired outcomes and actual outcomes will be considered.

3. Result and Discussion

The result of this research will be used as recommendations to proposed a model of low carbon society.

3.1. Promoting Action

The promotional action can be done through local media, on prepared awareness raising and education materials and information and in association with all local community programs and activities. This will enable the community to participate voluntarily in the planned activities sequences as an effort to improve environmental monitoring action. One example of a type of promotional activity is to engage the support and services of a community leader or well-known identity to help communicate key messages and to be seen 'doing the right thing' [8]. If used wisely, it can help to make it socially desirable to participate and socially unacceptable not to. The promoting action of this research will be done by 4 steps, they are (1) find communities surrounding garbage center in each Cities of Indonesia, (2) visit the communities and develop the agreements toward the communities participation, (3) select one agent from each community to participate, and (4) invite the agents from several cities in a workshop as a socialization process.

3.2. Implementing an Integrated Low Carbon Society

This program as shown in Figure 3 is a tool to support the delivery of initiatives and activities would involve members as an agent from each community. Selected agents will build the Indonesia LCS and propose a collaboration with Japan LCS to create integrated LCS. They can initiate communication, exchange information, and share environmental conditions to learn low carbon awareness and find common solutions from each garbage center issue in each city of Indonesia. After having undertaken training, the agents of the community can raise the awareness within their local communities.

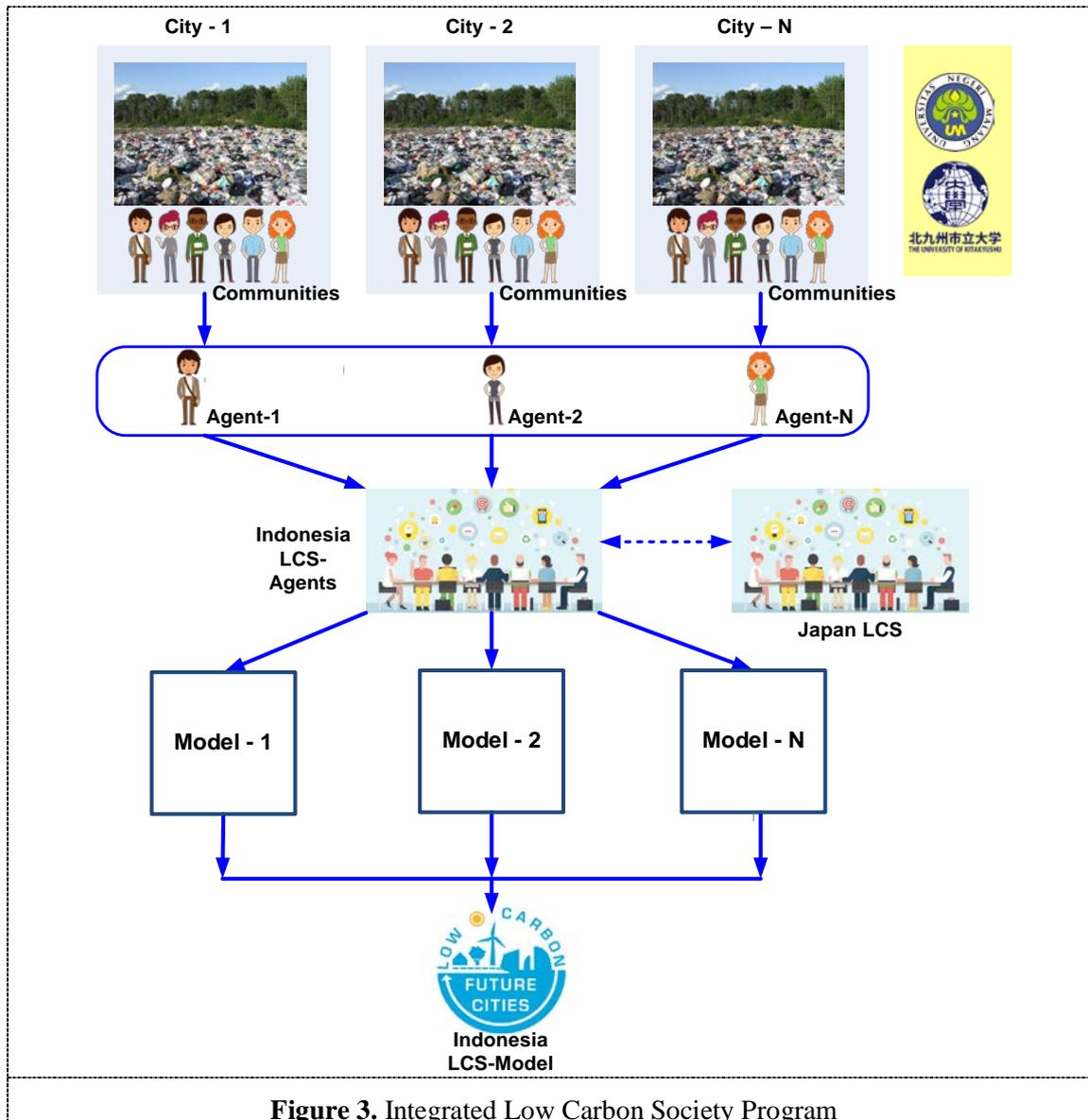


Figure 3. Integrated Low Carbon Society Program

3.3. Developing Low Carbon Society

In order to improve environmental monitoring action, the system will be developed to enable the sharing data and information of environmental condition. The development system will be applied in several cities in Indonesia, such as Malang, Kediri, Jombang, Blitar, and Tulungagung. The monitoring data of environment will consist of (1) temperature, (2) CO₂ levels, (3) CH₄ levels, and (4) PH levels. All of the data monitoring result as an environmental condition will be sent to the data center. Therefore, the environmental monitoring action is improved in order to make the process easier. Moreover, by using this system each cities of Indonesia will be able to know the other cities condition. Each agent could be analyzing their environmental condition and compare their condition with other cities. This condition will enable the communities from each city to discuss and find the solutions for each garbage center issues in Indonesia.

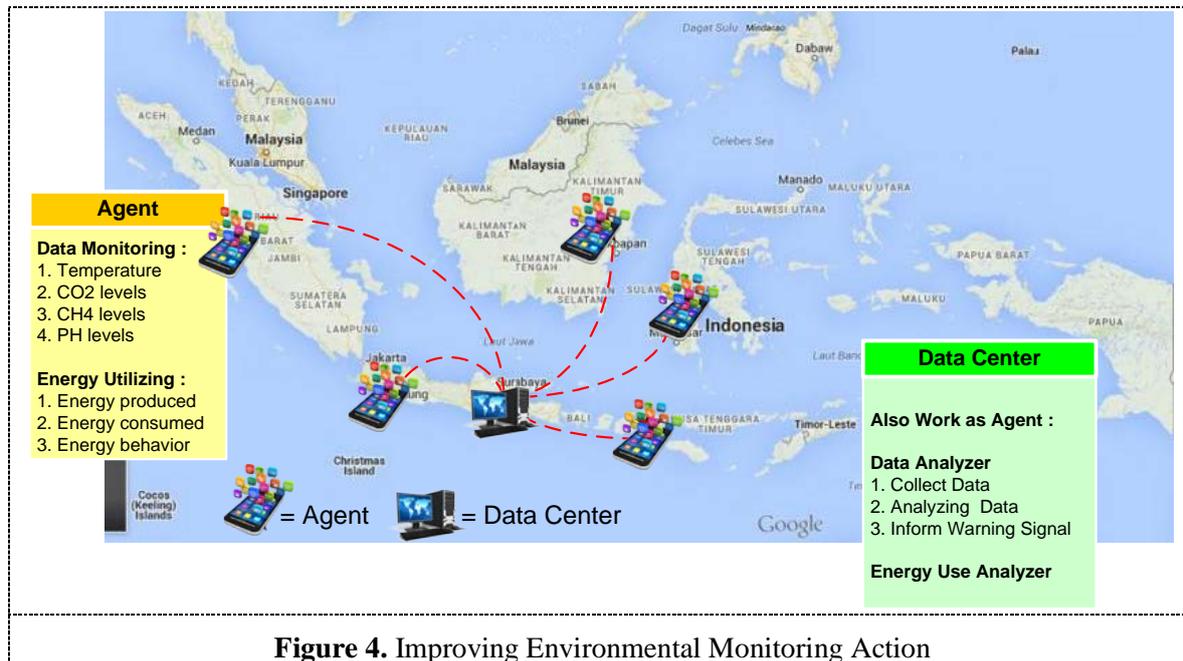


Figure 4. Improving Environmental Monitoring Action

4. Conclusion

Based on the results, improving environmental monitoring action could be implemented by building integrated low carbon society from communities surrounded garbage center in each city of Indonesia. This integrated low carbon society is considered to be able to share the environmental condition, change community behavior and mindset of communities considering environment, reducing potential conflicts, and create sustainable society.

5. Acknowledgment

We want to express our gratitude to Ministry Technology & Higher Education of Indonesia government, which supported funds for this project.

References

- [1] Irwanto. (2017). *Sampah Indonesia Rata-Rata Naik Satu Juta Per Tahun*. Ministry of Environmental and Forestry, Retrieved from <https://www.merdeka.com/peristiwa/sampah-indonesia-rata-rata-naik-satu-juta-ton-per-tahun.html>. A reference
- [2] Central Bureau of Statistic. (2014). *Persentase Rumah Tangga Menurut Provinsi dan Perlakuan Memilah Sampah Mudah Membusuk dan Tidak Mudah Membusuk*, Retrieved from <https://www.bps.go.id/linkTabelStatis/view/id/1360>. Another reference
- [3] United Nations Framework Convention on Climate Change (UNFCCC). (2008) *Kyoto Protocol Reference Manual on Accounting Of Emissions And Assigned Amount*.
- [4] N. J. A. Aziz, M. Y. M. Yunos, N. A. Ismail, and M. A. O. Mydin. (2015). *Developing Low-Carbon Awareness and Low-Carbon Behavior Framework for Tackling Co2 Emission in a City*. Applied Mechanics and Materials, Vo. 747, pp. 2650268.
- [5] D. N. V. Satyanarayana and K. R. Chandra. (2014). *Municipal Solid waste management by Sanitary Landfill*. International Journal of Engineering Sciences and Research Technology, Vol 3, No. 6, pp. 811-818.
- [6] F. Z. Siddiqui and M. E. Khan. (2011). *Landfill Gas Recovery and Its Utilization in India: Current status, potential prospects and policy implication*. Journal of Chemical and Pharmaceutical research, vol. 3, No. 5, pp. 174.

- [7] Science, S. (2011). *International Master's Programme in Environmental Is low carbon tourism a good incentive for the development of a low carbon community? - A case study of the Pinglin District* Ying-Chen Fang, 46(0)
- [8] Environment Protection Authority Consultancy. (2003). *Community Education and Awareness Strategy for Waste Management*. Government of Shouth Australia.