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	There has been few studies on the working fluid mass velocity for ORC evaporator. The thermodynamic and economic performance of geothermal water ORC system using R1234ze(E) are analyzed, the working fluid mass velocity influences of evaporator on geothermal water outlet temperature, net power output, thermal efficiency, exergy efficiency and electricity generation cost (EGC) are studied, the optimal mass velocities for maximizing net power output and minimizing EGC are obtained for 373.15–423.15 K geothermal water respectively. The results show increasing mass velocity can increase net power output and exergy efficiency, EGC initially decreases and then increases with increasing mass velocity; optimal mass velocities increase with increasing geothermal water inlet temperature; when geothermal water inlet temperature is 418.15K, the EGC of case 2 can decreases by 22.73% compared with case 1.
GE040 **16:45-17:00**	Nontechnical challenges in solar PV system applications in urban area of Indonesia: review of recent literature and lesson learned from personal experience **Elieser Tarigan** University of Surabaya, Indonesia Abstract--In this work, the nontechnical challenges in implementation of photovoltaic (PV) electricity in urban area of Indonesia are reviewed. The key challenges are identified from recent literature and from personal experience of PV system users, in particular the users in Surabaya city of Indonesia. The identified challenges can be categorized into (i) Policy and institutional challenges; (ii) Financial challenges; and (iii) Technology challenges. For the first category, the most identified challenges are: Complex and unclear local permitting requirements; Restrictions on utility interconnection; Lack of sufficient inspectors and permitting authorities experienced with solar systems in urban applications; Lack of "certified" PV system; and Difficulty for private power developers to sell power generated to the grid. For the second category, the most identified challenges are: Fossil fuel subsidies; Higher upfront costs of solar system; Limited city government investments; Lack of integrated supply chains; and Import duties on PV system components, products and materials. For the last category, the most identified challenges are: Lack of consumer knowledge about the technology; Grid integration issues which can damage sensitive electronic; Lack of stable pricing for solar-electric components and systems; and Shading from large buildings achieving optimum performance of PV systems. The identified challenges here would be useful for the stake holders who concern in solar energy development, especially for application in urban area.
GE059 **17:00-17:15**	Harmonic Distortion in Distribution System Due to Single-Phase Electric Vehicle Charging **Azhar Ul-Haq**, Marium Azhar, Aqib Perwaiz, Saif Ullah Awan National University of Sciences and Technology, Islamabad, Pakistan Abstract—An undesirable jack-up of uneven EV charging load is feared to arouse various technical issues in the existing ill-suited power system. In this wake, assessment of total harmonic distortion (THD) in low voltage distribution network is considered of prime

Nontechnical challenges in solar PV system applications in urban area of Indonesia: review of recent literature and lesson learned from personal experience

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Abstract: In this work, the nontechnical challenges in implementation of photovoltaic (PV) electricity in urban area of Indonesia are reviewed. The key challenges are identified from recent literature and from personal experience of PV system users, in particular the users in Surabaya city of Indonesia. The identified challenges can be categorized into (i) Policy and institutional challenges; (ii) Financial challenges; and (iii) Technology challenges.

Keyword: PV system, urban area, solar energy, challenges.

1. Introduction

More than 70% of energy consumed, and at the same percentage of the greenhouse gas emissions are from human activities in Cities. On the other hand the cities cover 2% of the world's land mass but account for 70% of global Gross Domestic Product (GDP). It is considerably feaseable that solar energy is one option for source of energy for urban area, all at once for sustainibility [1].

In this paper, the nontechnical barriers to solar photovoltaic (PV) use are reviewed, in particular for aplication in urban area of Indonesia. Specifically, we draw on recent literature to help identify key barriers that should be addressed in the PV technology acceptance efforts in Indonesia. A broad literature search yielded more than 400 references, which we narrowed to 19 recent documents on nontechnical barriers to the use of solar energy and other energy efficiency and renewable energy (EE/RE) technologies.

2. Methods

A systematic literature review was carried out in this study. To identify the relevant literature, key word searches were conducted in a number of databases:

- Indonesia Onesearch
- ScienceDirect Search
- Google Search
- Energy Citations Database
- National Renewable Energy Laboratory (NREL) publications database

These data bases are commonly used to retrieve publication for review studies related to energy .

The research process consisted of four steps, adopted from a method by previous work[2] as shown in Fig1. The reviewed articles are listed the reference number [1], [2], [11]–[20], [3], [21]–[26], [4]–[10]

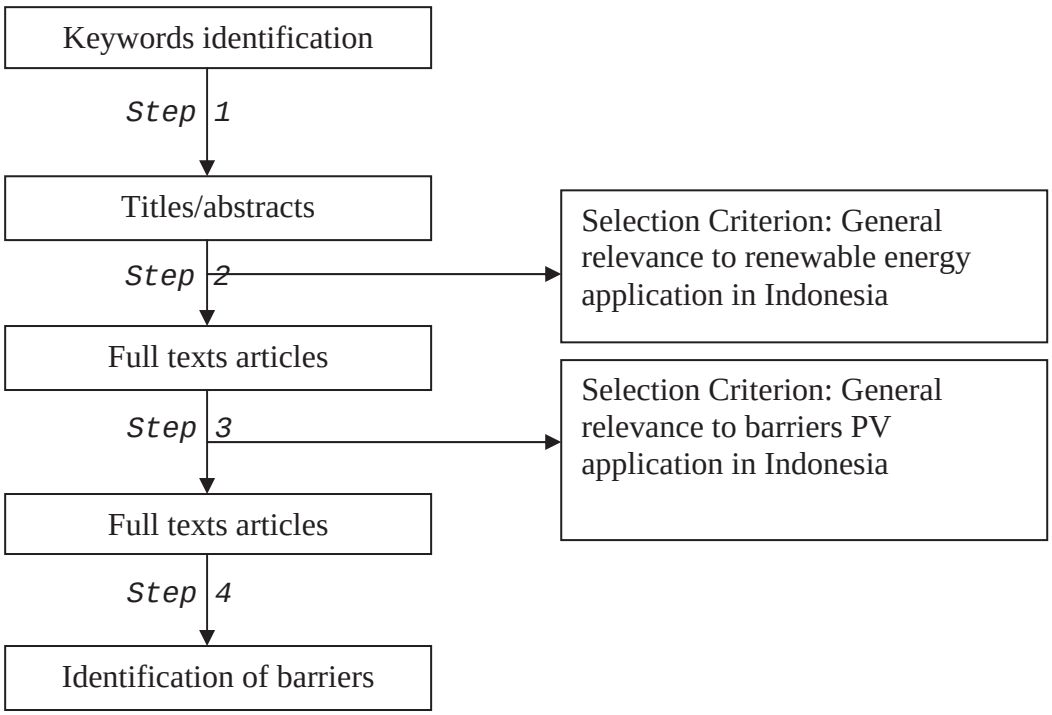

Fig. 1 The flowchart for literature review process

For the first step, a combination of keywords was dentified, i.e. *(renewable* OR "solar energy"OR " energy barrier") AND Indonesia* . There was, however, a slight variations and structure in search technique for each database.

Besides the literature review as mentioned above, personal experience of a PV user who has been using for last five years are discussed.

3. Results and Discussions

The key challenges are identified from recent literature and from personal experience of PV system users, in particular the users in Surabaya city of Indonesia. The identified challenges can be categorized into:

(i) Policy and institutional challenges;
(ii) Financial challenges; and
(iii) Technology challenges.

For the first category, the most identified challenges are:

- Complex and unclear local permitting requirements;
- Restrictions on utility interconnection;
- Lack of sufficient inspectors and permitting authorities experienced with solar systems in urban applications;
- Lack of "certified" PV system; and Difficulty for private power developers to sell power generated to the grid.

For the second category, the most identified challenges are:

- Fossil fuel subsidies;
- Higher upfront costs of solar system;
- Limited city government investments;
- Lack of integrated supply chains; and
- Import duties on PV system components, products and materials.

For the last category, the most identified challenges are:

- Lack of consumer knowledge about the technology;
- Grid integration issues which can damage sensitive electronic;
- Lack of stable pricing for solar-electric components and systems; and
- Shading from large buildings achieving optimum performance of PV systems.

The chalanges found in the literatures moreless similar with the personal experiences as those found that:

- Solar radiation relatively high in Indonesia (Surabaya), 4,8 kWh/day.m2
- The daily used energy from PV is 2,0 – 3,2 kWh/day
- Grid tied (net metering) should be better in efficiency and energy gain, but there has not been any policy
- Lack of availability of the system components locally
- Properly setting and operation is necessary need basic knowledge
- Poeple Responses: "agree but not trust"
- Investment (PV electricity price) : USD 0,20/kWh.
- Need policies on small solar system
- Grid tie policy
- Feed in tariff
- Encouraging RESCOs business
- Training basic knowledges for users

From results of the study, it can be drown some recomendation for promotion of PV for the urban area as follow:

- Understand What Renewable Energy Means to our City
- Make a Commitment to Renewable Energy
- Initiate a Plan of Action
- Build an Effective Policy Framework
- Establish Rules and Regulations
- Address Technical Issues
- Provide Access to Financing
- Launch a Renewable Energy Awareness Campaign
- Strengthen Local Capacity
- Lead by Action

4. Conclussions

The key challenges are identified from recent literature and from personal experience of PV system users, in particular the users in Surabaya city of Indonesia. The identified challenges can be categorized into (i) Policy and institutional challenges; (ii) Financial challenges; and (iii) Technology challenges. For the first category, the most identified challenges are: Complex and unclear local permitting requirements; Restrictions on utility interconnection; Lack of sufficient inspectors and permitting authorities experienced with solar systems in urban applications; Lack of "certified" PV system; and Difficulty for private power developers to sell power generated to the grid. For the second category, the most identified challenges are: Fossil fuel subsidies; Higher upfront costs of solar system; Limited city government investments; Lack of integrated supply chains; and Import duties on PV system components, products and materials. For the last category, the most identified challenges are: Lack of consumer knowledge about the technology; Grid integration issues which can damage sensitive electronic; Lack of stable pricing for solar-electric components and systems; and Shading from large buildings achieving optimum performance of PV systems. The identified challenges here would be useful for the stake holders who concern in solar energy development, especially for application in urban area.

References

[1] Asian Development Bank (ADB), *Indonesia: Energy Sector Assessment, Strategy, and Road Map*. 2016.

[2] M. Yaqoot, P. Diwan, and T. C. Kandpal, "Review of barriers to the dissemination of decentralized renewable energy systems," *Renew. Sustain. Energy Rev.*, vol. 58, pp. 477–490, 2016.

[3] Kementerian ESDM Republik Indonesia, "Investing in New and Renewable Energy in Indonesia," 2015, no. June.

[4] A. D. Wibisono, "Studied on Energy Conservation Policies in Indonesia : Policy

Target, Strategy, and Barrier," no. January, 2014.
[5] A. Aprilia, "Off-Grid Renewable Energy Policies in Indonesia," no. June, 2017.
[6] Y. Sugiawan and S. Managi, "The environmental Kuznets curve in Indonesia: Exploring the potential of renewable energy," *Energy Policy*, vol. 98, pp. 187–198, 2016.
[7] W. W. Purwanto, Y. W. Pratama, Y. S. Nugroho, Warjito, G. F. Hertono, D. Hartono, Deendarlianto, and T. Tezuka, "Multi-objective optimization model for sustainable Indonesian electricity system: Analysis of economic, environment, and adequacy of energy sources," *Renew. Energy*, vol. 81, pp. 308–318, 2015.
[8] J. Rentschler and M. Kornejew, "Energy price variation and competitiveness: Firm level evidence from Indonesia," *Energy Econ.*, vol. 67, pp. 242–254, 2017.
[9] Y. Chang and Y. Li, "Renewable energy and policy options in an integrated ASEAN electricity market: Quantitative assessments and policy implications," *Energy Policy*, vol. 85, pp. 39–49, 2015.
[10] Y. Chang, Z. Fang, and Y. Li, "Renewable energy policies in promoting financing and investment among the East Asia Summit countries: Quantitative assessment and policy implications," *Energy Policy*, vol. 95, pp. 427–436, 2016.
[11] H. Outhred and M. Retnanestri, "Insights from the Experience with Solar Photovoltaic Systems in Australia and Indonesia," *Energy Procedia*, vol. 65, pp. 121–130, 2015.
[12] M. Wimala, E. Akmalah, and M. R. Sururi, "Breaking through the Barriers to Green Building Movement in Indonesia: Insights from Building Occupants," *Energy Procedia*, vol. 100, no. September, pp. 469–474, 2016.
[13] T. V. Kusumadewi and B. Limmeechokchai, "CO2Mitigation in Residential Sector in Indonesia and Thailand: Potential of Renewable Energy and Energy Efficiency," *Energy Procedia*, vol. 138, pp. 955–960, 2017.
[14] J. Rawlins, J. Beyer, J. Lampreia, and F. Tumiwa, "Waste to energy in Indonesia," pp. 1–103, 2014.
[15] J. Khoury, R. Mbayed, G. Salloum, E. Monmasson, and J. Guerrero, "Review on the integration of photovoltaic renewable energy in developing countries - Special attention to the Lebanese case," *Renew. Sustain. Energy Rev.*, vol. 57, pp. 562–575, 2016.
[16] M. K. Biddinika, R. P. Lestari, B. Indrawan, K. Yoshikawa, K. Tokimatsu, and F. Takahashi, "Measuring the readability of Indonesian biomass websites: The ease of understanding biomass energy information on websites in the Indonesian language," *Renew. Sustain. Energy Rev.*, vol. 59, pp. 1349–1357, 2016.
[17] T. Ahmed, S. Mekhilef, R. Shah, N. Mithulananthan, M. Seyedmahmoudian, and B. Horan, "ASEAN power grid: A secure transmission infrastructure for clean and sustainable energy for South-East Asia," *Renew. Sustain. Energy Rev.*, vol. 67, pp. 1420–1435, 2017.
[18] J. Marquardt, "A Struggle of Multi-level Governance: Promoting Renewable Energy in Indonesia," *Energy Procedia*, vol. 58, pp. 87–94, 2014.
[19] A. Rahmadi, H. Hanifah, and H. Kuntjara, "ASEAN BRIEFS," vol. 2, no. September, 2017.
[20] S. Colenbrander, A. Gouldson, A. H. Sudmant, and E. Papargyropoulou, "The economic case for low-carbon development in rapidly growing developing world cities: A case study of Palembang, Indonesia," *Energy Policy*, vol. 80, no. 2015, pp. 24–35, 2015.
[21] I. Renewable and E. Agency, *Renewable Energy Prospects: Indonesia*, no. March. 2017.
[22] E. Karakaya and P. Sriwannawit, "Barriers to the adoption of photovoltaic systems: The state of the art," *Renew. Sustain. Energy Rev.*, vol. 49, pp. 60–66, 2015.
[23] Y. Kamarudin and T. Boothman, "Powering the Nation : Indonesian Power Industry Survey 2017," no. May, p. 40, 2017.
[24] W. W. Purwanto and P. Y. Wienda, "SESP-UI_Book_AnalysisofIndonesiasRenewableEnergyPolicy_StatusBarriersandOpportunities.pdf." UI Press, Jakarta, 2017.
[25] J. Siegel, J., McNulty, S., & Weingart, "Renewable Energy for Urban Application in the APEC Region," *APEC Energy Work. Gr. - Expert Gr. New Renew. Energy*

Technol., pp. 10–19, 2010.
[26] R. Dutu, “Challenges and policies in Indonesia’s energy sector,” *Energy Policy*, vol. 98, pp. 513–519, 2016.

Certificate

Certificate for Oral Presentation

This Certificate is Awarded to *Elieser Tarigan (GE040)*

Paper Title:

Nontechnical challenges in solar PV system applications in urban area of Indonesia: review of recent literature and lesson learned from personal experience

For her/his attendance and delivery of an oral presentation in 2018 2nd International Conference on Green Energy and Applications (ICGEA 2018) held in Singapore during March 24-26, 2018.

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