

Rooftop PV System Policy and Implementation Study for a Household in Indonesia

Elieser Tarigan*

Department of Electrical Engineering, and Center for Environmental and Renewable Energy Studies, University of Surabaya (UBAYA), Indonesia. Email: elieser@staff.ubaya.ac.id

Received: 05 March 2020

Accepted: 13 June 2020

DOI: <https://doi.org/10.32479/ijee.9539>

ABSTRACT

This paper discusses the recent solar rooftop photovoltaic (PV) system policies in Indonesia, particularly for the implementation of the residential sector. The aim of this study is to demonstrate the rooftop PV system for a household based on the current related policies. The study is conducted by literature reviews and computer simulation for a typical rooftop PV system for residential in Surabaya, Indonesia. The most recent solar energy policy in Indonesia is the Ministry of Energy and Mineral Resources Regulation No. 49, the year 2018, which establishes net metering for the residential, commercial and industrial National Grid (PLN) customers that have excess power from solar rooftop installations. The simulation shows the average values global solar irradiation on a horizontal surface in Surabaya vary between 6.81 kWh/m² and 4.82 kWh/m² with an average of 5.54 kWh/m²/day. Energy output by 3 kWp rooftop PV system in Surabaya is found about 4,200 kWh/year, with an average of 11.67 kWh/day. Economically, under present conditions, rooftop on-grid PV system investment would give about 9-10 years of the payback period.

Keywords: Rooftop, PV System, Solar Energy, Residential, Indonesia

JEL Classifications: C58, G18, H41, H50 & Z18

1. INTRODUCTION

Solar energy is one of the most promising of renewable energies in attempting to reduce fossil-based fuel consumption due to its limited reserved and the greenhouses gas (GHG) emissions from the combustion process. Indonesia is located around the equator line, which fortunate to have relatively high and stable daily solar energy throughout most of the year. Statistically, the daily solar irradiation in Indonesia would provide more than 500 GW of potential solar sources (Dang, 2017; UNEP DTU Partnership, 2016). However, the solar photovoltaic (PV) sector has not been well tracked in Indonesia. By the time of writing this paper, based on various sources (Hamdi, 2019; Tarigan, 2018; Tarigan et al., 2015), it is estimated that there are approximately 14.7 MW of solar PV system running on-grid, 48 MW under construction, and an estimated 326 MW in the pipeline. This capacity is relatively small in comparing to the neighboring South East

Asian countries such as Thailand (2.6 GW) and the Philippines (868 MW) (Hamdi, 2019).

The success of the implementation of the rooftop PV system in a country might be affected by many factors such as technical and policy or regulation. It is important for electricity consumers to consider the factors to ensure the beneficial use of the PV system. A number of studies for different countries were found in the literature regarding the policies that regulate the rooftop PV systems in particular countries. Goel (2016) studied and reported the policies, challenges, and outlook of solar rooftop in India. It is reported that with a strong commitment to increasing the renewable sources based energy capacity to 175 GW by 2022, India has a target to install 100 GW of solar energy capacity. Of this 40 GW would be the share of grid-connected solar PV rooftop (Goel, 2016). Xin-Gang and Yi-Min (2019) studied the economic performance of industrial and commercial rooftop PV in China.

It was reported that for a small rooftop PV investment payback period is short and the risk is low. The levelized cost of electricity is reported at about 0.2727 - 0.5573 CNY/kWh. The techno-economic impact of the rooftop PV system for schools in Palestine is reported by Ibrik and Hashaika (2019) by taking three different schools as the study cases. It is reported that the application of the rooftop PV systems was experiencing a significant increase and expanding vastly as an alternative source of energy provider for different buildings.

The Government of Indonesian under the Ministry of Energy and Mineral Resources (MEMR) has set a target of 23% of renewable energy of total national energy needs by 2025 (ESDM, 2016). In this connection, the PV rooftop system regulation has recently been introduced (Government of Indonesia, 2018), i.e Permen ESDM or MEMR Regulation No 49/2018. The regulation allows and encourages users, including residents, public, and commercial buildings to generate electricity by using PV system installed on the building roofs. The produced energy can be exported or fed into the utility grid.

The present paper discusses the current solar rooftop PV system policies in Indonesia, particularly for implementation for the residential sector. The available previous related policies on solar energy are compared, and the electricity Feed-in Tariffs (Fit) per are identified. In addition, simulation for a 3 kWp rooftop PV system for residential is done using solar PVspot (SolarGis, 2017). The objective of this study is to demonstrate the rooftop PV system for households based on the current related policies and to figure out the opportunity benefits from the user's perspective. The information and the results from this work are expected to be useful for the development of solar rooftop PV system applications for a larger scale in Indonesia, particularly for residential sectors.

2. METHOD

The study in this present work is carried out by literature reviews and computer simulation. The related solar PV policies documents and literature were retrieved through the internet, and then they were reviewed and discussed. Implementation of solar rooftop PV system for a typical household is simulated by taking Surabaya as object location.

In terms of capacity by the National Electricity Grid (Perusahaan Listrik Negara, PLN), there are several types and sizes of installation capacity for residential, however, the installation with 1300 kVA and 2200 kVA (BPS Kota Surabaya, 2019) are dominating the houses in urban area such as Surabaya. The amount of energy consumption with these capacities varies between 3 and 15 kWh/day. Hence, the analysis and simulation in this study are conducted for a 3 kWp capacity of the on-grid rooftop PV system, which assumes that it would be able to supply the daily energy demand. Simulation is done using PVspot online software by SolarGIS (SolarGis, 2017). In addition, economic and environmental analysis is carried out using RETScreen (Natural Resources Canada, 2017) simulation software. The geographical position of the simulated location is $-7^{\circ}19'S$ and $112^{\circ}46'E$; altitude: 3m. The other parameters for the simulation are shown in Figure 1.

3. RESULTS

3.1. Solar Energy Policies in Indonesia

Since 2013, the government of Indonesia, through the Directorate General of New and Renewable Energy and Energy Conservation (DGNREEC) of the MEMR has started to regulate solar energy sectors in Indonesia. The first policy was introduced with MEMR Regulation Number 17/2013. In the early years, solar technology was still perceived as expensive and unreliable relative to conventional technologies. This has made the lack of a market for solar energy. In the course of time, there have been the regulation changes in Indonesia as shown in the road map solar energy policies in Figure 2.

Table 1 presents the comparison of solar regulations ever issued in Indonesia. The important issues of regulations are mainly concerning: requirement of local content, feed-in tariffs, procurement method, residential application, the build own operate transfer (boot) rules, and deemed dispatch in case of force majeure. It can be seen that none of the regulations specifically regulate the rooftop PV system until the latest MEMR Regulation Number 49/2018 was introduced.

3.2. Rooftop PV System Policy

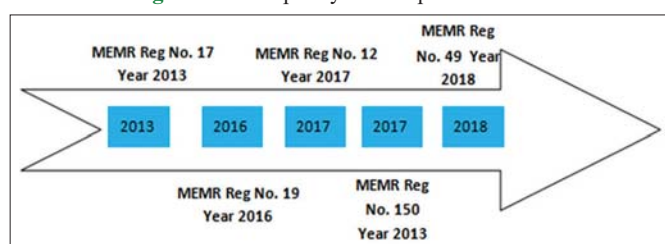
The most recent solar energy policy in Indonesia is MEMR Regulation No. 49 the year 2018 which establishes a net metering

Figure 1: Simulation parameters for studied rooftop PV system

PV system name:	UBAYA	Module technology type:	crystalline silicon (c-Si)
Installed power (kWp):	3	Installation date:	July of 2018 (year)
Installation type:	roof mounted	extended settings (optional)	
Mounting type:	one angle	Inverter efficiency:	97.5
Azimuth of modules (°):	135	constant curve pairs	
Tilt of modules (°):	45	DC losses:	total DC losses
		Total DC losses (%):	5.4
Apply shading by horizon:	yes	AC losses:	total AC losses
Horizon:	Default	Total AC losses (%):	1.5

Table 1: Solar energy policies in Indonesia

Regulation items	MEMR Regulation No. 12/2017 Updated by No. 50/2017	MEMR Regulation No. 49/2018 – (Solar Rooftop)	Regulation No. 17 the Year 2013	Regulation No. 19 the Year 2016	Regulation No. 12 the Year 2017, Updated by Regulation No. 50 the Year 2017	Regulation No. 49 the Year 2018 – (Solar Rooftop)
The requirement of local content			Yes	Yes	Yes	Yes
Feed-in tariffs			US\$ 0.30/kWh (using modules with >40% local content) US\$ 0.25/kWh (using modules with <40% local content)	The range between US\$ 0.145 – 0.25/kWh depending on the project location	The tariff should be lower than the National supply cost of electricity (National BPP) or no more than 85% of local electricity supply cost (regional BPP) which ranges from US\$ 0.048 – 0.144/kWh depending on the location	Net metering scheme Exported electricity will be offset with imported electricity from PLN Exported electricity is valued at 65% for compensation If the export is higher, the balance can be accumulated for up to 3 months before it expires 7
Procurement method			Auction based on quota per annum Direct appointment allowed if only 1 company bids	Auction based on quota for certain pre-determined regions Project size per developer is subject to a limit based on the available quota in the region	Direct selection based on quota capacity	Self-procurement
Residential application			Not regulated	Not regulated	Not regulated	Regulated
BOOT			No	No	Yes	No
Deemed Dispatch in case of force majeure			Not regulated	Not regulated	In 2017, MEMR released several regulations concerning deemed dispatch. The latest issue was No 10/2018, wherein the case of force majeure (from a natural disaster), PLN is not obligated to pay deemed dispatch to IPPs	Yes Industry/commercial rooftop users are charged with parallel operation charges which include an emergency charge

Figure 2: Solar policy roadmap in Indonesia

scheme for the customers of PLN, including the residential, commercial and industrial customers that have excess power from solar rooftop installations. Under the regulation, the installation and construction of a rooftop PV system require prior approval and verification from PLN. The process of approval and verification involves application submission to office of relevant PLN distribution unit, along with the required technical information and administrative matters, such as the PLN customer identification number, the capacity of the rooftop PV system planned to install, one-line diagram of the planned PV system, and the specifications of the equipment to be installed.

Upon customer application, PLN will make the evaluation on the application and notify the decision within 15 business days. The decision can be either approved or rejected. The installation work for the PV system can only be started after a customer gets formal approval.

With the rooftop PV system, the electricity bill for PLN customers will be calculated monthly using the export-import energy meter. The calculation is based on the energy used (kWh import) value minus energy produced by the rooftop PV system (kWh export) value. Under MEMR Regulation No 49 the year 2018, the price of electricity by rooftop PV customers that exported to the grid will be valued at 65% of the applicable PLN tariff. To illustrate, if a rooftop PV system customer exported 1000 kWh to the grid (daily accumulated for a certain month), and the customer imported 1200 kWh from PLN, the export value will be calculated as 650 kWh. In this case, the customer would be billed for 550 kWh (i.e. 650 subtracted from imported of 1200 kWh). Some key points of MEMR Regulation 49 the year 2018 are:

- The allowed capacity of the rooftop PV system is limited at a maximum of 100% of the PLN customer's installed capacity.

exemption of emergency energy charge and capacity charge for rooftop PV systems;

- The industrial users can install rooftop PV systems either off-grid on an on-grid installation. For the off-grid installations, capacity charge and emergency energy charge are exempted, while for on-grid installation will be subject to both charges.

There have been some questions raised related to the latest MEMR Regulation 49/2018, including how the electricity that exported from rooftop PV systems valued by the government, and what is the additional requirements to obtain approval prior to system installation. The multiplier of 65% applied to exported energy is considered unfavorable to rooftop PV users (Hamdi, 2019).

3.3. Implementation Study for Household

The conversion process of solar energy into electricity is affected by many factors, including materials properties and operating environment conditions. The material properties have been fixed during the manufacturing process of solar cells, while environmental operating conditions factors can be simulated to find out optimum conditions. The Solar GIS PV planner simulation results showed the potential of the site solar irradiation presented in the form daily sum of global irradiation.

The result from the simulation shows that the average values global solar irradiation on a horizontal surface in Surabaya vary between 6.81 kWh/m² and 4.82 kWh/m² with an average of 5.54 kWh/m²/day. The global solar irradiation consists of direct, diffuse, and reflected components. The diffuse component of radiation is quite significant especially during March – October, while reflected radiation relatively small throughout the year. The monthly global from simulation results is shown in Figure 3. The global radiation in the past time was usually higher during

month April – October than the other months due to dry season, meanwhile low radiation during December – March due to rainy season. However, in the present time, the season period is likely unpredictable, and further investigation should be done. Daily air temperature showed that the ambient temperature in Surabaya varies about 26-30°C.

The results of the simulation on energy output by 3 kWp PV system presented in Figure 4. Total annual energy production from the system is found at about 4200 kWh. The lowest energy production was in December and January which is about 190 kWh. Further specific studies are recommended to investigate the main factors such as dust, shading, weather, etc to optimize the energy output.

3.4. Economic Analysis

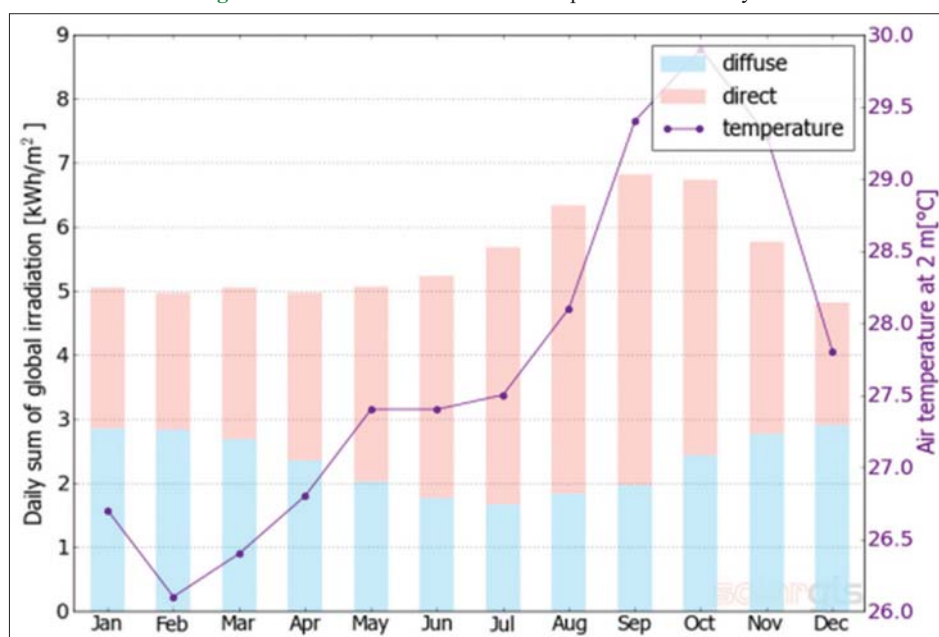
A quick market survey on the retail price of PV system components in Surabaya was conducted using the internet. There was a variation of the price for each of the components by different brands, types and vendors or suppliers. The average prizes among all surveyed data are used for economic analysis. The retail price of components and cost for installing 3kWp rooftop on-grid PV is presented in Table 2.

A financial simulation was carried out with RETScreen software with financial parameters as presented in Table 3. Assuming that the price of one kWh of exported electricity from rooftop PV

Table 2: Cost component for 3 kWp PV system

Components	Retail price or cost (USD)
3 kWp PV modules	2400
Inverters 3000 W	350
Cabling	100
Construction cost	250
Total	3100

Figure 3: Global irradiation and air temperature in Surabaya



system to the grid is 0.09 (USD/kWh), then during 1 year, based current situation above, the system will be generated earning: $4.200 \text{ (kWh/year)} \times 0.09 \text{ (USD/kWh)} \times 1 \text{ (year)} = 378 \text{ (USD/year)}$. Lifetime for PV panels is considered about 20 years, while for inverters are 6-7 years.

Table 3: Simulation parameters for financial simulation

Parameters	Value
Debt ratio	50%
Debt interest rate	6%
Inflation rate	5%
Project life	20 year
Electricity export rate	1.2 USD/kWh
GHG emission factor	0.709 tCO ₂ /MWh
debt term	10 year
Capacity factor	14%

The annual cumulative cash flows are presented in Figure 5. The cumulative cash flow in the figure is from the accumulation of money value of electricity produced by the PV system in comparison to system incremental of installation cost. It can be seen that under present conditions, rooftop on-grid PV system investment would give about 9-10 years of the payback period.

3.5. Environmental Analysis

Replacing fossil fuel with renewable ones for power generation would give a positive impact on the environment. It has been known that the combustion process of fossil fuels in power plants would realize GHG such as Sulphur dioxide (SO₂), nitrogen oxide (NOx), and Carbon dioxide (CO₂) to the atmosphere. Besides, it also produces a large amount of ash that needs particular handling. Mathematically, reducing GHG emissions from using 3 kWp solar panels in Surabaya (due to replace the burning of fossil fuel

Figure 4: Energy output by 3 kWp PV system in Surabaya

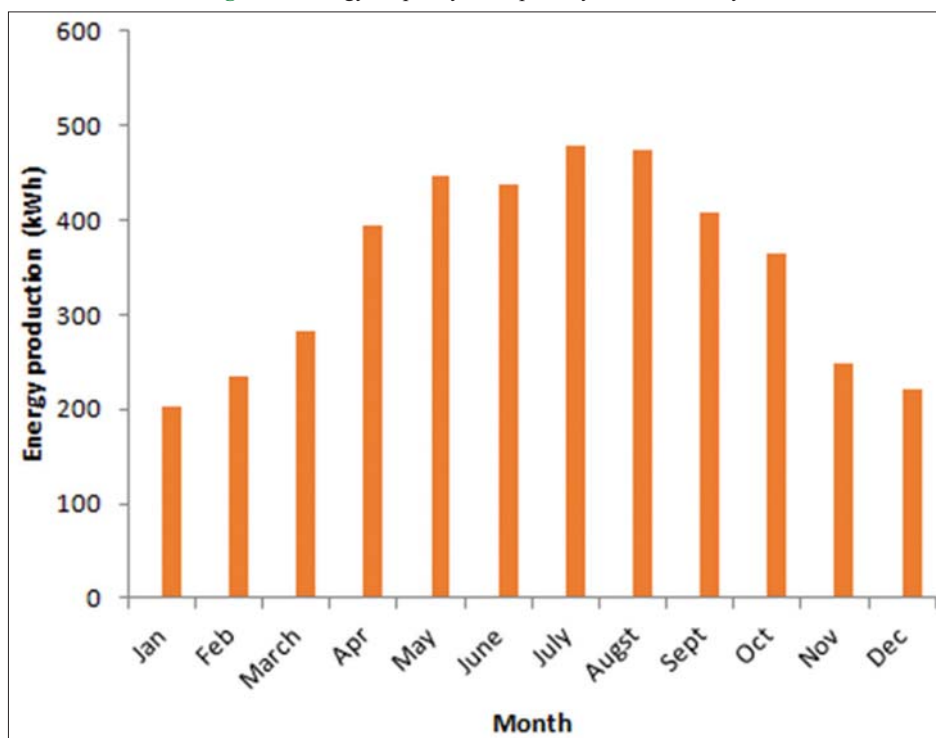


Figure 5: Cash flows cumulative of rooftop PV system investment

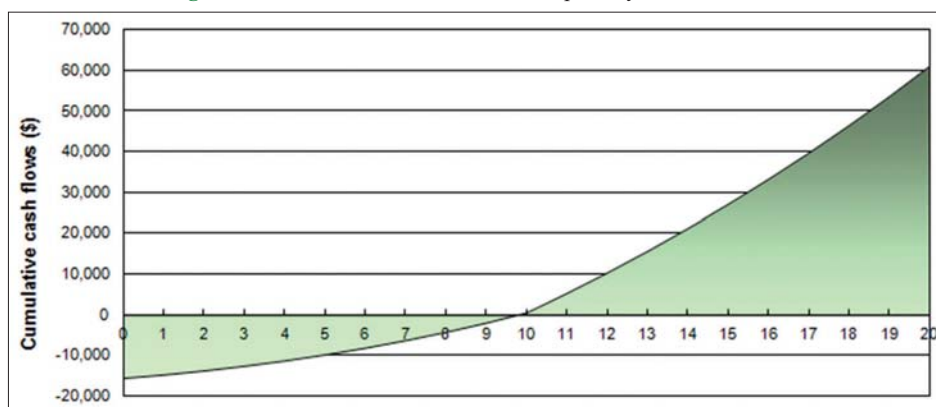


Table 4: Greenhouse gasses reduction by 3 kWp PV system

Greenhouse gasses from the coal power plant	Per kWh (g)	For annual energy production of E=4200 kWh (kg)
SO ₂	1.24	5.21
NO _x	2.59	10.88
CO ₂	970	4075.00
Ash	68	285.6

with the equivalent of produced energy) (RETScreen, 2019) is presented in Table 4.

GHG reduction as shown in Table 4 is just representing by applying the PV system by a household. If the number of the house installing PV increases then the amount of reduction GHG should be multiplied by the number of houses with PV systems.

4. CONCLUSIONS

The regulation on solar energy application in Indonesia has been reviewed, and the simulation of the rooftop PV system a typical household in Surabaya Indonesia has been conducted. The most recent solar energy policy in Indonesia is MEMR Regulation No. 49 the year 2018 which establishes a net metering scheme for the customers of PLN, including the residential, commercial and industrial customers that have excess power from solar rooftop installations. Under the current regulation, the electricity bill for PLN customers will be calculated monthly using the export-import energy meter. The calculation is based on the energy used (kWh import) value minus energy produced by the rooftop PV system (kWh export) value.

The price of electricity by rooftop PV customers that exported to the grid will be valued at 65% of the applicable PLN tariff. The simulation shows the average values global solar irradiation on a horizontal surface in Surabaya vary between 6.81 kWh/m² and 4.82 kWh/m² with an average of 5.54 kWh/m²/day. Energy output by 3 kWp rooftop PV system in Surabaya is found about 4200 kWh/year, with an average of 11.67 kWh/day. Economically, under present conditions, rooftop on-grid PV system investment

would give about 9-10 years of the payback period. Environmentally, a 3 kWp rooftop PV system would reduce CO₂ emission about 4, 7-ton kg/year.

REFERENCES

- BPS Kota Surabaya. (2019), Kota Surabaya Dalam Angka 2019. Available from: <https://www.surabayakota.bps.go.id/publication.html?publikasi%5btahunjudul%5d=2019> and [publikasi%5bkatakunci%5d=surabaya+dalam+angka](https://www.surabayakota.bps.go.id/publication.html?publikasi%5bkatakunci%5d=surabaya+dalam+angka) and [yt0=tampilkan](https://www.surabayakota.bps.go.id/publication.html?publikasi%5dyt0=tampilkan).
- Dang, M.Q. (2017), Solar Energy Potential in Indonesia. 19th International Conference of Young Scientist. p199.
- ESDM. (2016), Rencana Umum Energi Nasional (RUEN). Available from: <https://www.esdm.go.id/id/publikasi/ruen>.
- Goel, M. (2016), sciencedirect solar rooftop in India : Policies, challenges and outlook. *Green Energy and Environment*, 1(2), 129-137.
- Government of Indonesia. (2018), Peraturan Menteri ESDM No. 49 Tahun 2018 Tentang Penggunaan Sistem Pembangkit Listrik Tenaga Surya (PLTS) Atap. Indonesia: Government of Indonesia.
- Hamdi, E. (2019), Indonesia's Solar Policies: Designed to Fail? Available from: <http://www.ieefa.org>.
- Ibrik, I., Hashaika, F. (2019), Techno-economic impact of grid-connected rooftop solar photovoltaic system for schools in Palestine: A case study of three schools. *International Journal of Energy Economics and Policy*, 9(3), 291-300.
- Natural Resources Canada. (2017), RETScreen. Available from: <http://www.nrcan.gc.ca/energy/software-tools/7465>. [Last accessed on 2017 Sep 14].
- RETScreen. (2019), Clean Energy Management Software. Available from: <https://www.nrcan.gc.ca/energy/retscreen/7465>.
- SolarGis. (2017), Solargis PvPlanner. Available from: <http://www.solargis.info/pvplanner>. [Last accessed on 2017 Mar 01].
- Tarigan, E. (2018), Simulation and feasibility studies of rooftop PV system for university campus buildings in Surabaya, Indonesia. *International Journal of Renewable Energy Research*, 8(2), 895-908.
- Tarigan, E., Djuwari, Kartikasari, F.D. (2015), Techno-economic simulation of a grid-connected PV system design as specifically applied to residential in Surabaya, Indonesia. *Energy Procedia*, 65, 90-99.
- UNEP DTU Partnership. (2016), Indonesian Solar PV Rooftop Program. Karnataka: ISPRP.
- Xin-Gang, Z., Yi-Min, X. (2019), The economic performance of industrial and commercial rooftop photovoltaic in China. *Energy*, 187, 115961.

IJEPP

INTERNATIONAL JOURNAL OF
ENERGY ECONOMICS AND POLICY

EJ EconJournals

ISSN: 2146-4553

[Home](#) / [Editorial Team](#)

Editorial Team

EDITORS

Ilhan Ozturk, Editor-in-Chief, Cag University, Mersin, Turkey

Ali ACARAVCI, Co-Editor, Mustafa Kemal University, Hatay, Turkey

SECTION EDITORS

Serkan Yilmaz KANDIR, Co-Editor, Çukurova University, Adana, Turkey

Muhittin KAPLAN, Istanbul University, Istanbul, Turkey

Alper ASLAN, Nevsehir Hacı Bektas Veli University, Nevsehir, Turkey

Seyfettin ARTAN, Karadeniz Technical University, Trabzon, Turkey

Gazi Salah UDDIN, Linkoping University, Sweden

Constantinos ALEXIOU, Cranfield University, Bedfordshire, United Kingdom

Abdulnasser Hatemi-J, UAE University, United Arab Emirates

Hooi Hooi Lean, Universiti Sains Malaysia, Penang, Malaysia

Muhammad Shahbaz, School of Management and Economics, Beijing Institute of Technology, China

Cem SAATCIOGLU, Istanbul University, Istanbul, Turkey

Faik BILGILI, Erciyes University, Kayseri, Turkey

Abu N.M. WAHID, Tennessee State University, United States

Chor Foon TANG, Universiti Sains Malaysia, Penang, Malaysia

Yunke YU, Louisiana State University, Louisiana, United States

Yu Hsing, Southeastern Louisiana University, United States

Yue-Jun ZHANG, Business School of Hunan University, China

Aviral Kumar Tiwari, ICFAI University Tripura, India

Nicholas Apergis, University of Derby, United Kingdom

Mohamed El Hedi Arouri, EDHEC Business School, France

Ali AHMED, Linköping University, Linköping, Sweden

Usama Al-mulali, Sohar University, Oman

Mohammad SALAHUDDIN, Trent University (Canada) & University of Southern Queensland, Australia

Abdul JALIL, Quaid-i-Azam University, Pakistan

Diana Mihaela Pociovalisteanu, "Constantin Brancusi" University of Targu-Jiu, Romania

Vincenzo Bianco, University of Genoa, Italy

Mita Bhattacharya, Monash University, Australia

Seyed Ehsan Hosseini, Arkansas Tech University, United States

Burcu Ozcan, Firat University, Elazig, Turkey

Rabindra Nepal, University of Wollongong, Australia

Mohammad H. Ahmadi, Shahrood University of Technology, Iran, Islamic Republic of

Roula Inglesi-Lotz, University of Pretoria, South Africa

Songül Kakilli ACARAVCI, Mustafa Kemal University, Hatay, Turkey

Victor M.F. Moutinho, Universidade de Aveiro, Portugal

Samuel Asumadu Sarkodie, Nord University, Business School, Norway

Abdul Rauf, Nanjing University of Information Science and Technology, China

Ardi Gunardi, Universitas Pasundan, Indonesia

Qazi Muhammad Adnan Hye, Mohammad Ali Jinnah University, Karachi, Pakistan

Solarin Sakiru Adebola, Multimedia University, Melaka, Malaysia

Abbas Ali Chandio, Sichuan Agricultural University Chengdu, Chengdu, China

Arshian Sharif, Universiti Utara Malaysia, Malaysia

Hoang Phong Le, University of Economics Ho Chi Minh City & Ho Chi Minh City University of Law, Viet Nam

Festus Victor Bekun, Istanbul Gelisim University, Turkey

Oludele Folarin, University of Ibadan, Nigeria

Festus Adedoyin, Bournemouth University, United Kingdom

Adedoyin I. Lawal, Landmark University, Omu Aran, Nigeria

Muddassar Sarfraz, Nanjing University of Information Science & Technology, Wuxi, Jiangsu, China

Ionel Bostan, Ștefan cel Mare University of Suceava, Romania

Bashar H. Malkawi, University of Sharjah, Sharjah, United Arab Emirates

Andrew Adewale Alola, University of Vaasa, Vaasa, Finland

Fabio Pizzutilo, University of Bari "Aldo Moro", Italy

Sana Ullah, Quaid-i-Azam University, Islamabad, Pakistan

Nuno Carlos Leitão, Évora University, Évora, Portugal

Idiano D'Adamo, Sapienza Università di Roma, Italy

Fayyaz Ahmad, Lanzhou University - Lanzhou, Gansu, China

Akbar Maleki, Shahrood University of Technology, Iran, Islamic Republic of

Shah Fahad, Xi'an Jiaotong University, Xi'an, Shaanxi, China

Muhammad Tariq Majeed, Quaid-i-Azam University, Islamabad, Pakistan

Muhammad Hafeez, University of Sialkot, Sialkot, Pakistan

Muntasir Murshed, North South University, Dhaka, Bangladesh

Daniel Balsalobre-Lorente, University of Castilla-La Mancha, Spain

Danish Khan, University of Foreign Studies, India

Avik Sinha, Goa Institute of Management, India

Nisar Ahmad, Sultan Qaboos University, Oman

Kazi Sohag, Ural Federal University, Russian Federation

Phouphet - Kyophilavong, National University of Laos, Lao People's Democratic Republic

Angeliki N. Menegaki, Agricultural University of Athens-EU Conexus, Greece

Kamil Sertoglu, Eastern Mediterranean University, Famagusta, Cyprus

Danish Iqbal Godil, Dar-ul-Madina International University, Islamabad, Pakistan

Dinh Tran Ngoc Huy, Binh Duong University, Viet Nam

Larisa Ivascu, Politehnica University of Timisoara, Romania

Lucian-Ionel Cioca, Lucian Blaga University of Sibiu, Romania

Sobia Naseem, Shijiazhuang Tiedao University, China

Aura Domil, West University of Timisoara, Romania

Muhammad Mohsin, Hunan University of Humanities, Science and Technology, China

Ayfer Gedikli, Duzce University, Duzce, Turkey

Seyfettin Erdogan, Istanbul Medeniyet University, Istanbul, Turkey

Balakrishnan Deepanraj, Jyothi Engineering College, Thrissur, India.

[Submit Your Paper](#)

[Home](#) / [Archives](#) / Vol. 10 No. 5 (2020)

Vol. 10 No. 5 (2020)

Published: 2020-08-10

Articles

Modeling the Efficiency of Using Digital Technologies of Energy and Resource Saving Technologies at Petrochemical Enterprises

Alexey I. Shinkevich

1-6



Rule of Law and Environment Nexus in Saudi Arabia

Haider Mahmood, Awad Ali Alanzi

7-12



Analysis and Prospects for the Development of Regional Energy Integration of the Eurasian Economic Union Countries

Natalya Yuryevna Sopilko, Olga Yuryevna Myasnikova, Nataliya Vital'evna Bondarchuk, Natalia Anatolyevna Navrotskaia, Tatyana Evgenyevna Migaleva

13-20



Renewable Energy Projects on Isolated Islands in Europe: A Policy Review

Marula Tsagkari, Jordi Roca Jusmet

21-30



Energy Consumption and Sustainable Economic Welfare: New Evidence of Organization of Petroleum Exporting Countries

Somayeh Azami, Shabnam Almasi

31-40



The Investments in Energy Distribution Networks: Does Company Ownership Matter?

Francesca Di Pillo, Nathan Levialdi, Laura Marchegiani

41-49



Renewable Energy Use and Its Effects on Environment and Economic Growth: Evidence from Malaysia

Muhammad Raza, Ahmed E. Ahmed, Ali Saleh Alshehawi, Aleksandra G. Polyakova

50-57



Analysis of Economic Growth, Oil Stocks and SIN Stocks in United States

Iis Nurashia, Nugraha Nugraha, Disman Disman, Rozmita Dewi Yuniarti, Kharisya Ayu Effendi

58-63



Future Natural Gas Price Forecasting Model and Its Policy Implication

Ambya Ambya, Toto Gunarto, Ernie Hendrawaty, Fajrin Satria Dwi Kesumah, Febryan Kusuma Wisnu

64-70



Examining the Driving Forces Affecting Energy Intensity during Financial Crisis: Evidence from ASEAN-6 Countries

Dhani Setyawan, Rakhmin Dyarto, Hadi Setiawan, Rita Helbra Tenrini, Sofia Arie Damayanty

71-81



Energy Price Formation and Energy Consumption by Households as a Factor of Ensuring Energy Safety

Valeriy Prasolov, Valery Bezpalkov, Svetlana Doguchaeva, Rodion Rogulin

82-93



The Driving Forces of Change in Energy-related CO2 Emissions in the Polish Iron and Steel Industry in 1990-2017

Zbigniew GoÅaÅ

94-102



The Effect of Ownership and Financial Performance on Firm Value of Oil and Gas Mining Companies in Indonesia

Hasanudin Hasanudin, Andini Nurwulandari, I. Made Adnyana, Novi Loviana
103-109



Rooftop PV System Policy and Implementation Study for a Household in Indonesia

Elieser Tarigan
110-115



The Impact of the Oil and Oil Products Market on Economic Development: A National Aspect

Arailym Suleimenova, Kulyash Turkeyeva, Aigul Tulemetova, Nazigul Zhanakova
116-122



How Oil Price and Exchange Rate Affect Non-oil GDP of the Oil-rich Country – Azerbaijan?

Famil Majidli, Hasraddin Guliyev
123-130



Nuclear Power Production: The Future or the Past?

Sergey Kashurnikov, Valeriy Prasolov, Vladimir Gorbanyov, Rodion Rogulin
131-141



Stock Prices Reaction to Oil Price Fluctuations: Empirical Evidence from Nigeria

Henry Inegbedion, Eseosa Obadiaru, Olamide Adeyemi
142-149



Relationship between Oil and Stock Markets: Evidence from Pakistan Stock Exchange

Muhammad Hanif
150-157



Strategic Energy Partnership between Russia and China

Pavel Baboshkin
158-163



PDF

Does the Choice of the Multivariate GARCH Model on Volatility Spillovers Matter? Evidence from Oil Prices and Stock Markets in G7 Countries

Dimitrios Kartsonakis-Mademlis, Nikolaos Dritsakis

164-182



PDF

Drivers of the Quality of Electricity Supply

Remy Tehero, Emmanuel Brou Aka

183-195



PDF

Macro Economics of Virtual Power Plant for Rural Areas of Botswana

Sampath Kumar Venkatachary, Jagdish Prasad, Ravi Samikannu, Annamalai Alagappan, Leo John Baptist, Raymon Antony Raj

196-207



PDF

Analysis of the Effects of Cell Temperature on the Predictability of the Solar Photovoltaic Power Production

Sameer Al-Dahidi, Salah Al-Nazer, Osama Ayadi, Shuruq Shawish, Nahed Omran

208-219



PDF

Cross-country Analysis of the Comparative Efficiency of Government Support for Coal and Lignite Production

Alan Karaev, Vadim Ponkratov, Andrey Masterov, Elena Kireeva, Maria Volkova

220-227



PDF

Accurate Estimated Model of Volatility Crude Oil Price

Toto Gunarto, Rialdi Azhar, Novita Tresiana, Supriyanto Supriyanto, Ayi Ahadiat

228-233



PDF

The Relationship Between Crude Oil Prices, EUR/USD Exchange Rate and Gold Prices

Benlaria Houcine, Gheraia Zouheyr, Belbali Abdessalam, Hadji Youcef, Abdelli Hanane

234-242



PDF

Foreign Direct Investment, Electricity Power Supply and Economic Growth in Nigeria

Sherifatu O. Onayemi, Philip A. Olomola, Philip O. Alege, Oluwakemi O. Onayemi

243-247



PDF

A Look to the Biogas Generation from Organic Wastes in Colombia

Michel DurÃ¡n Contreras, Rodrigo Sequeda Barros, Jorlany Zapata, Marley Vanegas Chamorro, Alberto Albis Arrieta

248-254



PDF

Oil and Food Prices for a Net Oil Importing-country: How Are Related in Indonesia?

Agus Widarjono, Indah Susantun, Sarastri M. Ruchba, Ari Rudatin

255-263



PDF

Relationship Between Crude Oil prices and Macro-economic Variables: Evidence from BRICS Countries

Guntur Anjana Raju, Shripad Ramchandra Marathe

264-271



PDF

Clean Energy in the EAEU in the Context of Sustainable Development: Compliance and Prospects

Natalia A. Sadovnikova, Valery L. Abramov, Andrey A. Ogryzov, Olga A. Makhova

272-280



PDF

Factors Associated with Electricity Losses: A Panel Data Perspective

Hugo BriseÃ±o, Omar Rojas

281-286



PDF

The Influence of Board Diversity on Environmental Disclosures and Sustainability Performance in Malaysia

Rohaida Abdul Latif, Nurul Huda Yahya, Kamarun Nisham Taufil Mohd, Hasnah Kamardin, Arifatul Husna Mohd Ariff

287-296

**Do Electricity Consumption and Economic Growth Lead to Environmental Pollution? Empirical Evidence from Association of Southeast Asian Nations Countries**

Van Chien Nguyen, Hai Phan Thanh, Thu Thuy Nguyen

297-304

**Oil Rent, Geopolitical Risk and Banking Sector Performance**

Naif Alsagr, Stefan F. Van Hemmen Almazor

305-314

**Identifying the Dynamic Connectedness between Propane and Oil Prices: Evidence from Wavelet Analysis**

Ngo Thai Hung

315-326

**An Approach to the Large-scale Integration of Wind Energy in Albania**

Lorenc Malka, Ilirian Konomi, Ardit Gjeta, Skerdi Drenova, Jugert Gjikota

327-343

**The Influence of Fiscal Progress on Energy Consumption in Kazakhstan**

Azamat Zhanseitov, Gulnur Raikhanova, Sagynysh Mambetova, Serik Daribekov, Yerbolsyn Akbayev

344-347

**World Practice of Using Biogas as Alternative Energy**

Aslan B. Tasmaganbetov, Zhumabay Ataniyazov, Zhangul Basshieva, Abu U. Muhammedov, Anar Yessengeldina

348-352

**Time Series Analysis of Carbon Dioxide Emission, Population, Carbon Tax and Energy use in South Africa**

Rufaro Garidzirai

353-360

**An Analysis of Electricity Generation with Renewable Resources in Germany**

Eduardo Vicente Mendoza Merchán, Moisés David Velásquez Gutiérrez, Diego Armando Medina Montenegro, José Ricardo Nuñez Alvarez, John William Grimaldo Guerrero

361-367

**Renewable and Non-renewable Energy, Economic Growth and Natural Resources Impact on Environmental Quality: Empirical Evidence from South and Southeast Asian Countries with CS-ARDL Modeling**

Zeeshan Arshad, Margarita Robaina, Anabela Botelho

368-383

**Determinants of Diversification from Oil Sector in Saudi Arabia**

Khalid Abdullah Alkhathlan, Tarek Tawfik Yousef Alkhateeb, Haider Mahmood, Wardah Abdulrahman Bindabel

384-391

**Energy Prices, Income and Electricity Consumption in Africa: The Role of Technological Innovation**

Taiwo Owoeye, Dayo Benedict Olanipekun, Akindele John Ogunsola, Augustine Adebayo Kutu

392-400

**Evaluation of the Gas Industry Company's Competitiveness in the Domestic Market**

Natalya S. Shcherbakova, Yulia A. Nazarova, Natalia A. Navrotskaia, Nataliya V. Bondarchuk, Alla V. Vavilina

401-408

**The Lead Lag Relationship between Spot and Futures Markets in the Energy Sector: Empirical Evidence from Indian Markets**

Guntur Anjana Raju, Sanjeeta Shirodkar

409-414

**An Investigation of the Causal Relationship between Energy Consumption and Economic**

Growth: A Case Study of Vietnam

Xuan Hoi Bui

415-421



The Impact of COVID-19 on Price Volatility of Crude Oil and Natural Gas Listed on Multi Commodity Exchange of India

Bharat Kumar Meher, Iqbal Thonse Hawaldar, Latasha Mohapatra, Adel M. Sarea

422-431



Price and Volatility Spillovers between Crude Oil and Natural Gas markets in Europe and Japan-Korea

Theodosios Perifanis, Athanasios Dagoumas

432-446



Energy Intensity of Kazakhstan's GDP: Factors for its Decrease in a Resource-export Developing Economy

Nurlan Kurmanov, Ulukbek Aliyev, Aizhan Satbayeva, Gulmira Kabdullina, Darkhan Baxultanov

447-453



Management of Sustainable Consumption of Energy Resources in the Conditions of Digital Transformation of the Industrial Complex

Marina V. Shinkevich, Nikolay A. Mashkin, Izida I. Ishmuradova, Valeria V. Kolosova, Olga V. Popova

454-460



The Effect of Oil Price Fluctuation on the Economy of Nigeria

Jelilov Gylych, Abdullahi Ahmad Jbrin, Bilal Celik, Abdurrahman Isik

461-468



Assessing the Impacts of Contemporary Development in Biofuel on Agriculture, Energy and Domestic Economy: Evidence from Nigeria

Iyabo Adeola Olanrele, Adedoyin I. Lawal, Ezekiel Oseni, Ahmed Oluwatobi Adekunle, Bukola, B. Lawal-Adedoyin, Crystal O. Elleke, Racheal Ojeka-John, Henry Nweke-Love

469-478



PDF

Renewable Energy, Foreign Direct Investment and Sustainable Development: An Empirical Evidence

Narayan Parab, Ramashanti Naik, Y. V. Reddy

479-484



PDF

Effect of Oil Revenues on Government Size in Selected Oil-exporters with an Emphasis on Iran's Economy

Davood Danesh Jafari, Hamid Nazemian, Javid Bahrami, Mohammad Hassan Kheiravar

485-497



PDF

Biogas Fed-fuel Cell Based Electricity Generation: A Life Cycle Assessment Approach

S. M. Shafie, Z. Othman, N. Hami, S. Omar, A. H. Nu'man, N. N.A.N. Yusoff, A. Shaf

498-502



PDF

Negating the Role of Institutions in the Long Run Growth of an Oil Producing Country

Mohammad Imdadul Haque

503-509



PDF

Do Oil Price Shocks Give Impact on Financial Performance of Manufacturing Sectors in Indonesia?

Sudarso Kaderi Wiryono, Oktofa Yudha Sudrajad, Eko Agus Prasetyo, Marla Setiawati

510-514



PDF

Decovidization through Rurbanization: The Re-development Option for Sustainable Energy Access

Salil K. Sen

515-523



PDF

Bosnia and Herzegovina's Renewable Energy Policy and Perspective

Amir Tokic, Tahir Cetin Akinci, Aydin Tarik Zengin

524-530



PDF

Venture Financing and the Fuel and Energy Complex: Investing in Alternative Energy

Arslan Kulanov, Assiya Issakhova, Olga Koshkina, Parida Issakhova, Alma Karshalova

531-538



PDF

International Economic Cooperation of Central Asian Countries on Energy Efficiency and Use of Renewable Energy Sources

Gulnar Shaimardanovna Kaliakparova, YDulena Evgenevna Gridneva, Sara Sarsebekovna Assanova, Sandugash Babagalikyzy Sauranbay, Abdizhapar Djumanovich Saparbayev

539-545



PDF

Theoretical Implications of Renewable Energy using Improved Cooking Stoves for Rural Households

Muhammad Abrar Ul Haq, Muhammad Atif Nawaz, Farheen Akram, Vinodh K. Natarajan

546-554



PDF

The Impact of Environmental, Social and Governance Index on Firm Value: Evidence from Malaysia

Muhammad Sadiq, Jaspal Singh, Muhammad Raza, Shafi Mohamad

555-562



PDF

Effect of Economic Growth and Foreign Direct Investment on Carbon emission in the Asian States

Toto Gunarto

563-569



PDF

Seeing Domestic and Industrial Logistic in Context of CO2 Emission: Role of Container Port Traffic, Railway Transport, and Air Transport Intensity in Thailand

Chaisri Tarasawatpipat, Thammarak Srimarut, Witthaya Mekhum

570-576



PDF

What Difference Urban Sprawl, Industrialization and Migration Can Make in Energy Consumption? A Time-series Analysis of Thailand

Chonmapat Torasa, Waleerak Sittisom, Witthaya Mekhum

577-583



The Impact of Foreign Direct Investment on CO2 Emissions in ASEAN Countries

Rizky Eriandani, Saiful Anam, Dewi Prastiwi, Ni Nyoman Alit Triani

584-592



Long Run Association of Oil Prices and Stock Prices: A Case of Indonesia

Venkata Sai Srinivasa Rao Muramalla, Hassan Ali Alqahtani

593-600



Energy Consumption and Economic Growth in Indonesia

Nguyen Duy Dat, Nguyen Hoang, Mai Thanh Huyen, Dinh Tran Ngoc Huy, Luong Minh Lan

601-607



Estimating the Impact of Energy Consumption on Carbon Emissions Using Environmental Kuznets Curve

Naif Dalish N. Alanazi, Zavyalov Dmitriy, Aleksandra G. Polyakova

608-614



The Influence of Biological Asset Accounting Policies and Corporate Governance Practices on the Financial Performance: Moderating Role of Knowledge about Renewable Energy

Retno Martanti Endah Lestari, Wahyudin Zarkasyi, Ida Farida

615-622



Development and Challenges for the Functioning of the Renewable Energy Prosumer in Poland: A Legal Perspective

Dawid Stadniczek

623-630



Utilization of Energy Sources, Financial Stability and Prosperity in the Economy of Indonesia

Hoang Thanh Hanh, Dinh Tran Ngoc Huy, Pham Minh Dat

631-637

**Towards a Low-carbon Economic Sustainable Development: Scenarios and Policies for Kazakhstan**

Sholpan Saimova, Gulsim Makenova, Aizhan Skakova, Aitolkyn Moldagaliyeva, Ardak Beisembinova, Zhamilya Berdiyeva, Bagdagul Imanbekova

638-646

**Impact of Accounting Information System and Intensity of Energy on Energy Consumption in Sugar Industry of Indonesia: Moderating Role of Effectiveness of Supply**

Meiryani Meiryani, Leny Suzan, Jajat Sudrajat, Watcharin Joemsittiprasert

647-654

**Impact of Energy consumption and Economic Growth on Environmental Performance: Implications for Green Policy Practitioners**

Mahmoud Radwan Hussein AlZgool, Syed Mir Muhammad Shah, Umair Ahmed

655-662

**The Increasing of Competitiveness of Agro-Industry Products Through Institutional Empowerment to Support the Achievement of Sustainable Agricultural Development**

Achmad Faqih, Roosganda Elizabeth, Delima Hasri Azahari

663-671

**Impact of Energy Consumption, and Economic Dynamics on Environmental Degradation in ASEAN**

Tri Andjarwati, N. Anggoro Panji, Agus Utomo, Linda Nur Susila, P. Anton Respati, Abdul Talib Bon

672-678

**Analysis of the Level of Implementation of Programs for the Efficient Use of Energy and Unconventional Sources: Case Study Colombia**

Marlen Fonseca Vigoya, Jos   Garc  a Mendoza, Sofia Orjuela Abril

679-686



Ads by Google

Stop seeing this ad Why this ad?

International Journal of Energy Economics and Policy

COUNTRY	SUBJECT AREA AND CATEGORY	PUBLISHER	H-INDEX
Turkey	Economics, Econometrics and Finance Economics, Econometrics and Finance (miscellaneous)	EconJournals	33
 Universities and research institutions in Turkey	Energy Energy (miscellaneous)		
PUBLICATION TYPE	ISSN	COVERAGE	INFORMATION
Journals	21464553	2011-2020	Homepage How to publish in this journal ilhanozturk@cag.edu.tr

Ads by Google

Stop seeing this ad Why this ad?

SCOPE

International Journal of Energy Economics and Policy (IJEPP) is the international academic journal, and is a double-blind, peer-reviewed academic journal publishing high quality conceptual and measure development articles in the areas of energy economics, energy policy and related disciplines. The journal has a worldwide audience. The journal's goal is to stimulate the development of energy economics, energy policy and related disciplines theory worldwide by publishing interesting articles in a highly readable format. The journal is published bimonthly (6 issues per year) and covers a wide variety of topics including (but not limited to): Energy Consumption, Electricity Consumption, Economic Growth - Energy, Energy Policy, Energy Planning, Energy Forecasting, Energy Pricing, Energy Politics, Energy Financing, Energy Efficiency, Energy Modelling, Energy Use, Energy - Environment, Energy Systems, Renewable Energy, Energy Sources, Environmental Economics, Environmental Management, Oil & Gas

Join the conversation about this journal

Ads by Google

Stop seeing this ad Why this ad?

files

Ads by Google

Stop seeing this ad Why this ad?

Ads by Google

Stop seeing this ad

Why this ad? ⓘ

FIND SIMILAR JOURNALS ⓘ

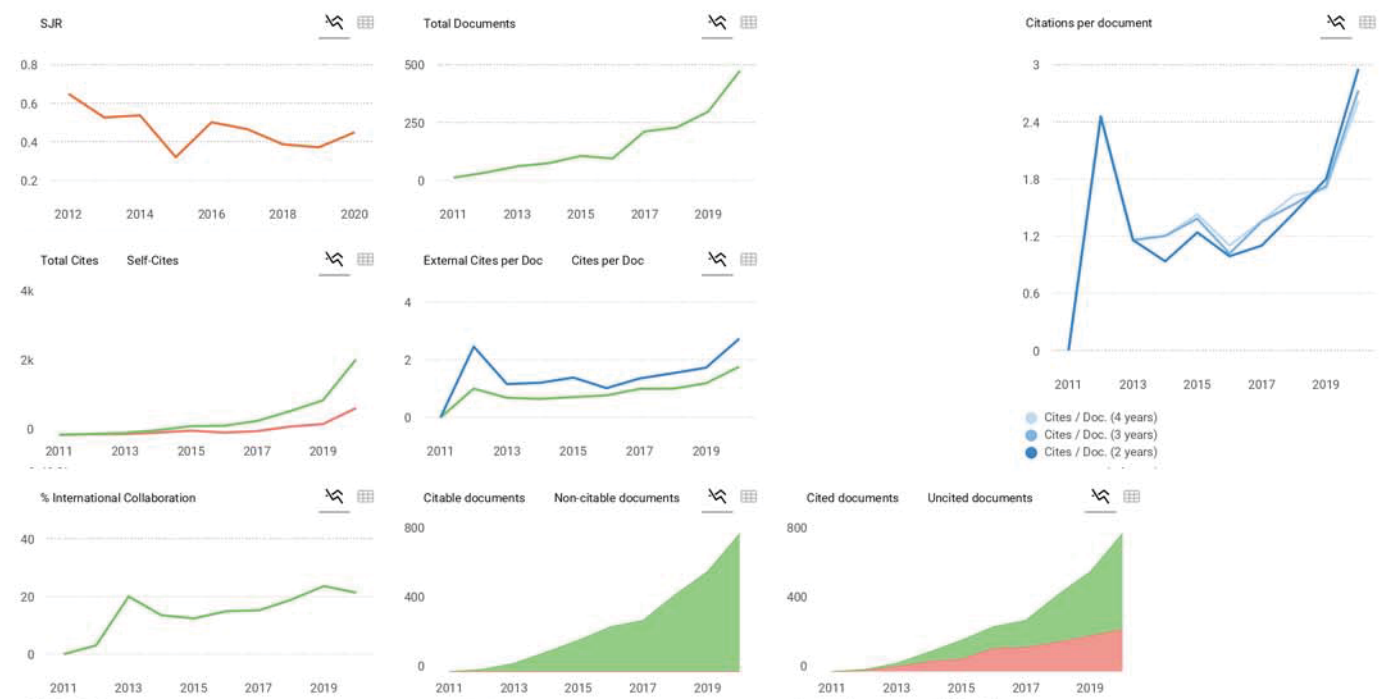
options ⋮



Ads by Google

Stop seeing this ad

Why this ad? ⓘ



← Show this widget in your own website

Just copy the code below and paste within your html code:

``

SCImago Graphica

Explore, visually communicate and make sense of data with our new free tool.

Get it





Source details

International Journal of Energy Economics and Policy

Open Access ⓘ

Scopus coverage years: from 2011 to 2021

Publisher: EconJournals

ISSN: 2146-4553

Subject area: Economics, Econometrics and Finance: General Economics, Econometrics and Finance Energy: General Energy

Source type: Journal

CiteScore 2020

3.5

ⓘ

SJR 2020

0.449

ⓘ

SNIP 2020

1.302

ⓘ

[View all documents >](#)

[Set document alert](#)

[Save to source list](#)

[CiteScore](#) [CiteScore rank & trend](#) [Scopus content coverage](#)

i Improved CiteScore methodology

CiteScore 2020 counts the citations received in 2017-2020 to articles, reviews, conference papers, book chapters and data papers published in 2017-2020, and divides this by the number of publications published in 2017-2020. [Learn more >](#)

CiteScore 2020

$$3.5 = \frac{4,293 \text{ Citations 2017 - 2020}}{1,210 \text{ Documents 2017 - 2020}}$$

Calculated on 05 May, 2021

CiteScoreTracker 2021 ⓘ

$$4.0 = \frac{4,951 \text{ Citations to date}}{1,227 \text{ Documents to date}}$$

Last updated on 06 March, 2022 • Updated monthly

CiteScore rank 2020 ⓘ

Category	Rank	Percentile
Economics, Econometrics and Finance	#20/243	91st
General Economics, Econometrics and Finance		
Energy	#20/65	70th
General Energy		

[View CiteScore methodology >](#) [CiteScore FAQ >](#) [Add CiteScore to your site](#)