UNIVERSITAS INDONESIA

FACULTY OF ECONOMICS AND BUSINESS

Ketahanan Energi dalam Mendukung Pembangunan Ekonomi Berkelanjutan di Indonesia

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Guru Besar Bidang Ekonomi Energi

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Energi dan Kehidupan

Kebutuhan untuk kehidupan

- Transportasi

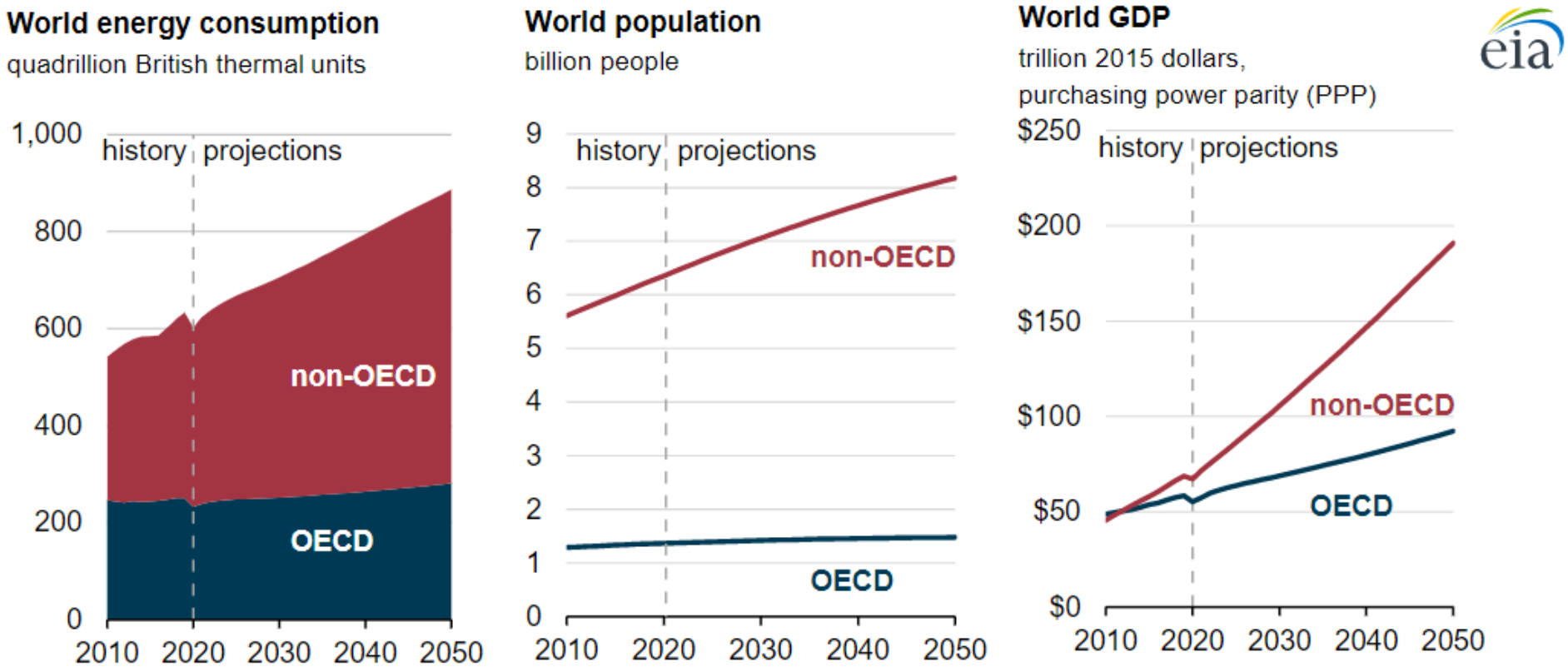
- Penerangan dan keperluan rumah tangga

- Administrasi perkantoran atau perhotelan

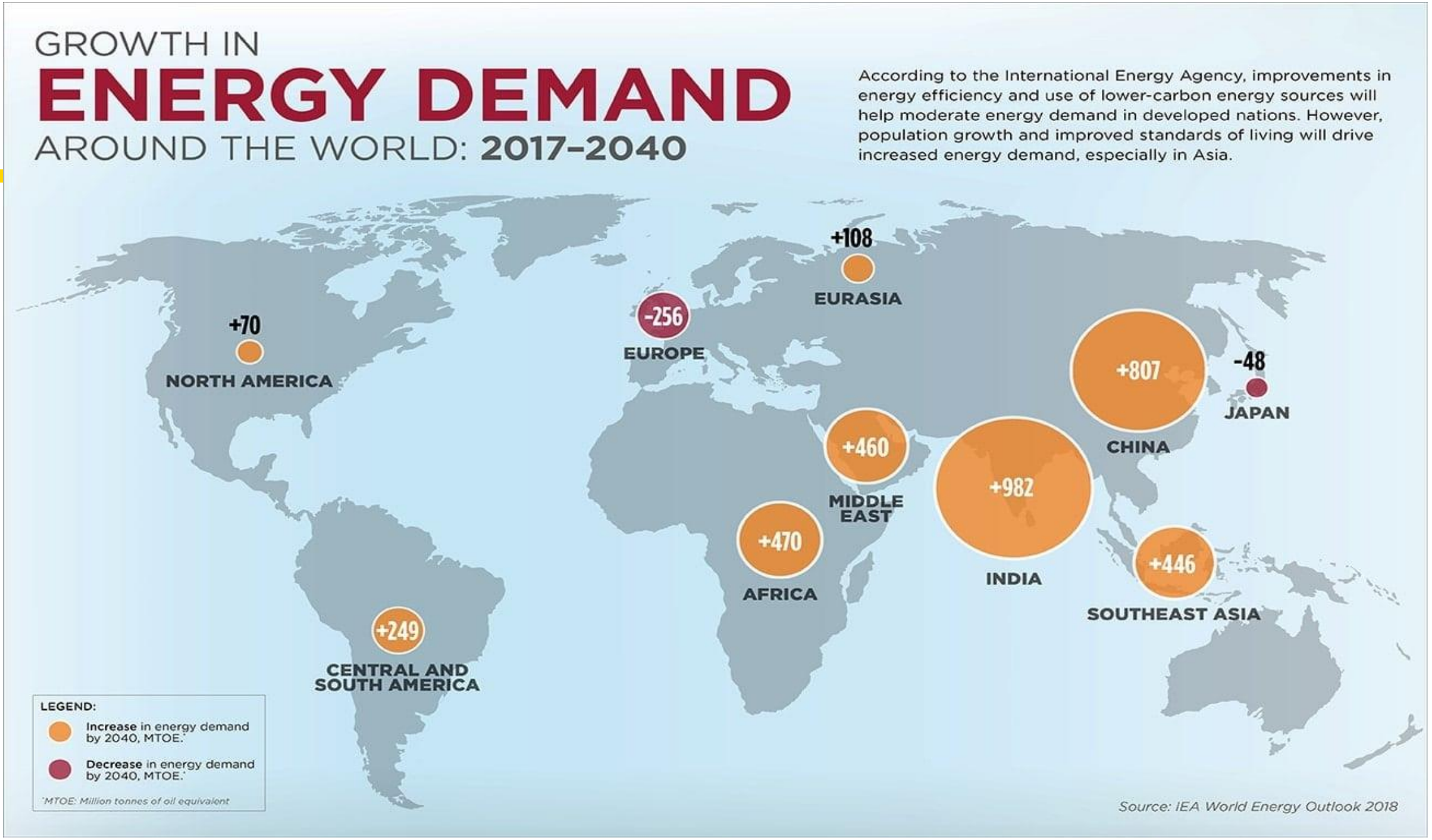
- Pendukung keperluan Kesehatan dan Pendidikan

- Penggerak mesin Industri

Permintaan Terhadap Energi



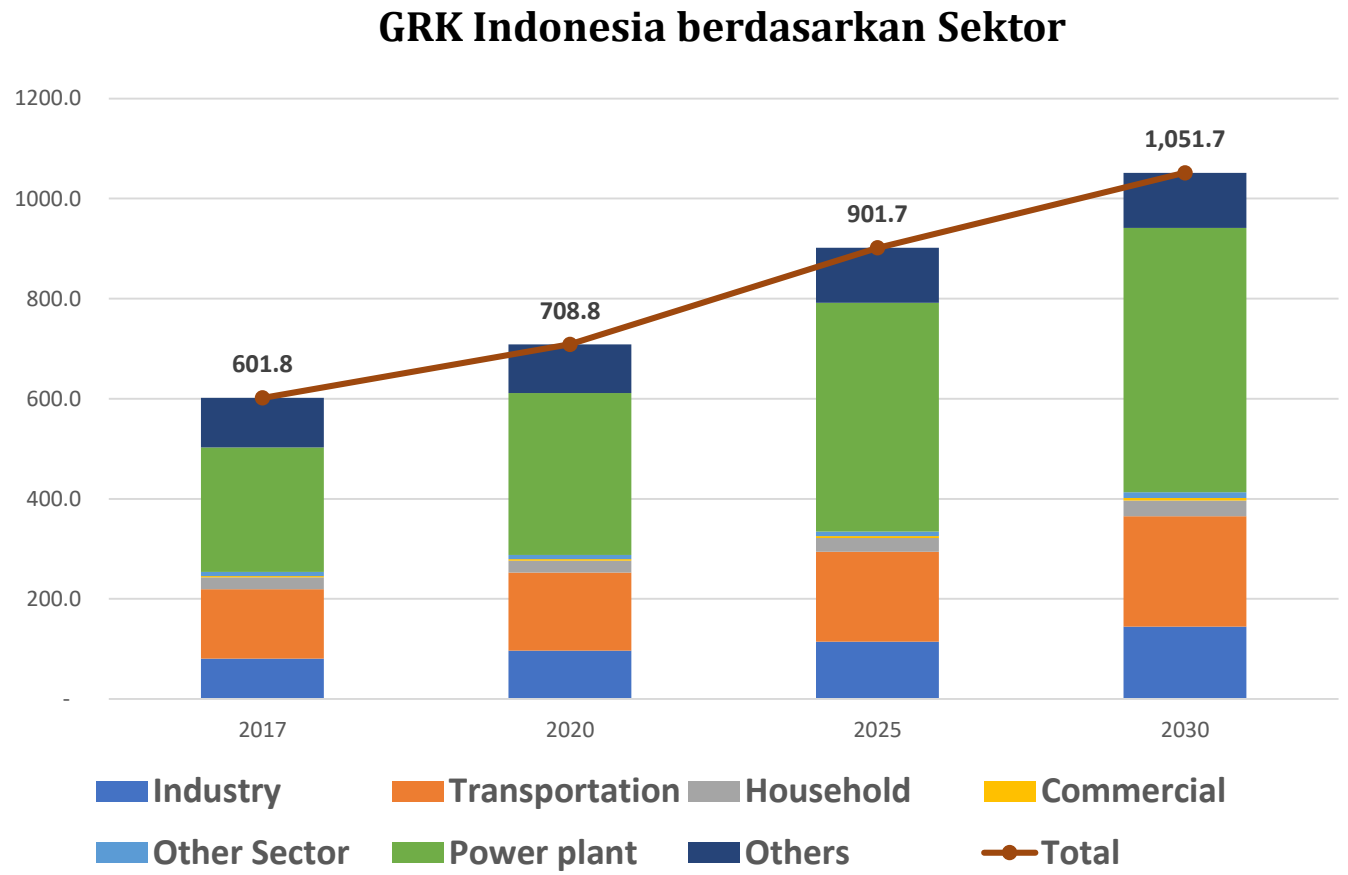
Sumber : International Energy Outlook 2021



Sumber : International Energy Outlook 2018

Pentingnya Energi Rendah Karbon

- UU 16/2016 tentang *National Determined Contribution* : Indonesia berkomitmen untuk mengurangi emisi hingga 29% pada tahun 2030 dan hingga 41% di bawah skema bersyarat
- Pada COP 26 tanggal 2 November 2021, Indonesia mempertegas kembali komitmen untuk menurunkan emisi GRK dan berkontribusi lebih cepat bagi pencapaian target Net Zero Emission dunia
- Transisi energi menjadi EBT merupakan program utama dalam komitmen penurunan emisi, utamanya pada pembangkit listrik



Sumber : Agency for the Assessment and Application of Technology, 2018

Energi Penyokong Kehidupan Berkelanjutan

- Dengan meningkatnya pertumbuhan ekonomi, ada potensi meningkatnya permintaan energi
- Pada tahun 2030 populasi dunia diproyeksikan bertambah 1,3 milyar hingga mencapai 8,3 milyar, dan disaat yang sama, total PDB dunia akan mencapai dua kali lipat dibanding tahun 2011. Tingkat konsumsi energi dunia rata-rata akan tumbuh 1,6% per tahun, sehingga akan bertambah hingga 36% pada tahun 2030.
- Dalam hal ini, penyediaan sumber energi yang bersih, mencukupi, dan terjangkau merupakan keharusan untuk menyokong pertumbuhan dan pembangunan berkelanjutan.

Energy *is tightly linked with economic growth and* ***development*** *(worldbank, 2022)*

Ketahanan Energi : Definisi & Kebijakan

*"Suatu kondisi terjaminnya ketersediaan energi, **akses masyarakat terhadap energi** pada harga yang terjangkau dalam jangka panjang dengan tetap memperhatikan perlindungan terhadap lingkungan hidup"*

Peraturan Pemerintah Nomor 79 Tahun 2014 tentang Kebijakan Energi Nasional (KEN),

- **Ketahanan Energi pada SDG 7 :** *Menjamin **Akses Energi** yang Terjangkau, Andal, Berkelanjutan dan **Modern** untuk Semua*
- Ketahanan energi merupakan salah satu prioritas pembangunan nasional sebagaimana tercantum dalam Undang Undang Energi Nomor 30 Tahun 2007, Peraturan Pemerintah Nomor 79 Tahun 2014 tentang Kebijakan Energi Nasional (KEN), Nawa Cita, RPJMN 2015–2019, serta Peraturan Presiden Nomor 22 Tahun 2017 tentang Rencana Umum Energi Nasional.

Aspek & Indikator

- Aspek *Affordability*
  - Keterjangkauan biaya investasi energi, mulai dari biaya eksplorasi, produksi dan distribusi , hingga **keterjangkauan konsumen terhadap harga energi**
- Aspek *Availability*
  - "**Ketersediaan** sumber energi dan energi baik dari domestik maupun luar negeri

- Aspek *Accessibility*
  - "Kemampuan untuk **mengakses sumber energi**, infrastruktur jaringan energi, termasuk tantangan geografis dan geopolitik
- Aspek *Acceptability*
  - "Penggunaan energi yang peduli lingkungan (darat , laut dan udara) termasuk penerimaan masyarakat terhadap nuklir dsb

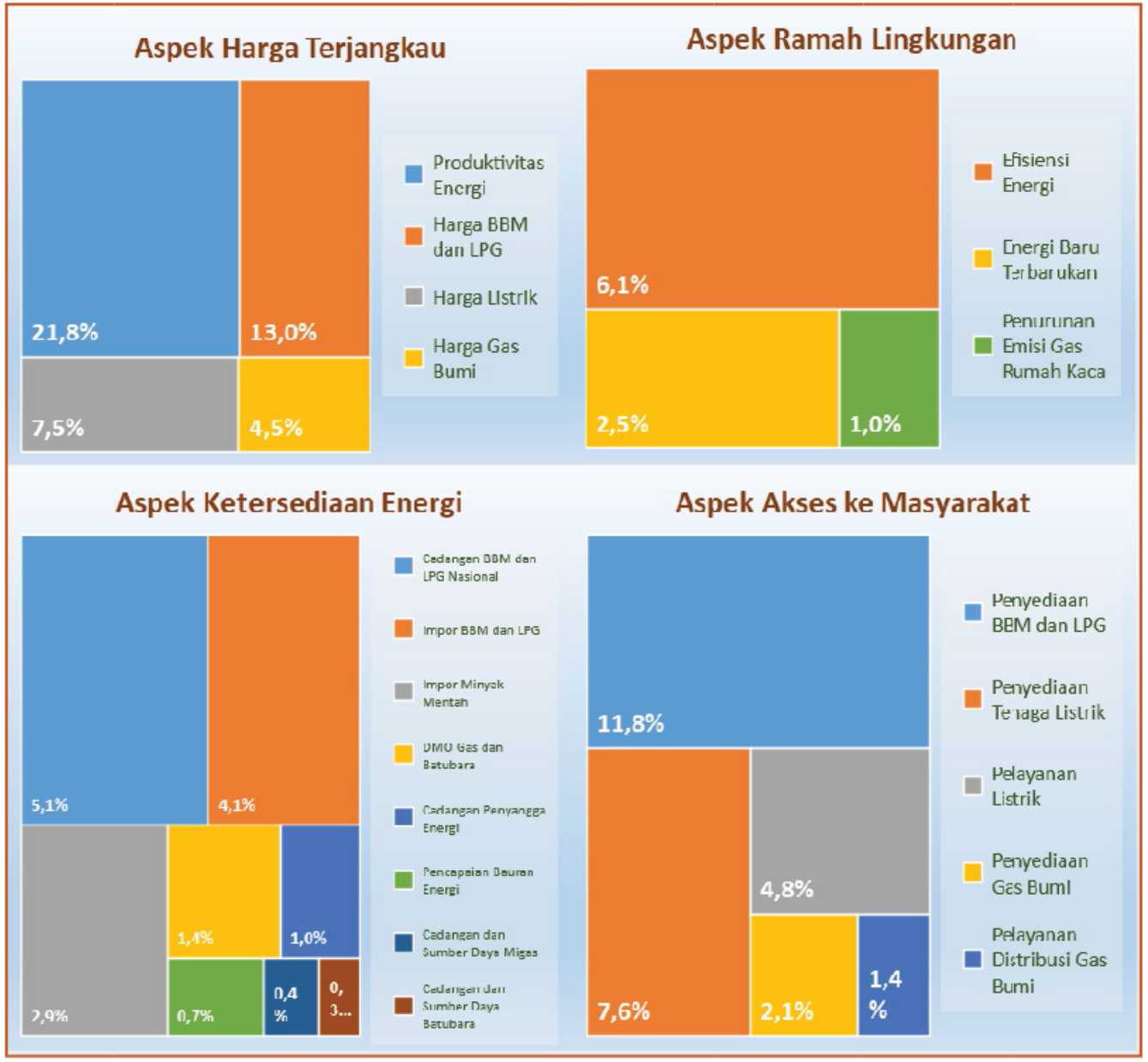
Setjen DEN, 2020

Indikator dan Parameter Ketahanan Energi

- Aspek Affordability
  - Produktivitas Energi
  - **Harga BBM dan LPG**
  - Harga Listrik
  - Harga Gas Bumi
- Aspek Accessibility
  - Penyediaan & Layanan BBM
  - Penyediaan dan Layanan Listrik
  - Penyediaan dan Layanan Gas Bumi & LPG
- Aspek Availability
  - Keberlanjutan Cadangan Energi
  - Ketergantungan Impor Energi
  - DMO Energi
  - Cadangan Energi Nasional
- Aspek Acceptability
  - **Intensitas Energi** / Efisiensi Energi
  - **Peranan EBT**
  - Capaian Diversifikasi ke **Energi Bersih**
  - Penurunan **Emisi Karbon**

Ketahanan Energi Indonesia

- Penilaian ketahanan energi sejak tahun 2015 s.d 2020
- Model menggunakan aspek 4A , metode pembobotan menggunakan AHP dan penilaian oleh Ahli



Sumber: Setjen DEN, 2020

Nilai Ketahanan Energi Indonesia

- Nilai ketahanan energi Indonesia menunjukkan tren meningkat dan berada pada tingkat kondisi ”tahan”
- Hasil penilaian aspek Harga Terjangkau (***Affordability***) paling berpengaruh terhadap nilai ketahanan energi tersebut, karena selain memiliki bobot tertinggi (46,7%) juga memperoleh nilai tertinggi.

Klasifikasi Penilaian	Skala Nilai/Warna
Sangat Tahan (*Highly Resilience*)	8 - 10
Tahan (*Resilience*)	6 - 7,99
Kurang Tahan (*Less Resilience*)	4 - 5,99
Rentan (*Vulnerable*)	2 - 3,99
Sangat Rentan (*Highly Vulnerable*)	0 - 1,99

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Nilai Ketahanan Energi Indonesia : Trilemma Index

- Energy Trilemma adalah tiga pilar prinsip pengelolaan energi untuk menghasilkan energi yang berkelanjutan berdasarkan 3 dimensi penilaian indeks, yaitu dimensi **energy security**, energy equity **(accessibility and affordability)** dan **environmental sustainability**.

Peringkat	Negara	*Energy Security*	*Energy Equity*	*Environmental Sustainability*	*Trilemma Score*
1	Swiss	A	A	A	84,3
4	Finlandia	A	B	A	82,1
9	USA	A	A	B	79,8
21	Belanda	B	A	B	76,6
29	Rusia	A	A	C	73,8
56	Indonesia	A	C	C	66,8
64	Thailand	C	B	C	65,2
86	India	B	C	D	56,2
89	Kenya	B	D	B	54,3
91	Cambodia	D	D	D	50,8

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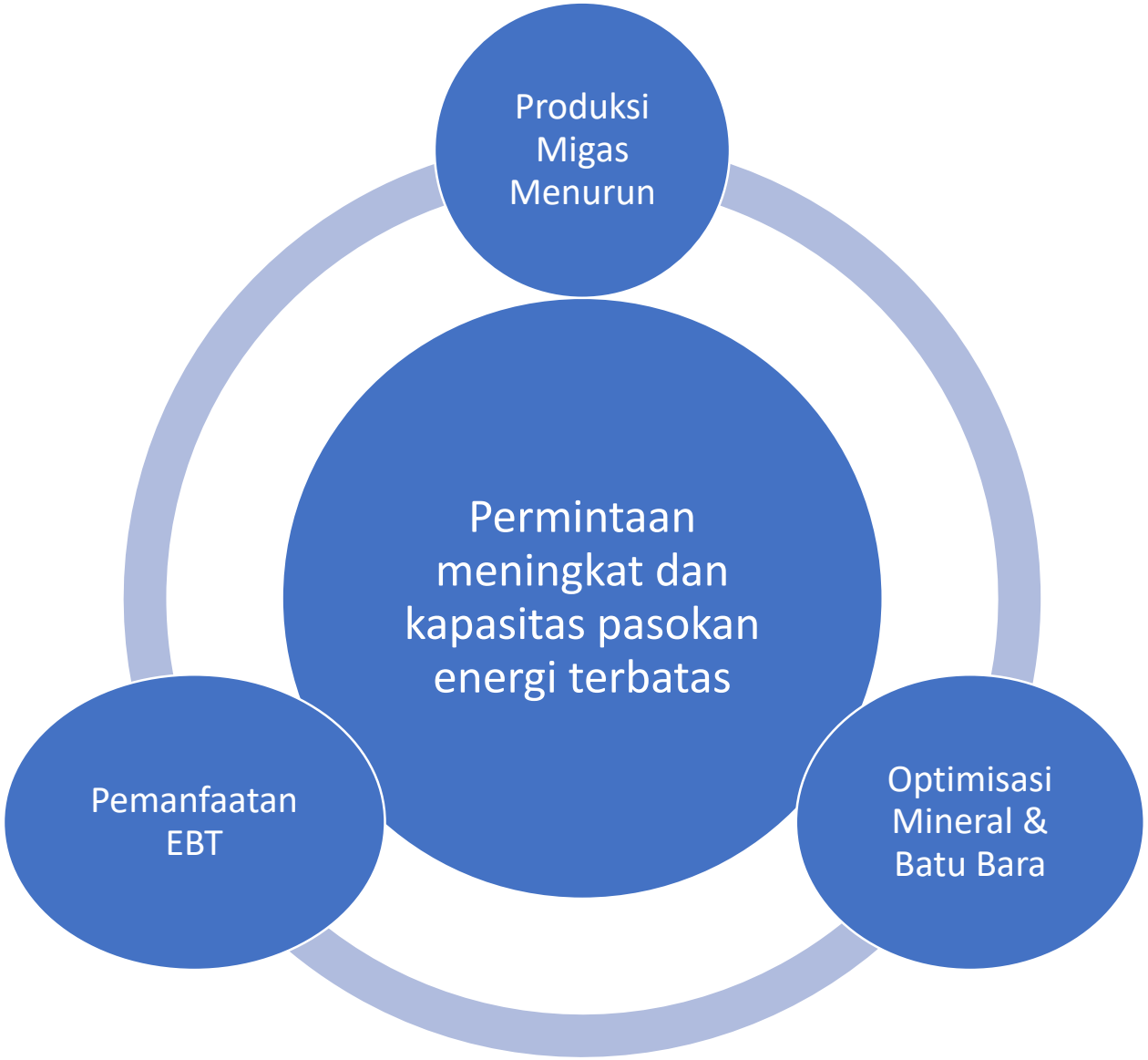
Tantangan Ketahanan Energi Indonesia



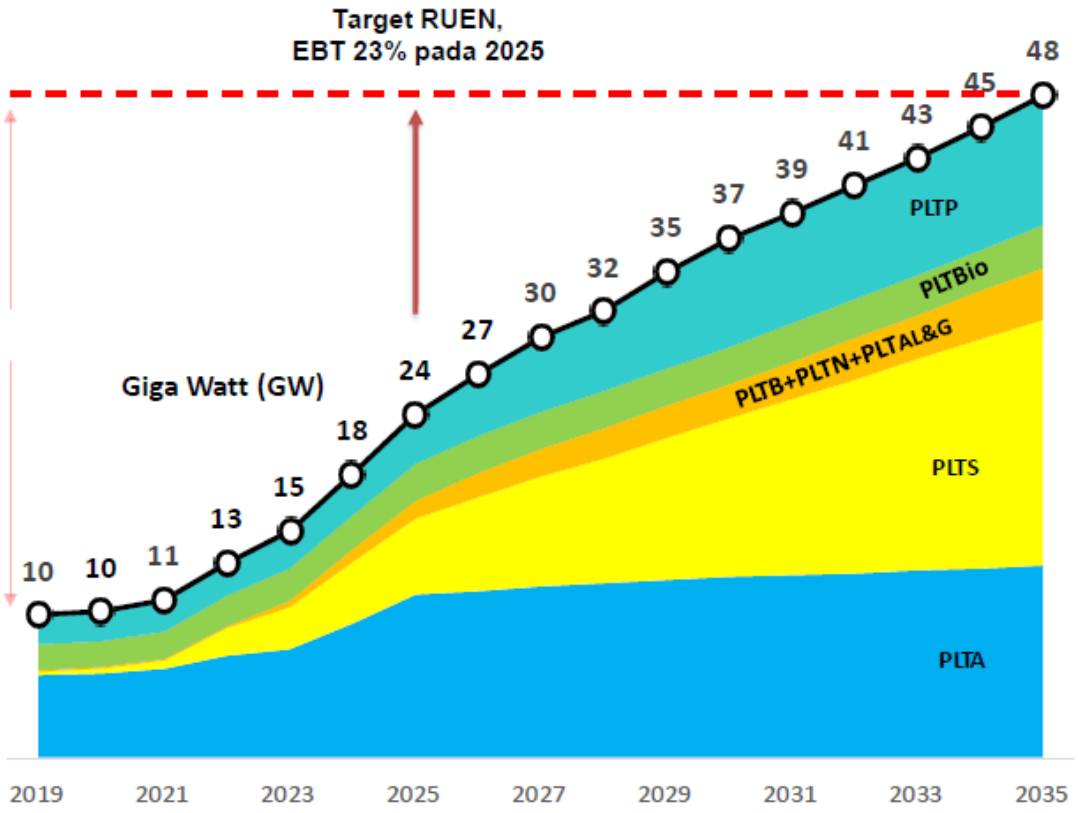
Setjen DEN, 2020

Tantangan dan Program Strategis

- Tantangan : Hilirisasi Mineral dan Batubara
  - sektor mineral dan batubara melakukan hilirisasi batubara dengan penerapan teknologi batubara bersih untuk mengurangi emisi yang dihasilkan dari pembakaran batubara.
- Program Strategis
  - **Hilirisasi batubara** tetap akan dilakukan untuk menghasilkan jenis energi yang dapat dimanfaatkan di dalam negeri dalam rangka mengurangi impor energi dan meningkatkan ketahanan dan kemandirian energi nasional.
  - Produk-produk dari hilirisasi batubara yaitu gasifikasi batubara untuk menghasilkan **Dimethyl Ether (DME)**, Syngas, cooking coal, ekstraksi batubara, briket dan coal upgrading.
  - **DME nantinya akan dimanfaatkan sebagai substitusi penggunaan LPG** untuk mengurangi ketergantungan impor LPG

Tantangan dan Program Strategis

- Tantangan : Penyediaan EBT
  - Pada COP 26 tanggal 2 November 2021, Indonesia mempertegas kembali komitmen untuk menurunkan emisi GRK dan berkontribusi lebih cepat bagi pencapaian target **Net Zero Emission** dunia, melalui **transisi energi** dari energi fosil ke EBT
  - Transisi energi memerlukan **investasi** yang sangat besar, total investasi sektor ketenagalistrikan diproyeksikan sebesar USD 1 triliun pada tahun 2060, atau USD 25 miliar per tahun



Sumber : DEN, 2021

Studi-Studi Terkait

Topik

- Ketahanan Energi
- Kemiskinan Energi
- Energy Trilemma
- Ketimpangan Energi
- Intensitas Energi
- Investasi Energi
- Peranan EBT

Data

- Susenas
- Input-Output
- SNSE
- IBS
- IFLS
- Regional / Provinsi

Metode

- Ekonometrika (Single Equation – OLS, Panel, Spatial Econ, Time Series)
- Model Keseimbangan Umum (IO, SAM, CGE)
- Model Dekomposisi (IO, Regional Makro)

Penelitian Terkait dengan Ketahanan Energi

9

Energy Security in Indonesia

Budy P. Resosudarmo, Ariana Alisjahbana & Ditya Agung Nurdianto

Introduction

Indonesia, which spreads over more than 17,000 islands and has a population of approximately 230 million, is the world's largest archipelago and the fourth most populous nation. It stretches along the equator for

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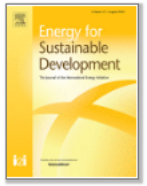
Energy for Sustainable Development

Volume 57, August 2020, Pages 57-68



Modern energy consumption in Indonesia: Assessment for accessibility and affordability

Djoni Hartono [a, b], Sasmita Hastri Hastuti [b], Audhi Ahmad Balya [b], Wahyu Pramono [c]

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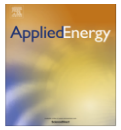

Assessment of renewables for energy security and carbon mitigation in Southeast Asia: The case of Indonesia and Thailand

Subhash Kumar *

Institute for Future Energy Consumer and Behavior (FCN), School of Business and Economics/E.ON Energy Research Center, RWTH Aachen University, Matheustrasse 10, 52074 Aachen, Germany

HIGHLIGHTS

- Energy sector of Southeast Asia (Indonesia and Thailand) is modeled.
- LEAP energy model is used.
- Least cost optimization method is used to estimate the future electric supply.
- CO_2 mitigation and electricity production costs are also estimated.

ARTICLE INFO

Article history:
Received 17 July 2015
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Accepted 4 November 2015

ABSTRACT

Due to fast rising energy demand, Southeast Asia has become a larger energy consumer and bigger player in global energy markets. Energy security and environmental emissions reduction have become higher priorities to ensure energy supply at affordable costs, for continued economic growth and development. To address these issues renewable energy plays a vital role in the long-term future for sustainable devel-

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Research Paper | Published: 16 August 2022

Revisiting the Energy-Happiness Paradox: A Quasi-Experimental Evidence of Electricity Access in Indonesia

Rus'an Nasrudin, Qisha Quarina & Teguh Dartanto

Journal of Happiness Studies (2022) | Cite this article

Penelitian Terkait dengan Energy Trilemma

sustainability

MDPI

Article

Mitigating Energy Poverty: Mobilizing Climate Finance to Manage the Energy Trilemma in Indonesia

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check for updates

Abstract: Energy poverty remains a key global challenge. In Indonesia, around 25 million people are still without electricity access, and many of them live in geographically isolated areas and remote places that preclude them from access to the electricity grid. Deploying renewable energy sources in these areas could present an opportunity for a remarkable and rare complementarity between energy security, energy access, and climate change mitigation. This article examines how energy trilemma plays out in mobilizing private climate finance for renewable rural electrification in Indonesia. Analysis of relevant documents combined with interviews at local and national levels reveals that multiple barriers persist constraining the mobilization of private climate finance to support renewable rural electrification in Indonesia. In turn, this has led to difficulties with managing the tensions and reaching the complementarity of the three key energy objectives. The article concludes with some

Energy Policy 54 (2013) 184–193

Contents lists available at SciVerse ScienceDirect

Energy Policy

journal homepage: www.elsevier.com/locate/enpol

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ENERGY POLICY

Managing the energy trilemma: The case of Indonesia ☆

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HIGHLIGHTS

- A challenge for energy governance is managing a complex 'energy trilemma'.
- There are tensions between energy security, energy poverty and climate change.
- Climate change mitigation requires appropriate forms of governance.
- In developing countries these depend upon overcoming financial constraints.
- Also the expectations of electorates for cheap energy must be met.

ARTICLE INFO

Article history:
Received 7 August 2012
Accepted 8 November 2012
Available online 21 December 2012

ABSTRACT

This article argues that a central challenge for energy governance is how to manage a complex 'energy trilemma' involving the sometimes competing demands of energy security, climate change mitigation and (particularly in developing countries) energy poverty. It suggests that tensions between the horns of the trilemma, in large part, explain Indonesia's current, profoundly suboptimal, energy policy. While

Penelitian Terkait dengan Kemiskinan Energi

A Multidimensional Energy Poverty in Indonesia and Its Impact on Health

Citra Nirmala Utami, Djoni Hartono

Abstract

Developing countries, such as Indonesia, still experience difficulties in terms of accessing electricity and meeting the need for clean energy for cooking. Therefore, it is important to measure energy poverty holistically. This study aimed to find empirical evidence regarding multidimensional energy poverty in Indonesia and its impact on health. Energy poverty and health had become a serious concern in the global world, including in Indonesia. However, empirical studies in proving multidimensional energy poverty and its impact on health are still very limited. This study uses a simultaneous equation model with Two-Stage-Least-Square (2SLS) regression method and measuring multidimensional energy poverty through two aspects, namely accessibility and affordability. Results show that low accessibility to electricity leads to a lower health condition and the higher the ratio of energy consumption to total consumption, the lower a household's health condition. The result from the multidimensional energy poverty measurement also shows positive causality with the households' health condition.

Keywords

Energy poverty; Health; Multidimensional energy poverty; Quality of life; Self-assessed health

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Energy Policy

Volume 132, September 2019, Pages 113-121

The state of energy poverty in Indonesia and its impact on welfare

Maxensius Tri Sambodo, Rio Novandra

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Energy Poverty and Education: Empirical Evidence from Indonesia

Hilma Oktaviani

Djoni Hartono
Universitas Indonesia

DOI: https://doi.org/10.15294/edaj.v11i2.48032

PDF

Published
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How to Cite
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Abstract

Energy poverty in Indonesia has brought negative impacts on various sectors, including education which is the fourth target in the Sustainable Development Goals. This study explores how energy poverty, which is proxied by the percentage of households consuming <32.4 kwh per month in

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Springer Link

Research Article | Published: 18 July 2022

The impact of *FDI* on energy intensity: a spatial econometric analysis of Indonesian provinces

Atina Saraswati, Djoni Hartono & Witri Indriyani

Journal of Environmental Studies and Sciences (2022) | Cite this article

Abstract

The government of Indonesia (GoI) is committed to reducing its carbon emissions through a decline in its energy intensity while encouraging foreign direct investment (*FDI*) inflows to boost economic growth. P
positive and negative relationships betwee

Heliyon 8 (2022) e10634

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Research article

Population density and energy consumption: A study in Indonesian provinces

Irfani Fithria Ummul Muzayanah [a,b], Hooi Hooi Lean [c], Djoni Hartono [a,b,*], Kenny Devita Indraswari [a,b], Ramadani Partama [b]

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[c] Economics Program, School of Social Sciences, Universiti Sains Malaysia, Penang, Malaysia

Heliyon

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Volume 6, Issue 6, June 2020, e04120

Research article

Comparing the impacts of fossil and renewable energy investments in Indonesia: A simple general equilibrium analysis

Djoni Hartono [a, b], Sasmita Hastri Hastuti [b], Alin Halimatussadiah [a], Atina Saraswati [b], Aria Farah Mita [a], Vitria Indriani [a]

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Pages 329-350 | Published online: 16 Aug 2020

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