On behalf of:

CASE for Southeast Asia

Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection

of the Federal Republic of Germany

Supporting National Economic Recovery through Power Sector Initiatives: Accelerating rooftop solar photovoltaics deployment for Indonesia's green recovery

Kementerian PPN/ Bappenas

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

IESR Institute for Essential Services Reform

Supporting National Economic Recovery through Power Sector Initiatives: Accelerating rooftop solar photovoltaics deployment for Indonesia's green recovery

IMPRINT

Supporting National Economic Recovery through Power Sector Initiatives: Accelerating rooftop solar photovoltaics deployment for Indonesia's green recovery

Study by
Institute for Essential Services Reform (IESR)
Jalan Tebet Barat Dalam VIII No. 20 B
Jakarta Selatan 12810 | Indonesia
T: +6221 2232 3069 | F: +62 21 8317 073
www.iesr.or.id | iesr@iesr.or.id

In the context of CASE
The regional programme "Clean, Affordable and Secure Energy for Southeast Asia" (CASE) is jointly implemented by GIZ and international and local expert organizations in the area of sustainable energy transformation and climate change: Agora Energiewende and NewClimate Institute (regional level), the Institute for Essential Services Reform (IESR) in Indonesia, the Institute for Climate and Sustainable Cities (ICSC) in the Philippines, the Energy Research Institute (ERI) and Thailand Development Research Institute (TDRI) in Thailand, and Vietnam Initiative for Energy Transition (VIET) in Vietnam, with the objective to change the narrative of the energy transition. In Indonesia, CASE is anchored with the Ministry of National Development Planning/National Development Planning Agency (Bappenas) - Directorate of Electricity, Telecommunications and Informatics, and jointly implemented by the Deutsche Gesellschaft fur Internationale Zusammenarbeit (GIZ) GmbH and the Institute for Essential Services Reform (IESR).

Author
Daniel Kurniawan (IESR).
daniel@iesr.or.id

Editors
Agus Tampubolon (IESR)
agus@iesr.or.id

Tammya Purnomo (GIZ Indonesia)
tammya.purnomo@giz.de

Acknowledgements
Our gratitude goes to all colleagues and experts from the CASE consortium who contributed insights, and country-specific examples through interviews, editorial comments, and written reviews; especially to the Directorate of Electricity, Telecommunications and Informatics, Bappenas:

1. Rachmat Mardiana - Directorate of Electricity, Telecommunications and Informatics
2. Yusuf Suryanto - Deputy Director for Electricity
3. Jadhie J. Ardajat
4. Muhammad Asrofi
5. Jayanti Maharani
6. Suhandono
7. Rizqi Koestendyah
8. Ferdy Nuralamsyah
9. Rarasvitania D. A. P.
10. Raga Septiarga.

On behalf of the
German Federal Ministry of Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) within the framework of its International Climate Initiative (IKI).

CASE online:
https://caseforsea.org/
https://www.facebook.com/CASEforSEA
https://twitter.com/CASEforSEA
https://www.linkedin.com/company/caseforsea

Disclaimer
The findings, interpretations and conclusions expressed in this document are based on initial information gathered by the author. Further technical study and analysis upon possible programs and measures uptake and implementation are needed.

This report should be cited as:
CASE Indonesia (2022). *Supporting National Economic Recovery through Power Sector Initiatives: Accelerating rooftop solar photovoltaics deployment for Indonesia's green recovery*. Clean, Affordable and Secure Energy for Southeast Asia (CASE) in Indonesia (CASE Indonesia).

Publication:
June 2022

Table of Contents

1

Introduction

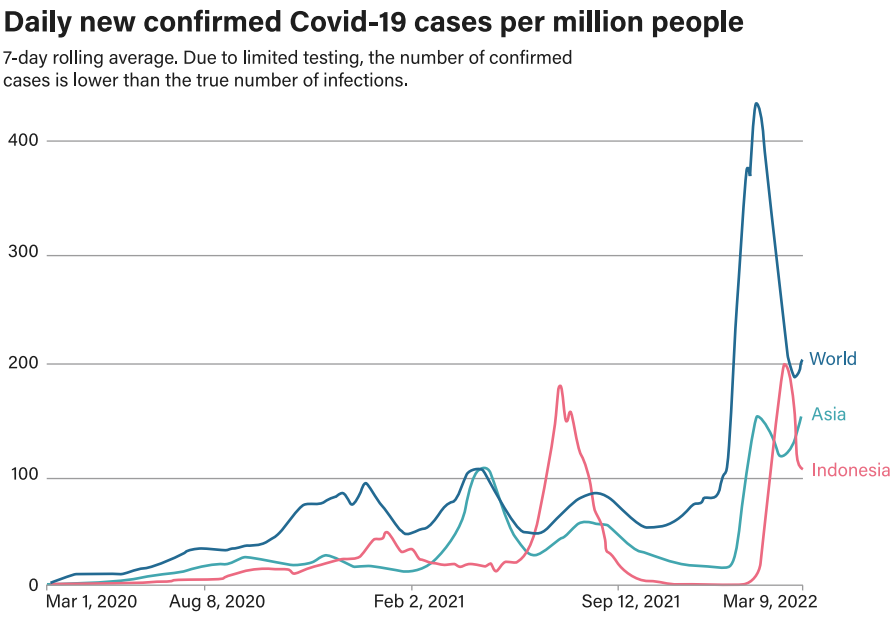
Two years into the pandemic, global economies, including Indonesia, are still battling the coronavirus. In dampening the impact and recovering the economy, governments around the world have announced trillions of dollars into rescue-type and recovery-type measures, of which the latter is sometimes also associated with measures that are aimed not only to kickstart the economy in the short term, but also facilitate transformative change that is sustainable, resilient, and environmentally positive in the long term, or often referred to as “green recovery”. This report seeks to provide analyses and recommendations on green recovery measures that Indonesia can adopt to recover its economy post-pandemic, particularly through power sector initiatives, i.e. rooftop solar photovoltaics (PV), given its deflationary cost as well as its quick-to-deploy and labor-intensive nature.

1.1. Background

Global economies faced heavy contraction due to the COVID-19 pandemic

The coronavirus disease (COVID-19) pandemic caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has impacted the world's economy in a big, perhaps even permanent, way. To contain the spread of the virus, social restriction measures and sometimes lockdowns were and continue to be imposed, causing a significant impact on the output of the economies. In April 2020, the International Monetary Fund (IMF) projected in their World Economic Outlook that the global economy will experience its worst recession since the Great Depression (1929–1933), surpassing even that seen during the Global Financial Crisis (2007–2009) (IMF, 2020a). The Great Lockdown, as the IMF calls it, has contracted the global economy by 3.1% in 2020.

While the growth projection certainly looked gloomy in 2020, growth projections in 2021 and 2022 were painted with a rosier tone. According to the IMF's latest World Economic Outlook in October 2021, the global economy is projected to grow by 5.9% in 2021, and 4.9% in 2022 (IMF, 2021b). The October 2021 outlook did revise downward its previous July 2021 forecast to reflect a downgrade for advanced economies, partly due to supply chain disruptions and bottlenecks, and for low-income developing countries, largely due to worsening pandemic conditions. The forecast indeed had not taken into account the rising concern over the new, more transmissible variant such as Omicron that has resulted in rising cases all over the world over December 2021–February 2022 (see Figure 1).



Source: Our World in Data, Johns Hopkins University CSSE COVID-19 Data. Data shown until March 9, 2022.

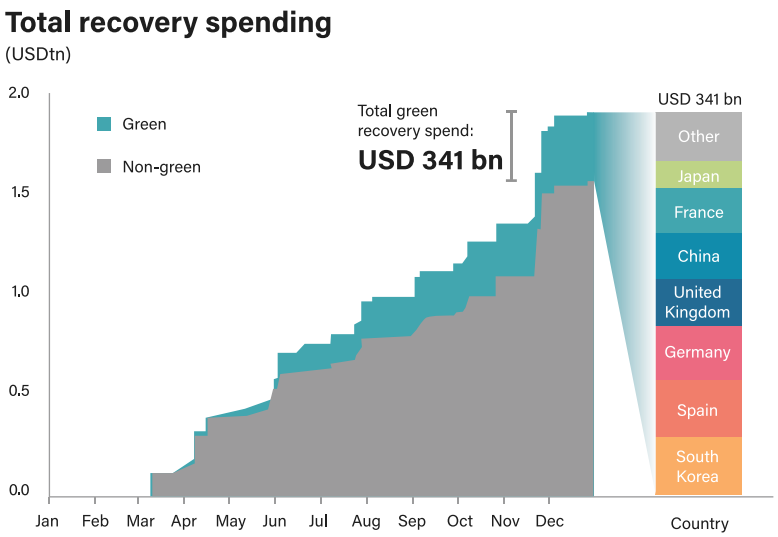
Figure 1. Daily new confirmed COVID-19 cases per million people in the World, Asia, and Indonesia.

The global pandemic hit Indonesian lives no differently. While Indonesia had never officially imposed a lockdown, several large-scale social restrictions were implemented to contain the spread of the virus. Indonesia saw its first positive COVID-19 case as early as March 2020, around the time when the World Health Organization (WHO) declared the SARS-CoV-2 outbreak as a global pandemic. Since then, Indonesia saw increasing numbers of cases that peaked at the end of January 2021 with 14,518 daily cases and faced a worse second wave in July 2021, due to the Delta variant outbreak, with 56,757 confirmed daily cases (record-high), leading to tighter, emergency social restrictions in Jakarta and throughout Java (COVID-19 Handling Task Force, 2021).

As a result of the imposed large-scale social restrictions, Indonesia's gross domestic product (GDP) contracted by 2.07% in 2020. However, Indonesia's GDP has bounced back to 3.69% in 2021, thanks to improved vaccination rates and the government's comprehensive response to the pandemic that prevented a deeper downturn despite the worse second wave (Statistics Indonesia, 2022). The IMF projects 5.6–6.0% growth for Indonesia in 2022, although looming concerns over the newer and more transmissible variants such as Omicron remain (IMF, 2022). More importantly, however, now that Indonesia has slowly recovered its economy, the timing could not be better for Indonesia to start planning for a cleaner, more sustainable post-pandemic recovery.

Fiscal stimulus spending: rescue-type and recovery-type spending

As a response to the health and economic crisis, governments around the world have announced trillions of dollars in financial support for companies and individuals since the start of the COVID-19 pandemic to contain the virus (rescue) and to recover the economic activities. However, as researchers at the Global Recovery Observatory (GRO) found, many have yet to use this opportunity to "green" their measures. According to O'Callaghan and Murdock (2021), a total of $14.6 trillion in fiscal stimulus measures from the world's 50 largest economies was recorded in 2020. Out of the $14.6 trillion, a lion's share of 76% ($11.1 trillion) was directed to immediate rescue efforts, which signified that most economies are still in the rescue phase. About 13% of the total spending ($1.9 trillion) was devoted to long-term recovery measures, in which only 18% ($341 billion) of the $1.9 trillion recovery spending was recorded as green recovery spending. A remainder of $1.6 trillion was recorded as unclear spending



Source: O'Callaghan and Murdock (2021).

Figure 2. Total non-green and green recovery spending in 2020.

These numbers only changed slightly in 2021. **As of December 31, 2021**, total fiscal stimulus measures spending amounts to $18.16 trillion (an increase of $3.5 trillion), with a total of $3.11 trillion recorded as recovery spending where 31.2% of that **($0.97 trillion) was recorded as green spending**. While these numbers generally do not tell much about the specific spending or measures, at least, they tell us how "not green" the world's fiscal measures have been, including Indonesia's, which will be discussed in more detail in Chapter 2.

What is green recovery?

Green recovery is a widely adopted term for a package of environmental, regulatory, and fiscal reforms to recover after a crisis. In essence, green recovery is a set of green stimulus[1] aimed at stimulating an economy during (or soon after) a crisis. Being a stimulus, a green recovery measure should ideally be ready for quick deployment, can deliver maximum economic impact (such as providing value for money, increasing private sector consumption, creating jobs, etc.), fit for government budgets, but most importantly, must be able to contribute to greenhouse gas emissions reduction and support climate progress (BloombergNEF, 2020). Green recovery generally covers a wide range of energy sub-sectors, such as green (clean) electricity, green transportation, green buildings and energy efficiency, natural capital, and green research and development (R&D) (O'Callaghan & Murdock, 2021). However, only power, buildings and energy efficiency, and to a lesser extent, green R&D will be discussed throughout this report.

Why is it important?

Adopting green recovery measures is closely aligned with the global ambition to limit global warming to 1.5 degree Celsius, as agreed in the Paris Agreement. Governments have a choice on how to address post-pandemic economic recovery, and green recovery pathways can be well aligned with the challenges of achieving climate mitigation targets. As such, the COVID-19-induced economic crisis does not change the basic climate challenge, or the proper response to it.

The IMF (2020b) noted that decisions made now will shape the climate for decades, and that fiscal policymakers should thus create greener recovery. While it is understandable that governments will focus on crisis-containment (rescue-type) spending first, they can start planning for a longer-term recovery-type spending that also supports low-carbon energy transition after the pandemic crisis is at a sufficiently controlled stage. While each country's situation might be different—in macroeconomic conditions, fiscal space, climate ambition, and many other faceted landscapes that are country-specific—some general principles can still help policymakers to properly "green" their response to the COVID-19 crisis. Therefore, it is in the interest of this report to support Indonesia's greener economic recovery, particularly through the lens of the energy sector initiatives.

[1] **Green stimulus** *differs* from green policies; in that, green stimulus is intended to have a shorter-term economic stimulus potential by its implementation generated by the aggregate demand shock. **Green policies**, on the other hand, are not intended to directly stimulate the economy, but rather intended for a longer-term effect as it takes time to make an impact in the market (BloombergNEF, 2020).

1.2. Objectives

This report aims to provide analyses and recommendations on green recovery measures that Indonesia can adopt to recover its economy post-pandemic, particularly by looking at rooftop solar PV technology, given its quick-to-deploy and labor-intensive nature. The report also aims to:

1. **Track** and **analyze** Indonesia's economic recovery spending since the onset of the pandemic to date, while also summarizing relevant existing studies from the public and the private sector—with a particular focus on the power sector
2. **Provide** several green recovery measures on rooftop solar PV for Indonesia's green recovery, where it includes cost and benefit analyses on each option

1.3. Report structure

This report is structured in six chapters:

Chapter 1

Starts by setting out the context of the study: the global pandemic, the state of global fiscal stimulus recovery spending, and the critical need for a green recovery.

Chapter 2

Provides a general theory and practice for green recovery and discusses fiscal spending taxonomy developed by leading institutions that will be used as a basis of what constitutes green spending in this study.

Chapter 3

Discusses Indonesia's COVID-19 situation: its impact on the Indonesian economy, and particularly, the government responses to COVID-19 handling and national economic recovery. The chapter also aims to answer whether or not Indonesia has been prioritizing or allocating green recovery measures in its current national economic recovery program.

Chapter 4

Explains the general methodology used in considering and designing the green recovery measures in this study. The chapter also provides a broader context of green recovery in Indonesia, particularly within its power sector and discusses why rooftop solar PV was prioritized.

Chapter 5

Then elaborates and analyzes the proposed green recovery measures within Indonesia's power sector, by looking specifically at rooftop solar PV. The chapter also provides analyses on the short-term and long-term cost and the benefit of each measure.

Chapter 6

Closes with the conclusion of the study.

2

Green recovery spending framework

Two years into the pandemic, governments have announced trillions of dollars to cushion the impact to the health sector and to recover the economy. Leading institutions around the world have developed recovery spending trackers and frameworks to see the effectiveness of the spending measures to recover from the pandemic. In this section, the general theory and practice of green recovery, as well as how green recovery fiscal spending measures are categorized within a recovery spending taxonomy will be discussed.

2.1 Green recovery: theory and practice

Green recovery is a widely adopted term for proposed fiscal measures directed toward an environmentally-positive, sustainable, and inclusive economic recovery after a crisis that is also aligned with long-term climate objectives. In essence, green recovery is a set of stimulus measures designed to not only kick-start the economy in the short term, but also facilitate a sustainable, resilient, and climate-neutral transformative change in the long term (GIZ, n.d.). Being a stimulus, green recovery measures should ideally be ready for quick deployment, able to deliver maximum economic impact (e.g. providing value for money, creating jobs, increasing private sector consumption, can ideally lead to private investment, etc.), fit the government budgets, and most importantly, able to contribute to greenhouse gas emissions reduction and support climate action (BloombergNEF, 2020).

In theory, green recovery measures could be implemented in the form of fiscal policy instruments, monetary policy, and regulatory intervention. In practice, however, fiscal policy measures—such as government expenditure and investment, transfer payments, and tax cuts—have been the dominant policy measures for output stabilization during the COVID-19 (Marquardt & Fearnehough, 2021). The use of expansionary monetary policy has been more limited, given the diminished returns amid already near-zero interest rates in most developed countries. While developing countries tend to have higher policy rates that allow them to lower the rates, the effect of lowering policy rates may not be transmitted well in these countries, especially since they have relatively underdeveloped financial markets and thus have less impact (Marquardt & Fearnehough, 2021). Therefore, recovery measures are still likely to lie in the form of fiscal policy measures in most countries.

2.2. Green recovery spending trackers and frameworks

In order to contextualize the fiscal spending measures, recovery spending trackers and frameworks have been created by leading institutions and experts. Table 1 summarizes six existing global fiscal stimulus recovery spending trackers.

Out of the six spending trackers, Global Recovery Observatory (GRO), led by the University of Oxford, provides the most comprehensive analysis of COVID-19-related fiscal rescue and recovery efforts. The tracker covers 50 leading economies, consisted of 24 advanced economies (AE) and 26 emerging markets & developing economies (EMDE) archetypes. In addition, the tracker also provides a general framework on how green recovery spending is conceptualized, which will become the basis of the green recovery framework in this report. The other five spending trackers will not be discussed in this report due to their specific use and scope (for example, specific focus on European Union (EU) countries) rather than being a general framework.

Table 1. Global fiscal stimulus COVID-19 recovery spending tracker

Tracker	Led by	Scope/Coverage
Global Recovery Observatory	University of Oxford	50 largest economies (24 AEs + 26 EMDEs)
Sustainable Recovery Tracker	IEA	>50 countries
OECD Green Recovery Database	OECD	44 countries + the EU: 38 OECD member countries + 5 key partner countries + Russia + the EU
Energy Policy Tracker	IISD	31 major economies + 8 MDBs—originally only in G20 countries
Greenness of Stimulus Index	Vivid Economics	G20 and ten other emerging economies
Green Recovery Tracker	Wuppertal Institute & E3G	EU (18/27 countries)

Source: IESR analysis

2.2.1. Fiscal stimulus spending taxonomy based on the Global Recovery Observatory

The Global Recovery Observatory has developed a fiscal spending taxonomy in order to categorize and assess the effectiveness or impact of a particular type of spending (O'Callaghan et al., 2021). While it is not in the interest of this report to discuss the taxonomy in much detail, it is still useful to paint a picture of how recovery spending is categorized so that it can assist policymakers when designing options for green recovery. (For a complete detail regarding the methodology, one can refer to the methodology developed by the GRO).

Rescue: Temporary liquidity measures	A	Liquidity support for subnational public entities
	B	Liquidity support for large businesses
	C	Liquidity support for start-ups and SMEs
	D	Liquidity support for not for profit organisations
	E	Temporary waiver of interest payments for businesses
Rescue: Temporary life and livelihood measures	F	Direct provision of basic needs G Targete welfare cash transfers
	H	Job continuation support
	I	Temporary waiver of interest payments for individuals
	J	Healthcare services support K Emergency services (disaster management) support
Rescue: Temporary tax and payment relief measures	L	Income tax cuts
	M	VAT and other goods and services tax cuts
	N	Business tax cuts
	O	Business tax deferrals
	P	Reduced prices for centrally-controlled products and services
	Q	Other tax cuts and deferrals
Recovery: Incentive Measures	R	Targeted recovery cash transfers
	S	Tourism and leisure industry incentives
	T	Electric vehicle incentives
	U	Electronic appliance and efficiency incentives
	V	Green market creation
	W	Other incentive measures
Recovery: Investment measures	X	Worker retraining and job creation
	Y	Education investment (non-infrastructure)
	Z	Healthcare investment (non-infrastructure)
	α	Social and cultural investment (non-infrastructure)
	β	Communications infrastructure investment
	γ	Traditional transport infrastructure investment
	δ	Clean transport infrastructure investment
	ε	Traditional energy infrastructure investment
	η	Clean energy infrastructure investment
	θ	Local (project-based) infrastructure investment
	λ	Buildings upgrades and energy efficiency infrastructure investment
	μ	Natural infrastructure and green spaces investment
	π	Other large-scale infrastructure investments
	σ	Armed forces investment
	τ	Disaster preparedness and capacity building investment
	φ	General research and development investment
	ψ	Clean research and development investment
Indiscriminate		

Source: O'Callaghan et al., 2021

Figure 3. Fiscal stimulus spending taxonomy developed by GRO.

The taxonomy developed by GRO covers three levels; typologies (5), archetypes (40), and sub-archetypes (158) (see Figure 3). The typologies function to distinguish between **rescue-type** (short-term measures designed for emergency support to keep people and businesses alive) and **recovery-type** (long-term measures to boost economic growth) spending. Recovery-type spending is further categorized into two: **incentive measures** and **investment measures**, which will form the basis of green recovery options discussed in Chapter 4 of this report.

It is important to note that when calculating the percentage of green recovery spending relative to total spending, some trackers divide green recovery spending with the total spending (including rescue-type), leading to a lower percentage of green recovery spending over the total spending. In this case, GRO uses recovery-type spending as the denominator rather than the total rescue-type, to reflect how much of the recovery-type is green.

Green recovery spending taxonomy based on the Global Recovery Observatory

The GRO also classified the spending taxonomy associated with green recovery spending. The classification includes spending on five sectors: green energy (electricity), green transportation, green buildings and energy efficiency, natural capital, and green R&D. **Due to the scope of this report, however, only spending in green energy (electricity) and green buildings & energy efficiency (as rooftop solar PV support falls into this category) will be discussed**. Spending on green transportation, natural capital, and green R&D will not be discussed in this report.

GRO classified recovery spending in green energy to include clean energy infrastructure investment, which are further broken down into eight sub-archetypes:

η:	**Clean energy infrastructure investment:**
η:1	New or refurbished renewable energy generation facilities
η:3	New biofuel and other renewable fuel infrastructure
η:4	Upgraded (or new) transmission infrastructure
η:5	Upgraded (or new) distribution infrastructure including smart grids
η:6	Hydrogen infrastructure
η:7	Battery and storage infrastructure
η:8	Carbon capture and storage/utilization
η:9	Other initiatives to clean existing dirty energy assets

Figure 4. Archetype and sub-archetypes on green energy spending

All green energy spending that cannot be categorized into one of the above sub-archetypes is categorized as “unclear spending”. Spending in new or refurbished nuclear energy generation facilities ($\eta 2$) is categorized separately under zero carbon (clean) spending, and not categorized as green spending in the framework.

The GRO also categorized the following for recovery spending on green buildings and energy efficiency:

λ:	**Buildings upgrades and energy efficiency infrastructure investment**
λ:1	Green retrofitting programs (including daylighting, electricity and electrification, insulation)
λ:2	Rooftop solar PV support

Figure 5. Archetypes and sub-archetypes on green buildings and energy efficiency spending

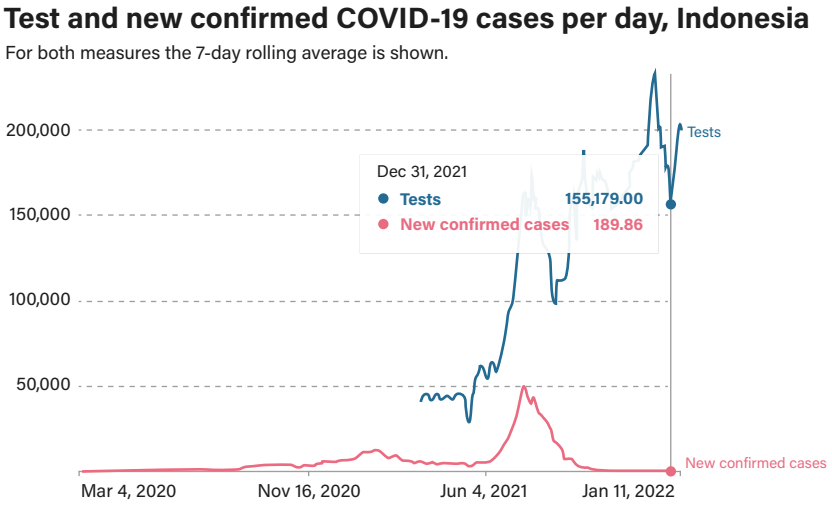
3

Indonesia's COVID-19 handling and recovery spending

The global pandemic hit Indonesia not any differently than other countries, pushing the Indonesian economy into a recession for the first time since the 1998 Monetary Crisis in 2020. Since then, Indonesia has been struggling to contain the spread of the virus with the Delta variant outbreak in mid-2021 and the Omicron variant in early 2022. This section will discuss Indonesia's COVID-19 pandemic situation and its impact on the Indonesian economy. In particular, this section will explore how the Indonesian government is responding to the crisis by means of government fiscal policies, especially under the national economy recovery program. A particular interest will be given to the "greenness" element (or lack thereof) of the recovery spending that is the climate aspects (i.e. emissions reduction potential and environmental benefits) that are aligned with long-term development goals in order to see whether Indonesia is building forward better toward climate progress in its economic recovery.

3.1 Indonesia's COVID-19 situation overview

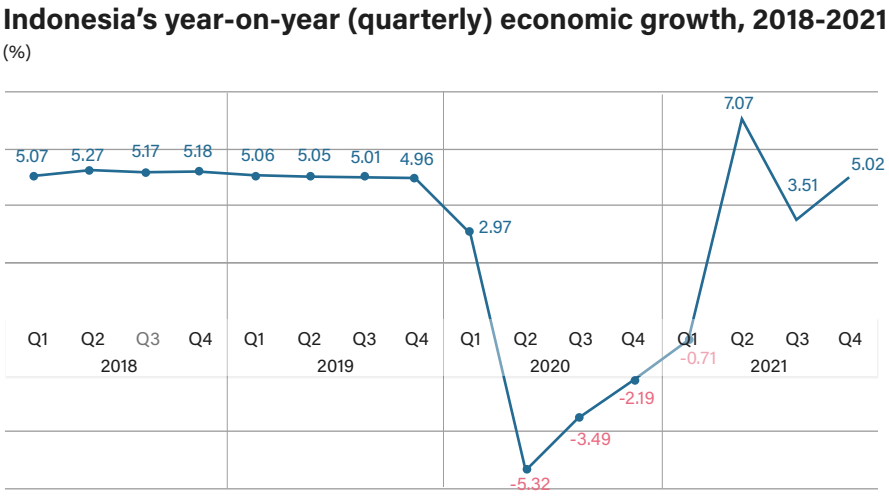
Indonesia detected its very first case on March 2, 2020, just a week before the WHO declared COVID-19 as a global pandemic (The Jakarta Post, 2020; WHO, n.d.). The government reacted quickly at the time and imposed a series of large-scale social restrictions to contain the spread of the virus, although that did not last long. At the end of January 2021, Indonesia saw a steep rise in positive cases, reaching about 12,000 of daily new cases. The situation worsened with the Delta variant outbreak in July–August 2021 that resulted in 40,000 to 50,000 daily new confirmed cases, an all-time high period in Indonesia's COVID-19 cases to date. The government then imposed a stricter "emergency" social restriction and was, fortunately, able to quickly contain the spread of the virus. As of December 31, 2021, daily cases have been dropping to about 200 new cases, albeit there is concern that Indonesia has not done enough testing and tracing. Moreover, fears of the new, more transmissible variant such as Omicron looms. As of December 31, 2021, Indonesia had tested 42.49 million cumulative tests, confirmed 4.26 million cases, and confirmed 144,094 deaths (Our World in Data, n.d.).



Source: Official data collated by Our World in Data - Last updated 11 January 2022, 17:10 (London time). Johns Hopkins University CSSE COVID-19 Data - Last updated 12 January, 09:05 (London time)

Figure 6. Indonesia's tests and new confirmed COVID-19 cases per day. Source: Our World in Data

The pandemic-led social restrictions has caused the Indonesian economy to contract since its early onset in 2020, even pushing it into a technical recession at the end of the third quarter of 2020 (see **Figure 7**). According to Statistics Indonesia (2021), the Indonesian economy has recovered slowly by the second quarter of 2021, hitting 7.07% (yoy). By the third quarter, the Indonesian economy experienced a slowdown to 3.51% (yoy) as a consequence of the emergency social restrictions to contain the Delta variant outbreak in July–August 2021. The primary cause of the contraction was the decline in mobility and consumption as a result of the large-scale social restrictions, which was apparent during the onset of the outbreak in 2020. In 2021, the restrictions have been more relaxed compared to 2020, in part due to increased vaccination rates and government policies to slowly open the economy. This has helped recover manufacturing output for product exports, which in turn led to higher economic output (Statistics Indonesia, 2021).



Source: Statistics Indonesia

Figure 7. Indonesia's year-on-year (quarterly) economic growth, 2018–2021.

While Statistics Indonesia has not released its annual economic growth for 2021 at the time of writing, cumulative economic growth has grown by 3.24% by Q3 2021 (compared to Q3 2020). This is somewhat consistent with what the IMF had projected in their World Economic Outlook in October 2021 that the Indonesian economy is expected to bounce back to 3.2% in 2021 (IMF, 2021b). Bank Indonesia similarly projected that the economy will grow at 3.5~4.3% in 2021 (Kompas, 2021). In 2022, while the Indonesian economy has slowly recovered from a rescue phase into a post-pandemic recovery phase, concerns over the newer and more transmissible variants such as Omicron remain a challenge. The government is, therefore, expected to work prudently to avoid another outbreak of the virus, increase vaccine distribution and vaccination rates, and recover its economy toward a more sustainable, more just, and cleaner one.

3.2 Regulatory framework for COVID-19 handling and economic recovery

Indonesia's response to the COVID-19 pandemic was first outlined under the **Government Regulation in Lieu of Law[2] No. 1/2020** regarding State Financial Policy and Financial System Stability for Handling Corona Virus Disease ("Covid-19") and/or in Order to Face Threats to Harm the National Economy and/or Financial System Stability. Originally released in March 2020, the regulation was soon legislated into **Law No. 2/2020**. The law was further implemented in May 11, 2020, through the release of **Government Regulation No. 23/2020** ("GR 23/2020") regarding the Implementation of the National Economic Recovery Program in Order to Support State Financial Policy for Handling the Corona Virus Disease 2019 (COVID-19) Pandemic and/or Facing Threats That Endanger the National Economy and/or Financial System Stability and Rescue the National Economy, often shortened into "COVID-19 pandemic handling and the national economic recovery" (*pemulihan COVID-19 dan pemulihan ekonomi nasional*, or "PC-PEN"), which was later revised by the Government Regulation No. 43/2020 ("GR 43/2020") regarding Amendments to **Government Regulation No. 23 of 2020** concerning the same.

Under GR 23/2020 *jo*. GR 43/2020, there are at least five ways the national economic recovery (PEN) could be implemented, or rather funded, (Article 4 and 5):

[2] *Peraturan Pemerintah Pengganti Undang-Undang*, or "Perppu"

1. State equity participation (*penyertaan modal negara*, "PMN");
2. Fund placement (*penempatan dana*);
3. Government investment (*investasi pemerintah*);
4. Guarantee (*penjaminan*);
5. Government spending (*belanja negara*).

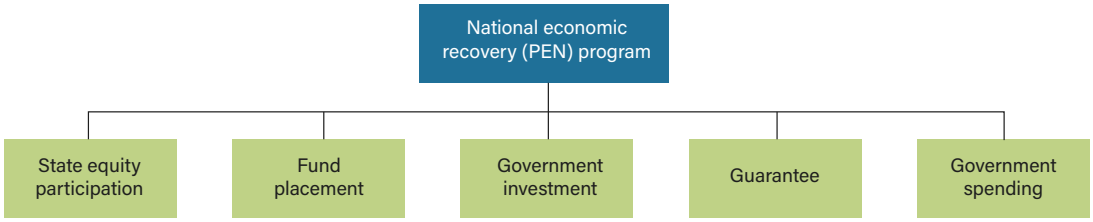


Figure 8. Scope of Indonesia's national economic recovery (PEN) program under GR 23/2020 jo. GR 43/2020

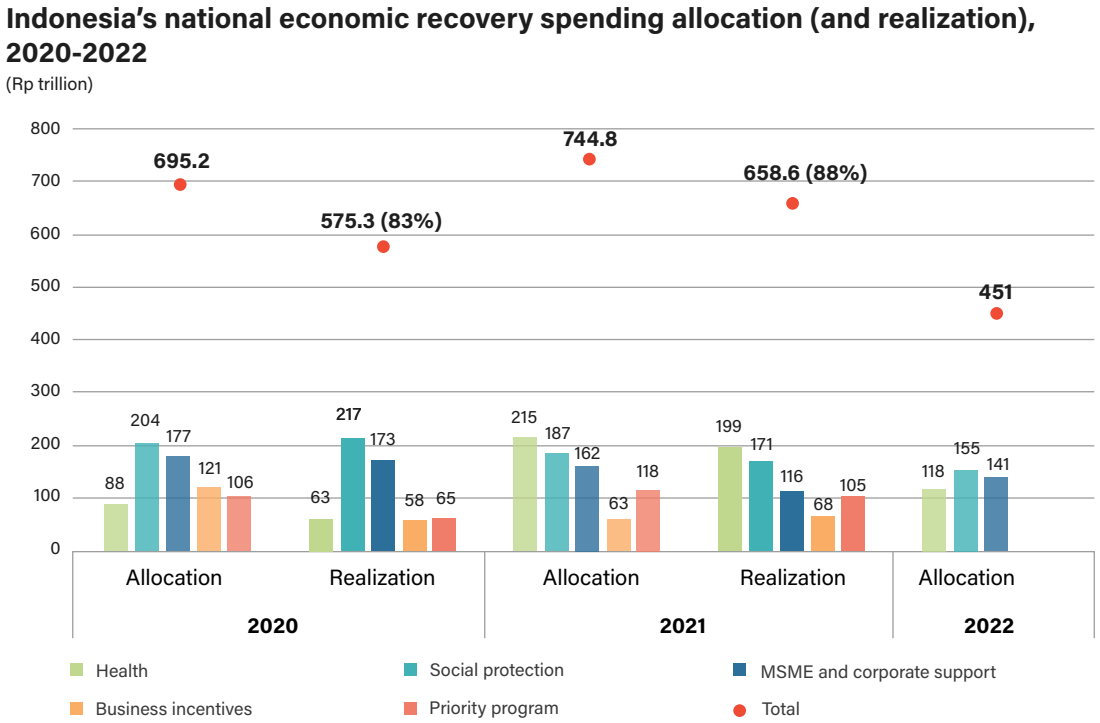
In addition to the government regulations outlined above, there are also other extraordinary steps in saving the public health crisis and the economy, such as the implementation of fiscal expansion policies, the loosening of monetary policy, the lowering of the central bank interest rates, accompanied by pumping liquidity or quantitative easing measures, as well as relaxing regulations in the financial sector, which includes extraordinary changes in the state budget posture and fiscal stimulus policy as a countercyclical instrument.

3.3 Fiscal stimulus package allocation to COVID-19 handling and economic recovery

Budgetary management of the COVID-19 handling and national economic recovery program, officially dubbed as the PC[3]-PEN program, was first outlined under the Minister of Finance Regulation No. 185/PMK.02/2020 ("**MoF 185/2020**") regarding Budget Management in the context of Handling the Corona Virus Disease 2019 (COVID-19) Pandemic and/or National Economic Recovery Program. The stimulus package covers six priority sectors, namely: 1) health, 2) social protection, 3) sectoral support for ministries/agencies and regional government, 4) business incentives, 5) support for small, micro, and medium enterprises (MSMEs), and 6) corporate financing, of which the last two is later merged into one sector in 2021's allocation.

In 2020, the Indonesian government allocated a total of **Rp695.2 trillion ($47.7 billion)** for the PC-PEN program. However, its realization only reached 82.8% (or Rp575.8 trillion) (Ministry of Finance, 2021). In 2020's allocation, the government allocated the largest share (35.1%) to MSMEs and business support, with the aim to retain MSMEs' productivity and their economic contribution. To protect or safeguard poor and vulnerable groups, the government also allocated 29.3% of the budget to supporting social protection and consumption. The health sector had only received 12.6% (Rp87.55 trillion) of the allocated budget in 2020, but in 2021 saw a significant increase due to a huge increase in cases. The remaining budget goes into support for the sectoral line ministry group and regional government and state-owned enterprises (see Figure 9).

[3] PC: *Penanganan Covid* (English: Covid Handling)



Source: Ministry of Finance, IESR analysis. Note: Allocation is rounded for visual clarity. Realization is based on the full year of that year. Breakdown on 2022 allocation is still unpublished per January 17, 2022 (shown is allocation from the allocation draft).

Figure 9. PEN Program stimulus package allocation and realization, 2020–2022

In 2021, the PEN program allocation increased by 7.1% to **Rp744.77 trillion** ($51.3 billion). Similar to 2020, its realization only reached 88%. PEN program budget allocation in 2021 was actually revised upwards from an earlier allocation in March 2021 at Rp699.4 trillion due to the Delta variant outbreak in July–August 2021. In 2021's allocation, the government increased the health sector allocation to Rp214.9 trillion (or 28% out of the total allocation in 2021) due to the significant jump in the number of positive cases. Allocation for social protection, MSMEs, and business incentives remain strong, with a total allocation of Rp186.6 trillion (25% out of total stimulus allocation), Rp162.4 trillion (21.8%), and Rp62.8 trillion (8.4%), respectively.

As the number of cases decline to around 200 daily cases as of December 2021, the allocation for 2022 is set to be reduced to **Rp451 trillion** ($31.1 billion). Further, the allocation for 2022 now only targets three sectors: health, social protection, and several fiscal facilities for MSMEs and businesses (Cabinet Secretariat of the Republic of Indonesia, 2022). While the details of the allocation have not been released at the time of writing, the government did mention three main strategies on the fiscal facilities support. These include the government-borne value added tax incentives (*Pajak Pertambahan Nilai Ditanggung Pemerintah*) for the property sector, luxury sales tax (*Pajak Penjualan Barang Mewah*) in the automotive sector, as well as front loading social assistance for street vendors and fishermen.

3.4 Indonesia's green recovery stimulus

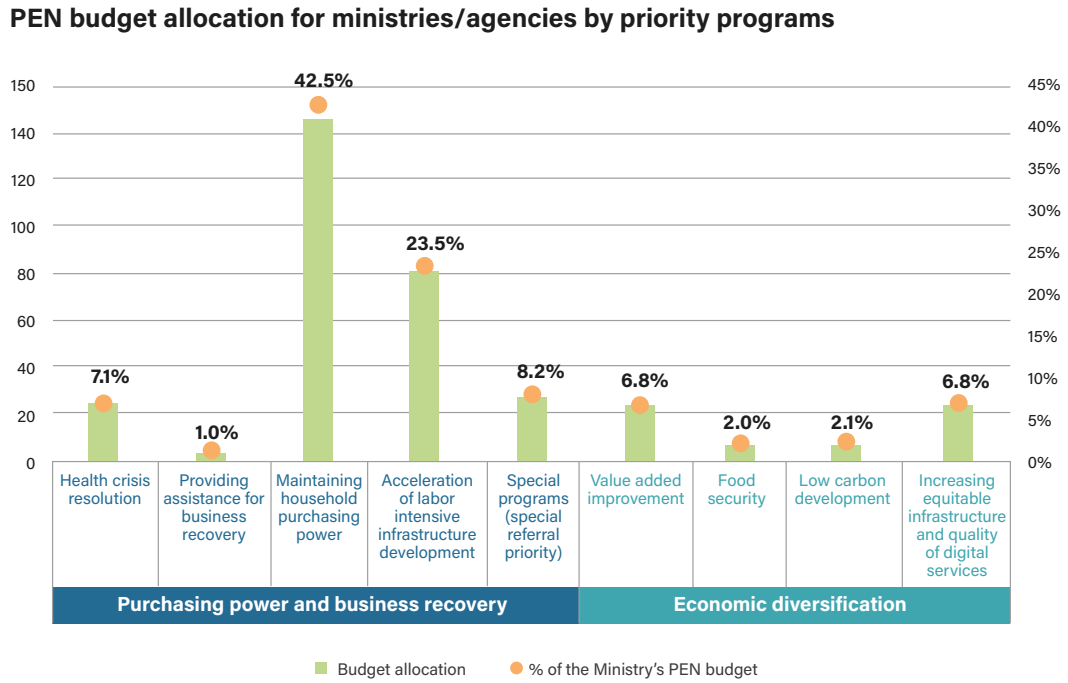
How "green" is Indonesia's national economic recovery program?

Green recovery, as a target, has never been explicitly mentioned in the PEN program. That said, the Climate Policy Initiative (CPI) and Seoul National University (SNU) (2021) did find several specific allocations related to the energy transition-related program in 2020's PEN allocation. Out of the total Rp695.2 trillion in the 2020 PEN budget allocation, only ~1% of that was allocated toward green recovery initiatives (CPI & SNU, 2021). Most of the allocations are directed towards state capital injection, or state equity participation, to state-owned utility and energy companies that are PLN and Pertamina.

CPI & SNU (2021) recorded a total of Rp5 trillion state capital injection to PLN that was formalized in Government Regulation 37/2020. A trillion of the capital was aimed toward renewable energy development in Aceh (87 MW), Papua (5.8 MW), and East Nusa Tenggara (5.3 MW). A total of Rp200 billion was directed toward village electricity distribution in Kalimantan. It is unclear how the remaining Rp3.8 trillion of the capital is used for. Similarly, Pertamina was allocated Rp2.78 trillion from the state budget subsidy for the B30 biodiesel blending program.

CPI & SNU (2021) also recorded allocations to other energy transition-related government programs for economic recovery through state budget transfer to line ministries. A total of Rp18.4 trillion was allocated to four ministries to create labor-intensive programs to provide temporary work for COVID-19-affected daily workers. Another allocation was through state budget allocation to state-owned infrastructure financing PT SMI to create concessional loans to regional governments for economic recovery programs in affected regions. The details and implementation of the programs, however, were not specified by the Ministry of Finance (CPI & SNU, 2021).

In a 2021 green recovery roadmap formulated by the National Development Planning Agency (*Badan Perencanaan Pembangunan Nasional*, "*Bappenas*") and Low Carbon Development Indonesia (2021b), Bappenas further stressed that green recovery has not been prioritized in the PEN program, and even less so in the national budgeting process (state budget). The roadmap found that out of the total Rp747.7 trillion allocated in 2021 PEN, only Rp7.03 trillion (0.94%) was allocated to low-carbon development initiatives—all were made through budget allocation for ministries/agencies' priority program (*program prioritas K/L*). The priority program allocation was further divided into two categories: 1) restoring the public and business purchasing power, and 2) economic diversification, which includes low-carbon development, as presented in Figure 10.



Source: Bappenas and LCDI (2021). Note: Graph is taken from the source because the raw data is unpublished.

Figure 10. PEN budget allocation for ministries/agencies by priority program in 2021

Fiscal stimulus package specific to the energy sector

The International Institute for Sustainable Development (IISD) (2021) analyzed the PEN program fiscal stimulus package with a specific focus toward Indonesia's energy sector (including more broadly energy subsidies). Consistent with that presented in Figure 9, IISD found that in 2020 the highest fiscal support was directed toward the social protection scheme, which includes energy subsidies (mostly electricity subsidies) to poor households, followed by support to MSMEs and corporate financing, of which the latter includes support for the state-owned enterprises (SOEs). The two target sectors collectively represented 15.6% (Rp108.5 trillion) of the total PEN program budget allocation in 2020.

The largest share of the fiscal stimulus package directed toward the energy sector was given to SOEs directly associated with the fossil fuel sector, namely: Pertamina, PLN, Garuda Indonesia, and Kereta Api Indonesia, amounting to Rp95.3 trillion ($6.6 billion). Whereas, the social protection scheme was allocated as much as Rp13.1 trillion for energy subsidies, mainly in the form of free and discounted electricity tariffs for subsidized tariff groups (i.e. the 450 VA and subsidized 900 VA user groups). Table 2 presents the summary of quantified subsidies and PEN program allocations in 2020 that are specific to Indonesia's energy sector.

Table 2. Energy sector subsidies from PEN program and state budget allocations in 2020

2020 Energy Subsidies	Rp (trillion)	$ (billion) eq.
COVID recovery packages	**108.5**	**7.5**
Fossil fuel SOEs	95.3	6.6
PT PLN	45.5	3.2
PT Pertamina	37.8	2.6
PT Garuda Indonesia	8.5	0.6
PT Kereta Api Indonesia	3.5	0.2
Poor households	13.1	0.9
Electricity subscription tariff	1.7	0.1
Annual Subsidy	**97.4**	**6.8**
Electricity subsidy	49.7	3.4
LPG subsidy	32.8	2.3
Fuel subsidy	32.8	2.3
Total	**205.8**	**14.3**

Source: IISD (2021)

Specific allocations toward renewable energy were mostly unquantifiable because most measures were in the form of non-financial fiscal incentives. To that point, the Energy Policy Tracker (n.d.) analyzed public money allocation (including from outside the PEN program) that were aimed toward different energy types (fossil fuel and clean energy) through new or amended policies. It found that between March 2020 and January 2022, Indonesia committed to at least Rp97.5 trillion ($6.78 billion) to supporting different energy types, where 94% (Rp91.65 trillion) were aimed toward fossil fuels support and only about 3.5% (Rp3.4 trillion) were directed toward clean energy support (Energy Policy Tracker, n.d.).

Why has green recovery initiatives not been prioritized?

As previous findings suggest, Indonesia faces several challenges to enable green recovery initiatives prioritization in its national economic recovery package. There are two primary reasons for this:

1. **Limited fiscal space of developing countries**

   Unlike in developed countries, developing countries are often faced with restricted fiscal space when it comes to funding recovery interventions (Marquardt & Fearnehough, 2021). This is also coupled with the fact that limited government budgets are further stressed in times of crisis. Bappenas and LCDI (2021b) have also noted that tax revenue has shrunk while public debt has increased during the pandemic. This means prioritization of budgeting will likely go to the more immediate measures, such as for dampening the impact to the health and economy sector, rather than for measures that do not reveal immediate impact on the economy.

2. **Developing countries face longer pandemic containment**

   Retrospectively, developing countries were also expected to face higher infection rates and longer containment period driven by its vaccination progress that continued to lack far behind that of advanced economies (OECD, 2021). As a consequence, developing countries will therefore prioritize efforts aimed at dampening the impact of the pandemic, characterized by policy responses that provide basic provision for social protection and for healthcare measures, as evidenced by the allocation in the PEN in 2020 and 2021 (Figure 6).

On top of the two primary situations described above, Bappenas (2021b) has also pointed out weak inter- and intra-sectoral synergies, where actions and priorities are often siloed, and limited political pressure on Indonesia's legislative body on green recovery initiatives. However, now that Indonesia has transitioned into a recovery-phase, Indonesia must be able to shift its focus toward recovering the economy for the longer term so that it can benefit from the long-term environmental and social benefits. How Indonesia could do so will be discussed in more detail in Chapter 4 and 5.

4

Methodology and green recovery context in Indonesia

This chapter discusses the methodology in designing the proposed measures laid out in Chapter 5. This chapter also provides a wider context of green recovery in Indonesia, in the power sector, and also briefly discusses the rationale behind why rooftop solar PV was chosen as a priority in the study.

4.1 Methodology

In considering and designing green recovery measures for Indonesia, this report took into account the green spending taxonomy developed by the Global Recovery Observatory discussed in Section 2.2.1. Generally, the proposed recovery measures come in the form of either incentive or investment measures (see Figure 3 in Chapter 2). As has been noted in Section 2.2.1, however, green recovery focus areas[4] have been predetermined to clean energy infrastructure and green buildings & energy efficiency (primarily because rooftop solar PV support falls into this category in the spending taxonomy).

The proposed measures in Chapter 5 are synthesized by reviewing existing initiatives in the literature that comes from the government agencies itself, development agencies, or any other organizations supporting the energy transition and greener economic recovery. It is important to note that the proposed measures in Chapter 5 are, in some cases, derived or reiterated directly from existing literature rather than made entirely custom, although slight customization exists to fit the broader green recovery and decarbonization context. It is also important to note that the proposed measures in Chapter 5 are meant to act more as a proposal or a suggestion rather than a complete program design, and therefore, might still require further, more technical study, and analysis upon possible program uptake and implementation.

Before diving into the specific proposed measures in Chapter 5, it is useful to look at the broad context of green recovery in Indonesia.

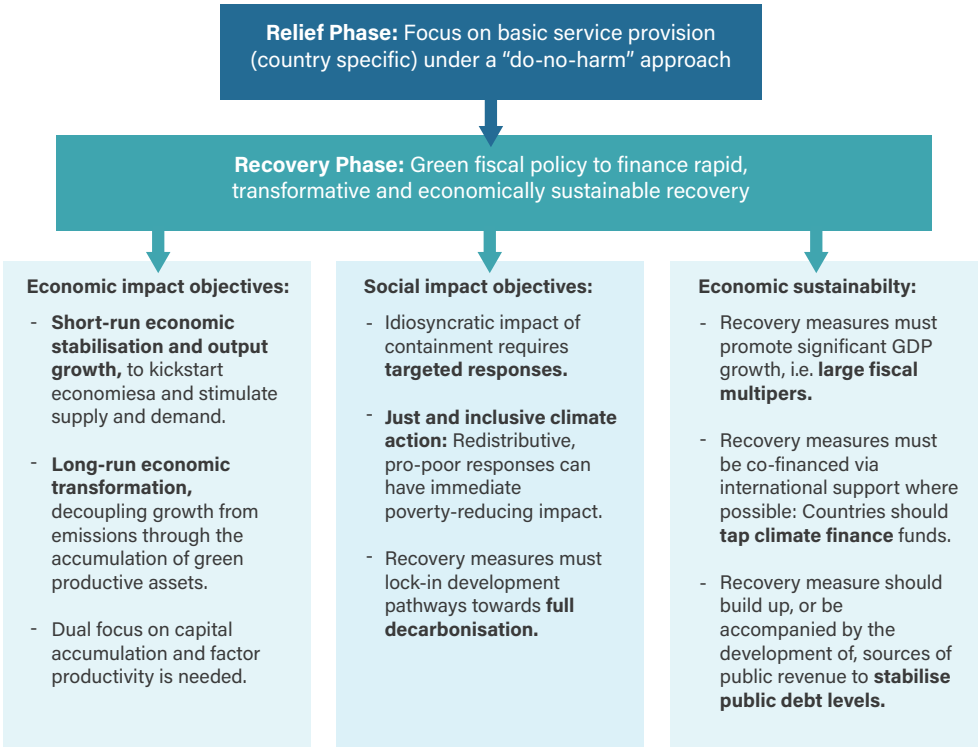
4.2 Broad context of green economic recovery in Indonesia

Green recovery measures can help recover Indonesia's economy and social development back on track, all the while setting Indonesia's climate action onto a track toward a sustainable and climate-compatible pathway. In the short-run, green recovery measures should be able to timely kickstart and stimulate the economy through job creation and increased aggregate demand. But in the long-run, green recovery measures must be able to drive green transformational change by accumulating productive assets and labor productivity gains that creates a lock-in of the economy onto a pathway toward a full decarbonization (Marquardt & Fearnehough, 2021).

Marquardt & Fearnehough (2021) further argued that progress on recovery in developing countries will be different than in developed countries. This is not only due to developing countries' limited fiscal space, but also due to the fact that economic activities remained under social restriction measures for longer, at least retrospectively, as vaccination progress in most developing countries was lagging. In such a case, countries will remain in the pandemic containment and relief phase, often characterized by rescue-type policy responses aimed at cushioning the impact of COVID-19, providing safety nets, as well as preserving healthcare and other basic services (see Figure 11). It is important to note that during this phase, it remains crucial to follow a "do no harm" approach on relief (or rescue) spending so as to avoid supporting carbon intensive industries such as with unconditional bailout or unconditional support. Once social restrictions ease, governments must then focus on recovery measures on kickstarting economies while also balancing secondary objectives such as social impact and long-term environmental/economic sustainability objectives (Figure 11).

[4] Policy focus areas can also be determined using a green recovery screening tool (SCREEN) developed by NewClimate Institute. The tool, which also takes into account the same green spending taxonomy developed by the Global Recovery Framework, can assist policymakers and analysts in selecting policy focus areas given a particular country's context and development priorities. The tool also allows users to evaluate user-defined and pre-defined recovery measures within each policy focus area with its qualitative and quantitative assessment capability. However, this was not performed in this report due to having a predetermined policy focus area and proposed measures that are highly customized, making it difficult to be input.

With that regard, the Indonesian government can tap into existing policy modeling initiatives (such as the Low Carbon Development Initiative) and current momentum (e.g., the recently put forward net-zero emissions target as well as Indonesia's G20 presidency) to build the case for implementing green economic recovery.



Source: Marquardt & Fearnehough, 2021.

Figure 11. Phases of recovery and the objectives of green recovery measures.

- First, Bappenas has noted in its green recovery roadmap that the Low Carbon Development Initiative (LCDI), at least one of the scenarios, can be the most realistic response to the current downturn that is also aligned with structural transformation towards green economy, as a part of the government's longer-term structural economic transformation strategies (Bappenas & LCDI, 2021b). While the current short-term response has not been supporting green economic recovery per se, now that Indonesia has slowly transitioned from a rescue-phase, the timing could not be better for Indonesia to start preparing for a greener economic recovery. In other words, the Indonesian government can tap into the green economy structural economic transformation pillar and the LCDI modeling as a basis of its green economic recovery plan for the longer term.
- Secondly, Indonesia has recently put forward a net-zero emissions target (by 2060 or sooner) in 2021, although it has yet to be legislated. Against that backdrop, several ministries including Bappenas and the Ministry of Energy and Mineral Resources (MEMR) have formulated a net-zero scenario modeling, in which most scenarios require a rapid uptake of renewable energy, and phasing down the use of fossil fuels, to cut emissions from the energy sector. This means that green recovery measures are well aligned with a net-zero vision. In the shorter-term, Indonesia also needs to achieve its 23% renewable energy target (in primary energy mix) by 2025, as laid out in the National Energy Policy. Meaning, Indonesia can benefit from both the short-term and long-term objectives that are not only related to economic development but also climate targets.

- Lastly, Indonesia has also taken up the mantle of 2022's G20 presidency recently, taking the theme "Recover Together, Recover Stronger" as the world is still recovering from the global pandemic crisis. Within the global pandemic landscape and its presidency, Indonesia has put forward sustainable energy transition, along with global health architecture and digital transformation, as priority issues in the upcoming G20 Summit. This makes all the more reason for Indonesia to lead and set an example for countries especially in the developing world, to walk the talk on its climate commitment from the Nationally Determined Contribution (NDC) to the net-zero target. As has been exercised in Bappenas' net-zero scenario modeling, green recovery from COVID-19 is a key first step in embracing a pathway to net-zero and making Indonesia's economy more robust, resilient, inclusive, and sustainable (Bappenas & LCDI, 2021a).

4.2.1 Green recovery context in Indonesia's power sector

As the primary mover of decarbonization of the energy system, green energy technologies, particularly clean electricity generation and its enabler technologies such as energy storage, are key to cutting emissions and achieving the net-zero target. In 2019, the electric power sub-sector represented one-third of Indonesia's total greenhouse gas (GHG) emissions in 2019, and was the primary contributor (42.8%) to GHG emissions from the energy sector in the same year (Ministry of Environment and Forestry, 2021). Therefore, cutting down emissions from electricity generation is a necessity if Indonesia were to reach its net-zero target (by 2060 or sooner) and be on track toward a climate-compatible pathway.

Indonesia's power sector situation

According to the MEMR, as of December 2021, coal still represented the lion's share (66%) of electricity generation mix, followed by gas at 17.5%, while renewables accounted for only 13.5% of total electricity generation. Variable renewable energy such as solar and wind, accounted for only less than 0.1% of total electricity generation. In installed capacity terms, coal-fired power plants represented half of the total installed power fleet, whereas renewables accounted for 15% (11.1 GW) of the entire 74 GW of total installed power capacity in 2021. Solar and wind accounted for only 0.2 GW and 0.15 GW of installed capacity, respectively (see Figure 12).

Source: Ministry of Energy and Mineral Resources (MEMR), IESR analysis

Figure 12. Indonesia's electricity generation and installed capacity in 2017–2021

Latest analysis in November 2021 from Climate Action Tracker (2021) showed that Indonesia's climate action is highly insufficient. With coal still being the primary source of electricity, Indonesia would not be able to get on track with a 1.5 °C climate-compatible pathway, let alone a 2°C world. This means that Indonesia must work to reduce its coal generation mix, while at the same time increasing its renewable electricity generation if Indonesia were to align with a climate-compatible pathway by mid-century.

4.2.2. Why rooftop solar PV is prioritized

In the context of green economic recovery, Indonesia could adopt several strategies to recover its economy, while at the same time, increasing the adoption of renewable energy in the electricity sector and taking advantage of its associated economic, social, and environmental (climate) benefits. However, it is important to distinguish between two broad adoption categories related to renewable power generation adoption in order to understand the impact and effectiveness of a particular measure.

Generally, renewable energy power generation can be largely divided into two main categories: 1) **centralized (utility-scale) generation**, and 2) **decentralized (distributed) generation**. The former's development is usually more centrally planned-driven by the government and state-utility PLN, while the latter's adoption is more market-driven—except when it was implemented by the government.

Investment measures such as direct government spending may look very different depending on which deployment model is concerned. For example, in the utility-scale[5] renewables power generation model, the Indonesian government's ability to spend directly on the project would be limited as the spending requirement is usually very large (at about $800,000 per MWp, with a minimum capacity of at least 50 MWp in order to be considered significant) to be financed *entirely* from the state budget. In practice, utility-scale projects are often financed using some type of project financing that combines private investment with a particular mix of debt and equity, rather than entirely from state budget allocation. Although that does not exclude the possibility of government spending's contribution into the mix, the impact of such spending measures are rather hard to quantify and are generally less timely as it takes years to develop projects. As discussed in Section 3.4, the government could still direct the spending for specific allocation such as for renewable projects through state equity participation (capital injection) to the state-owned enterprises such as PLN and Pertamina.

Government spending on decentralized generation (i.e. rooftop solar PV), on the other hand, tends to be less restrictive due to having smaller capital requirements. However, this usually comes at a trade-off on scale. In the following discussion of recovery options for Indonesia, the options will be mostly limited to rooftop solar PV projects, given its quick to deploy nature as well as its relatively low capital requirement, hence, much easier on government budgets. Given the nature of its installation, its impact can also be more widespread rather than centralized in one particular province. In instances where government spending (investment measures) are deemed too costly (cost far outweighs benefits), incentive measures could also be adopted to stimulate demand across sectors.

[5] Utility-scale power generation typically refers to a project that requires a power purchase agreement (PPA) between the developer (seller) and the utility (buyer), or generally state-owned utility PLN. In terms of scale, it might differ but can go as low as 5 MW to 1 MW.

5

Measures for Indonesia's green recovery

As the state of Indonesia's pandemic crisis has slowly moved from a rescue phase toward a recovery phase, the timing could not be better for Indonesia to plan for a green recovery that supports the rebuilding of a cleaner economy and paves progress toward climate action. Moreover, with Indonesia taking up the mantle of G20 presidency in 2022, Indonesia could take action and set an example to other countries, especially in the developing world, to show its commitment to transition to a low-carbon economy and making progress on climate change. This section discusses and proposes three green recovery measures on rooftop solar PV that are feasible for Indonesia, given its potential, situation, development objectives, and opportunities.

Rooftop solar PV installed at Regional Energy and Mineral Resources Office of Central Java Province
Photo courtesy: IESR 2021

Measure 1

Create a public procurement program to install rooftop solar PV at government buildings

Direct government spending on distributed energy projects, such as rooftop solar PV projects, can be readily deployed far more quickly, in the matter of four to six months, than utility-scale ones, which can take two to three years from development to commercial operation. The government could, therefore, choose to invest directly into distributed energy projects using state budget (APBN), or even regional state budget (APBD), given its relatively smaller capital requirements.

In line with the mandate to install rooftop solar PV on 30% of government buildings' rooftop area, as noted in Presidential Regulation 22/2017 on the National Energy General Plan (*Rencana Umum Energi Nasional*, "RUEN"), the government could provide a stimulus to the sector by creating a public procurement program on rooftop solar PV for government buildings, which is still largely untapped to date. In addition, the MEMR is also currently devising a rooftop solar PV installation target of **3.6 GW by 2025** as national strategic projects (*Proyek Strategis Nasional*, "PSN"), of which government buildings can play a significant role in achieving the target.

The program

The government could set up a public procurement program to install rooftop solar PV at government buildings. Echoing the same idea that Bappenas has devised in its green recovery roadmap recently, the government could start implementing the program from public buildings managed by ministries/agencies to public buildings managed by local government institutions in the next iteration. The proposal put forward by Bappenas features rooftop solar PV installation at government buildings across 70 ministries/agencies and a total of 514 local government institutions totaling 261.2 MWp in 2022–2024 (see Table 3) (Bappenas & LCDI, 2021b).

Table 3. Bappenas' rooftop solar PV on government buildings green recovery proposal

Rooftop solar installation, per agency	Capacity installation (MWp)			
	2022	2023	2024	Total
Ministries/agencies (70), @200 kWp	14	14	14	42
Provincial government (34), @200 kWp		6.8	6.8	13.6
Regencies/municipalities (514), @200 kWp		102.8	102.8	205.6
Total	**14**	**123.6**	**123.6**	**261.2**

The implementation phase proposed by Bappenas in its green recovery roadmap is as follows:

The first phase, in 2022, targets rooftop solar PV installation for public buildings managed by 70 ministries/agencies totaling 14 MWp of total capacity per year, assuming an installation quota of 200 kWp per ministry/agency. The installation for ministries/agencies is to be further extended until 2024.

The second/third phase, in 2023 and 2024, assumes an extension for installation at local government institutions (both at provincial and regency/municipal level), with the same assumed installation quota of 200 kWp per institution. This translates to 6.8 MWp of installation at 34 provincial government buildings per year and 102.8 MWp of installation from a total of 514 local government institutions per year (415 regencies, 1 administrative regency, 93 cities, and 5 administrative cities).

What are the costs?

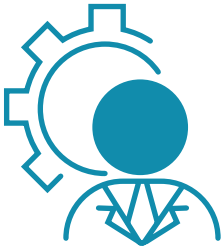
The initial phase of the program in 2022 is expected to cost Rp210 billion, assuming an average installation cost of Rp15 million per kWp of a rooftop solar PV system (Bappenas & LCDI, 2021b). For the second and third phase, it would require an additional Rp3.71 trillion, hence, totaling Rp3.92 trillion for the entire program in 2022–2024. Note that the budget allocation does not include operations and maintenance costs of running the system, which are approximately 5% of the total investment per year over the 25 years of expected lifetime of the system.

In the case where funds cannot be allocated to the program due to budgetary constraints, such as budgetary refocusing to COVID-19 handling, another adoption model could be considered. In this case, the government could adopt a long-term leasehold agreement with rooftop solar installers/developers. While previously unclear if this was possible from a public procurement perspective, at the end of January 2022, the Government Goods/Services Procurement Policy Agency (LKPP) has finally stated its support regarding the adoption of a long-term (25 years) leasehold agreement as an alternative public procurement scheme for rooftop solar installations at government/public buildings to Bappenas. The support came through an official letter from LKPP after a series of discussions on rooftop solar installations at government buildings led by Bappenas. While leasehold agreement adoption may now have been accommodated, further regulatory harmonization might be required at the ministry/agency level.v

A leasehold agreement works like a rental agreement of a rooftop solar PV system, in which the government only needs to pay for the lease fees. In return, the building can receive clean electricity, usually at a 5–10% lower tariff than the buildings' regular tariff (low-voltage P1 user group for government buildings, at Rp1,444.70). This way, the building management can save on electricity bills over the contracted lease period that can range between 15–25 years, depending on the leasehold agreement. It is important to note, however, in such a scheme, the building management does not own the rooftop solar PV system asset, but is rather owned (and operated) by the lessee (rooftop solar PV installer/developer). The government would also not be required to procure the system but only pays lease fees as an alternative electricity bill, which will be counted as bill savings.

What are the benefits?

1



Jobs support and creation

The program is projected to involve 13,060 workers for the entire program between 2022 and 2024, assuming each 200 kWp capacity installation will involve ten workers in the construction phase (Bappenas & LCDI, 2021b). The first phase is estimated to involve 700 direct jobs, whereas the subsequent phase adds up to 13,060 direct jobs. The program is also expected to stimulate or create jobs in the manufacture of solar panels and their componentry, although there is still a risk of leakage from imported components (Marquardt & Fearnehough, 2021). Beyond the procurement program, the Indonesian government could also set up a separate program to provide training, capacity building, and certification for rooftop solar PV workers (installers) as rooftop solar PV installation can be labor-intensive and can provide jobs—similar to what MEMR has done on rooftop solar PV training (PPSDM KEBTKE,

1

2021a, 2021b). In this case, human capital development for rooftop solar workers could be done through the existing vocational program on electrical installation at *Balai Latihan Kerja* (job training centers). Based on the information provided by the Directorate of Manpower of Bappenas, there are currently 12 job training centers under the Ministry of Labor and 134 job training centers at the provincial/regency/city-level, and around 2,127 training centers at community-level that can be institutionalized into rooftop solar training centers. For a conservative assumption of a 200 MWp per year rooftop solar PV installation, the direct labor needs can reach up to 4,400 workers, whereas indirect labor needs can reach 2,000 workers (IESR, 2020b). Surely the number of jobs creation potential can double or triple as the market creation assumption increases.

Aside from institutionalizing training centers, developing labor competency standards—not only for rooftop solar work but also for green jobs in general—are of equal importance. Competency standards are particularly important for training, educational, and professional certification institutions and could act as a benchmark for competency certification. The Directorate of Manpower of Bappenas, in this case, is currently developing the 'Green Jobs Occupation Map' which is meant to provide a basis for such development. Bappenas has identified at least five main function areas/subsectors: 1) agriculture, 2) manufacturing, 3) construction, 4) electricity and renewable energy, and 5) service industry and administration as subsectors most relevant to green jobs[6] in Indonesia.

2

Direct economic benefits (electricity cost savings) for the public buildings

Depending on which adoption model is selected, whether via public procurement or leasehold agreement, the economic benefits will vary. In general, a purchase scheme via public procurement practice would generate higher positive benefits (in net present value terms) than leasing a system (IESR, 2020a). This is because the overall system benefit (from avoided electricity cost) is offset by lease payment in the lease scheme, making the net cash flow smaller, albeit always in the positives (hence not having an internal rate of return or a payback period, since it does not count as an investment, but rather an operating expense). In contrast, the net cash flow generated from a purchase scheme is higher because the operating expense for lease payment is lower, hence resulting in a higher overall net present value (see Table 4). This, however, comes at a higher initial investment, which may not be suitable for the government budgets depending on the situation.

The government should, therefore, take note of the different system benefits between the two schemes when implementing the program. According to Bappenas, the entire program could save Rp411,4 billion per year under the public procurement (purchase) scheme. Besides electricity cost savings, the program is also expected to drive or

[5] According to the International Labour Organization, green jobs are "decent jobs that contribute to preserve or restore the environment, be they in traditional sectors such as manufacturing and construction, or in new, emerging green sectors such as renewable energy and energy efficiency".

2

stimulate the industry, from solar panel and its balance-of-system manufacturing, logistics for the distribution of solar panel components, installation services, and operation and maintenance services.

Table 4. Financial viability comparison between purchasing vs. leasing a rooftop solar PV system

Financial viability indicator	Purchase (owning the system)	Through lease agreement
Net present value, NPV (Rp)	Rp868,366,931.02	Rp284,180,510.07
Internal rate of return, IRR (%)	13.4%	-
Payback period (year)	8	-
Levelized cost of energy, LCOE (Rp/kWh)	Rp1,090.05	Rp1,412.73
Levelized cost of energy, LCOE (US$/kWh)	0.0762	0.0988

Source: IESR, 2020a. Rooftop solar study for BKPM. Unpublished. Notes: Assumes a 120 kWp system (1.2:1 DC/AC ratio), 1:1 net metering scheme, 7.5% discount rate, $900/kWp installation cost (US$1 = Rp14,300), electricity tariff of P1-TR group (Rp1,444.70) with an assumed 1% electricity tariff increase per year, 7.5% lower retail tariff rate for lease scheme, and daily solar irradiation output in Bali (3.93 kWh/kWp).

3

Emissions reduction

The entire program is projected to avoid a total of 267,000 tCO_2 per year or 6.6 million tCO_2 in the total 25 years of the system's lifetime, assuming a grid emission factor of 0.8 tCO_2/MWh.

Beyond the Program

Whether the government opts to go through the public procurement or through the leasehold agreement, rooftop solar PV on government buildings is an important segment to tap into if Indonesia were to decarbonize. Further, the government could also extend the program to green buildings and energy efficiency programs such as public buildings renovation and green retrofits, which are usually labor-intensive (see Box 2).

Box 2. Extending the rooftop solar PV program to green buildings and energy efficiency programs

Green buildings and energy efficiency programs can also be rolled out relatively quickly to stimulate economic activity and create labor-intensive jobs, all the while reducing overall energy demand and cutting emissions. In 2019, the buildings (residential, commercial and industrial) sector is responsible for 1.47% of Indonesia's total greenhouse gas emissions, or 4.3% of greenhouse gas emissions from the energy sector.

Policies on green buildings, however, are still pretty much limited—with little to no incentives—to a few cities like Jakarta, Bandung, and Semarang, and also several provinces such as Bali and South Sumatra (IESR, 2021c; The Jakarta Post, 2019b). The Ministry of Public Works and Public Housing (MPWPH) released a ministerial regulation (MPWPH Reg. 2/2015) on green buildings in 2015, but implementation has been slow so far due to a lack of awareness, and most probably, due to the lack of incentives to spur activity in the sector (The Jakarta Post, 2019a).

The Indonesian government could therefore maximize the opportunity in green retrofit and energy efficiency programs by creating a public procurement program for public buildings renovation, which could also feature installation of rooftop solar PV (as part of the public procurement program mentioned in the previous option). The retrofit or renovation program could include improvement in lighting, insulation, heating, ventilation, and air conditioning (HVAC) of the public buildings to increase the overall energy efficiency, which will also reduce energy bills in the long run. Since energy efficiency programs tend to be labor-intensive, this could be a good opportunity to spur economic activities in a relatively short term. On top of that, rooftop solar PV installations can further add cost savings to the electricity bills for public buildings.

Similar to the option of providing training for rooftop solar PV workers, the government could also provide training and certification for energy efficiency workers as efficiency scale-up will require a large, skilled workforce. This way, the government can fund the training in one go. Municipal governments that already have regional regulations can also support the training to hasten the effort. Examples include Bali's energy conservation strategy on green buildings under its Bali Clean Energy regulation which mandates rooftop solar PV installations on both government and private buildings, with the capacity of at least 20% of its connected power capacity or 20% of the buildings' rooftop area.

Photo: Vivint Solar/Pexels

Measure 2

Create a public procurement program to install rooftop solar PV at subsidized households' houses (*Surya Nusantara*[7] program)

Surya Nusantara is a rooftop solar PV program specifically directed toward subsidized households with the aim to increase rooftop solar PV adoption, stimulate/create jobs in the sector, and cut electricity subsidies at the same time. The program was originally proposed by IESR at the early breakout of the pandemic in April 2020 as a green recovery option for the government (IESR, 2020b).

[7] *Surya Nusantara* is IESR's proposal to accelerate Solar PV Rooftop installation as Indonesia's green recovery strategy post-Covid. For more info on this proposal, please refer to this policy brief.

The program

The program aims to procure and install rooftop solar PV systems at subsidized households' houses (PLN's 450 VA and subsidized 900 VA user groups), with an annual installation target of 1 GWp until at least 2025 to meet the government's 3.6 GW PSN target. This would be translated into an installation of 500,000~600,000 rooftops per year, assuming an average installation of 1.5~2 kWp per individual household and considering average monthly electricity consumption of 70 kWh and 100 kWh for 450 VA and subsidized 900 VA users, respectively.

What are the costs?

At 1 GWp target installation per year, the program would require a state budget allocation of Rp14~15 trillion (~$1 billion), assuming an average system price of Rp14~15 million per kWp. If the program is scheduled to run from 2023 to 2025, it would therefore amount to Rp45 trillion ($3 billion) in total.

Given the budgetary constraints due to COVID-19 handling, the government could opt for a lower annual installation target in the first years of the implementation. For example, in 2023 the government could set 250 MWp as a target, to then increase the annual installation to 500 MWp in 2024, and then 1 GWp in 2025.

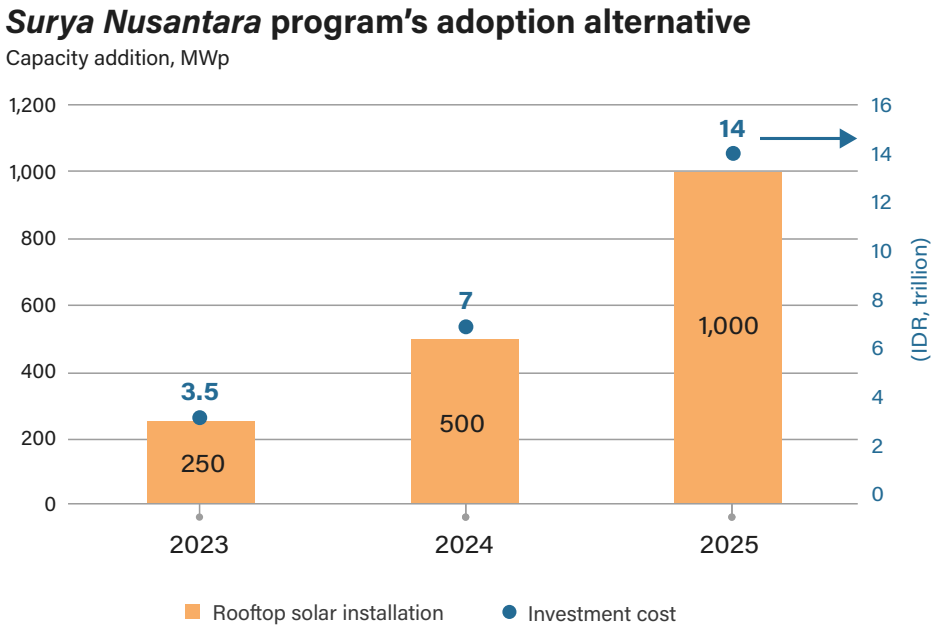
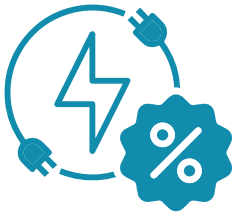


Figure 13. *Surya Nusantara* program's adoption alternative and its required cost

What are the benefits?

1

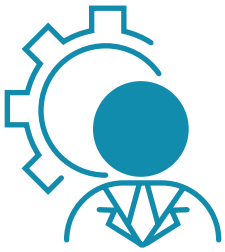


Electricity subsidy cut

By installing rooftop solar PV, targeted households whose tariffs are heavily subsidized can generate a certain percentage of their electricity from rooftop solar PV through a net metering mechanism (as regulated by MEMR Reg. 49/2018 regarding the Use of Rooftop Solar Power Plant System by PT Perusahaan Listrik Negara (Persero)'s Consumers as revised by MEMR Reg. 26/2021 regarding Rooftop Solar Power Plant that is Connected to Electricity Supply Business License Holders' Power Grid for General Use) and therefore can save electricity subsidy from the state budget allocation at Rp1,3 trillion per year, assuming an annual installation of 1 GWp, according to IESR analysis (IESR, 2020b). Over its 25 years of economic lifetime, the 1 GWp installation alone has the potential to bring a total of Rp32.5 trillion (without discounting) of electricity subsidies cut.

It is important to note that electricity subsidy amounted to Rp34 trillion ($2.4 billion) in 2019 and has seen an increase to Rp60 trillion ($4.2 billion) in 2020 due to compensation payments to the energy safety nets stimulus that exempts (or discounts) subsidized households from electricity tariffs as discussed in Section 2.3 (Ministry of Energy and Mineral Resources, 2021). This electricity subsidy reduction potential is, therefore, in some sense, a kind of a subsidy reform. It is also important to note that the funding for the program is, therefore, already "available" due to this transfer of subsidy scheme.

2



Jobs and economic development benefits

In addition to state-budgetary benefits, the program could create up to 22,000 direct jobs and 10,000 indirect jobs, mostly in the construction and manufacturing industries, which the government could provide training to (IESR, 2020b, NREL & USAID, 2020). More importantly, the program could also help foster the domestic solar photovoltaic (PV) module industry. Currently, the domestic PV module manufacturer faces an underutilization issue. Local solar manufacturing association (APAMSI) stated that it has only been able to utilize 5-10% of its 500 MWp annual production capacity (IESR, 2021b). With the 1 GWp annual installation target, the program could definitely foster domestic manufacturing capability as well as attracting foreign direct investment when the market is deemed large enough.

3

Emissions reduction

At 1 GWp of annual installation, the program could contribute to 1.05 million tCO_2 reduction per year, or 25 million tCO_2 over its 25 years of economic lifetime.

Broader consideration

When considering the program, it is important to consider the following:

1 Target group

The proposed target group for the program is poor and vulnerable households, which is proxied by PLN's subsidized household users (R-1/450 VA and subsidized R-1/900 VA) data. As of July 2020, PLN recorded that there were 25 million and 7.5 million household users of 450 VA and subsidized 900 VA, respectively (Ministry of Energy and Mineral Resources, 2020).

To further consider the target group's priority, however, policymakers should be mindful of the potential mismatch between PLN's subsidized household user groups and the Ministry of Social Affairs' Integrated Social Welfare Data, or *Data Terpadu Kesejahteraan Sosial* (DTKS), as some of the subsidized household users may not be necessarily of "poor households" category. For example, out of the 25 million 450 VA household users, only 9.3 million are included in the Ministry of Social Affairs' DTKS, according to the MEMR's official (Katadata, 2021). Discussion to match and verify the data has been underway since 2021, albeit to no decision thus far (Katadata, 2021). To make the program effective and reach its appropriate target, cross-sectoral coordination and matching of the database are therefore crucial.

2 Wider impact and correlation to other ongoing government program

A similarly-themed government program to divert energy subsidies, in this case to reduce liquefied petroleum gas (LPG) use/subsidy—and hence imports—by encouraging the use of electric induction stove, is also underway (Katadata, 2022). One of the technical challenges in adopting the conversion program is that subsidized households' power connection should be upgraded to at least 2200 VA (from either 450 or 900 VA). Normally, this would mean that these households will stop getting subsidized because they changed their tariff group to a non-subsidized one. However, PLN did put forward an idea to keep the electricity tariff for the targeted poor households at the same rate, also in accordance with the Ministry of Social Affairs' DTKS, so that the poor can benefit from the electric stove conversion program and not lose their subsidized electricity tariff (Katadata, 2022).

Upgrading power connection whilst maintaining the subsidy tariff rate will also benefit the rooftop solar PV installation, as the maximum power connection a person can install is tied to the installed power connection. For example, a 450 VA-power connected household can only install a maximum 100% of that installed power connection, or 450 Wac (from the inverter output). An upgrade to 2,200 VA will benefit the household more because it can install larger rooftop solar PV capacity (up to 2,750 kWp/2,200 Wac, due to the DC/AC conversion of 1.25). This means that the target household can produce more electricity during the day, hence lowers its electricity consumption from the grid (lowering allocated electricity subsidy as a result). Importantly, further system-wise cost-benefit analysis should also be taken when considering implementation in a particular region or system.

Photo: Kindel Media/Pexels

Measure 3

Incentivize small-scale rooftop solar PV adoption

In the instances where the government's ability to allocate funds for public procurement programs are limited, the government could opt for stimulating the economy through incentive measures instead. The government could incentivize small-scale rooftop solar PV adoption, particularly in the residential sector, to stimulate spending and growth in the nascent and promising sector.

The program

Generally, there are two ways the government can incentivize rooftop solar PV adoption:

- **Financial incentives**, such as purchase subsidies, are one of the more straightforward incentives to increase the adoption of rooftop solar PV. A CAPEX subsidy can directly affect the economic case of adopting rooftop solar PV, hence stimulating economic activity in the sector. Financial incentives for rooftop solar PV could also include indirect financial incentives such as the provision of free bi-directional energy meters (colloquially "kWh export–import meter") for net metering purposes, thereby incentivizing potential adopters. In 2020, South Korea doubled the purchase subsidy for rooftop solar PV to cover up to 80% of installation costs, making it one of the most generous financial incentive programs in the world (BloombergNEF, 2020). However, given limited financial resources, financial incentives might not always be a viable option, in which case the government might opt for fiscal/tax incentives instead.

Box 3: Ongoing performance-based rooftop solar PV incentive plan

Since mid-2021, the energy ministry has been working with several development partners on a performance-based payment (voucher) incentive scheme through a climate fund "sustainable energy fund (SEF)". The incentive scheme is targeted for PLN's customers who are going to install rooftop solar PV, including households, small businesses (SMEs), small-to-medium industry, and social (public school, hospitals, and place of worship). The incentive is targeted to reach 5 MWp of rooftop solar PV installed capacity, targeting 1,296 users, where 2.8 MW is allocated for 715 SMEs users. The total allocation for the incentive scheme was Rp23 billion, which is expected to bring a total of Rp67.5 billion in rooftop PV solar investment. The program is slated for implementation in February 2022, but could well be extended to target a more ambitious target in the following implementation years (2023–2025).

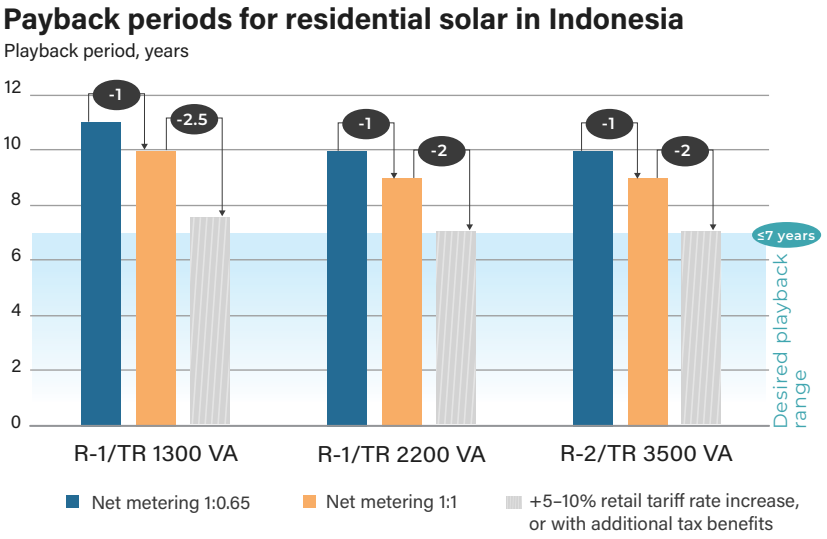
- **Fiscal incentives** can also be used to increase the attractiveness (economic case) of rooftop solar PV adoption, and hence, stimulate economic activity in the sector. This could include tax breaks on land and building tax (*pajak bumi bangunan*) if the house is equipped with rooftop solar PV, or in other forms of tax rebates, although the latter might be more complex to implement. Italy, for instance, increases their income tax rebate for rooftop solar PV systems (under 20 kWp) from 50% of CAPEX to 110% if installed during a "green home renovation program" (BloombergNEF, 2020). That said, fiscal incentives tend to have a delayed effect before they feed through to the economy, and hence may be less timely than financial incentives.

Through a combination of the two, the government could design incentives to increase the attractiveness of rooftop solar PV. Note that the attractiveness, as in the economic case, of rooftop solar PV might differ across the user tariff groups: residential, business/ commercial (including SMEs), industrial and social tariff groups. Generally, large commercial & industrial (C&I) users do not require further incentives to increase the economic case of adopting rooftop solar PV as there is already a viable business model for them (IESR, 2021b) (see "Beyond the program" below). For that reason, the program should be aimed specifically toward residential and small businesses groups instead.

What are the benefits?

The benefits of incentivizing residential rooftop solar PV through financial and/or fiscal incentives depend on how much success the incentives could bring in terms of the adoption. Since the release of MEMR 49/2018, installed rooftop solar PV capacity has been growing albeit at a snail's pace. At the current historical growth rate (2018–2021), residential solar is growing by an average of 2~4 MWp per year, with about 1,000~1,200 new users per year (IESR, 2021b). This number pales in comparison when looking at Indonesia's total residential solar potential that ranges between 194–655 GWp (IESR, 2019).

According to IESR analysis, homeowners prefer to have a payback period of seven years or faster when installing a rooftop solar PV system (IESR, 2021b). The recent regulatory update (MEMR 26/21) has brought the payback faster by at least a year, but more incentives could still be provided to push the payback period further down to seven years range (see Figure 14).



Source: IESR, 2021. Indonesia Energy Transition Outlook 2022

Figure 14. Payback period analysis for residential solar in Indonesia

Incentivizing the residential solar sector, therefore, could bring about job support and creation. At the current 4 MWp of annual capacity addition, it is estimated that it would involve at least 200 direct jobs (50 direct jobs per megawatt of installed capacity). While it is very difficult to predict the growth rate in the coming years, a tripling growth rate (12 MWp of annual capacity addition) could, therefore, bring about 600 direct jobs and an estimated 270 indirect jobs. In economic terms, the 12 MWp addition would translate to Rp174 billion of investment.

What are the costs?

The cost for running the incentive programs varies depending on the scheme chosen. To get a sense of how big the financial requirements are, a proxy from the ongoing financial incentive is used (see Box 3). In the ongoing formulation of a performance-based incentive, a total of Rp23.6 billion is allocated for 1,296 users totaling 5 MWp of rooftop solar PV capacity, which is expected to bring in at least Rp67.5 billion in investment. The allocation varies depending on priorities given to a specific user group or a particular segment as seen in Table 5. Further analysis needs to be performed to determine which segment can potentially generate the highest impact, in which case the estimated total targeted recipients can be increased, and the voucher allocation can be increased. For instance, if households segment were to be targeted, then the total targeted recipients and total allocation can be increased to meet a certain target.

Table 5. Allocation for the ongoing formulation of performance-based incentive. Source: UNDP, MEMR.

User group	Power connection (kVA)	Voucher (Rp)	Total targeted recipients	Total allocation (Rp)	Estimated total installed capacity (MWp)
Households (R1-R3)	1.3 ~ 5.5	1,450,000/kWp	250	725,000,000	0.5
Business (B2)	6.6 ~ 200	6,750,000/5 kWp	30	810,000,000	0.6
Business (B1)	1.3 ~ 5.5	5,400,000/kWp	450	4,860,000,000	0.9
Industry (I1)	>14 ~ 200	45,000,000/10 kWp	140	6,370,000,000	1.4
Industry (I2)	2.2 ~ 14	10,400,000/2 kWp	125	2,600,000,000	0.5
Social (S2)	>50 ~ 200	77,000,000/10kWp	43	3,311,000,000	0.4
Social (S2)	3.5 ~ 50	23,100,000/3 kWp	186	4,296,600,000	0.5
Social (S2)	1.3 ~ 2.2 kVA	9,100,000/kWp	72	655,200,000	0.1
Total			**1,295**	**Rp23.6 billion**	**4.9**

Channeling mechanism

The SEF grant program uses a performance-based payment mechanism (using an e-voucher) to disburse the cashback incentive. Applicants must pass the verification stage for meeting the requirements and criteria that have been determined. If the application is approved (after installation is complete), the incentive will be paid in full once by bank transfer based on the value of the e-voucher.

Potential sources of funds

Potential sources of funds to extend the program are generally limited to grants from impact/climate funds such as the Green Climate Fund (GCF) as well as grants from donors (philanthropic activity). Depending on the size of the program, government budgets may also be a potential source of funds.

Beyond the program

Cutting red tape for large C&I rooftop solar PV projects

Large commercial & industrial (C&I) rooftop solar PV projects generally do not require additional incentives to increase their economic case as there are already viable business models (e.g., lease option or performance-based renting) for the adoption (IESR, 2021b). However, in many instances, there are still bottlenecks in the licensing and grid interconnection to PLN (possibly due to potential revenue loss), hindering the construction to start (The Jakarta Post, 2022). The government could, therefore, fast-track and cut red tape for these projects as a COVID-19 stimulus, thereby allowing the flow of money in the supply chain.

Other Measures

Outside the three options discussed previously, there are two other measures that the government could consider to kickstart and boost a green economic recovery in the short- to medium-term. They are, however, harder to quantify and therefore its potential are only discussed here as general, normative ideas, rather than being a program.

Assign green conditions for state equity participation (to PLN in particular)

When considering state equity participation (capital injection), the government could require recipients to fulfill certain green conditions. As previously discussed in Section 2.3, this could include allocation toward renewable energy projects development, but it can also include transmission and distribution (T&D) grid infrastructure upgrade so long as it fulfills the green conditions, such as to improve reliability for variable renewable energy integration. Supporting project development is critical in creating "shovel-ready" project pipelines for PLN to auction under its procurement plan (RUPTL).

Accelerate utility-scale solar PV using systematic renewable energy auctions

In the economic recovery context, some renewable energy projects such as solar projects can be developed and deployed rather quickly and can create jobs in the short-to-medium term (1–3 years) compared to other technologies. With regard to the utility-scale projects mentioned earlier, it will require a strong central planning from state-owned utility PLN and the MEMR to allocate renewables power generation in PLN's electricity supply business plan, or *Rencana Usaha Penyediaan Tenaga Listrik* (RUPTL). In RUPTL 2021–2030, planned solar capacity is increased to 4.7 GW (from 0.9 GW in RUPTL 2019–2028), a five times increase. However, tenders will still likely be carried out individually and sporadically using one-off auctions, based on previous experience (IESR, 2021a). In this regard, the government can work with PLN to set up or establish a systematic (scheduled) solar auctions to send a positive market signal and to benefit from a competitive tariff an auction can reveal (IESR, 2021a).

6

Conclusion and Policy Recommendations

Conclusion

Indonesia is still fighting to contain the spread of the more transmissible Omicron variant since its discovery at the end of 2021. Despite the looming fear of Omicron, Indonesia has actually been quite successful in dampening the previous impact of the more severe Deltra variant as shown by its annual economic growth figure in 2021 (3.69%) compared to 2020 (-2.07%). However, this report found that Indonesia's national economic recovery has only prioritized short-term recovery measures and failed to make use of the opportunity to plan for a green economic recovery. This is shown by:

- Of the 2020 PEN program allocation (Rp 695 trillion), only 1.2% (Rp7.78 trillion) was allocated toward energy transition-related (green recovery) initiatives, mostly in the form of state capital injection to PLN and Pertamina.
- Of the 2021 PEN program allocation (Rp744.8 trillion), only Rp7.03 trillion (0.94%) was allocated to low-carbon development initiatives, through ministries/agencies priority program.

Policy Recommendations

Building upon existing studies and initiatives, this report synthesized several green recovery measures from the power sector by focusing on accelerating the adoption of rooftop solar PV, given its quick-to-deploy and labor-intensive nature as well as its potential in supporting the power sector's decarbonization. The government could consider the following measures as green recovery initiatives:

1. **Creating a public procurement program to install rooftop solar PV at government buildings** (with 13,060 jobs support and creation potential and 0.26 million tCO_2 reduction per year);
2. **Creating a public procurement program to install rooftop solar PV at subsidized households' houses** (with 32,000 jobs support and creation potential, 1 million tCO_2 reduction per year, plus an additional Rp1,3 trillion electricity subsidy savings per year from state budget);
3. **Incentivizing small-scale rooftop solar PV adoption through a combination of financial or fiscal incentives** (with 870 jobs creation and Rp174 billion of investment, given a tripling growth rate from the current projection).

Outside the three measures, the government could also consider: i) **cutting red tape for large C&I rooftop solar PV projects**, ii) **assigning green conditions for state equity participation to PLN** to support renewable energy project development; and iii) **accelerating utility-scale solar deployment using systematic (scheduled) auctions** to accelerate solar growth and bring in massive investment and job creation. As the market grows, Indonesia could also receive wider economic benefits, such as growing its domestic solar PV value chain.

To further design the project of the proposed measures, more detailed and technical analyses might still be required. Policymakers could first consider: 1) short-term and long-term economic and social impact objectives, 2) existing initiatives to see where synergistic opportunities may exist, 3) target group priorities, and 4) budget fits to determine which measures are more feasible. Of equal importance is to establish a clear definition of green spending (or budgeting) as a reference for near-future development planning and policy making, as it often becomes a constraint when it comes to state budgeting.

In conclusion, rooftop solar PV, given its quick-to-deploy and labor-intensive nature, offers huge potential for both short-term economic recovery and long-term emissions reduction benefits. With the right support, accelerating rooftop solar PV can be key to a greener, national economic recovery and support decarbonization in the long term.

References

Bappenas & LCDI. (2021a). *A Green Economy for a Net-Zero Future: How Indonesia can build back better after COVID-19 with the Low Carbon Development Initiative (LCDI)*. https://lcdi-indonesia.id/wp-content/uploads/2021/10/GE-Report-English-8-Oct-lowres.pdf

Bappenas & LCDI. (2021b). *Green Recovery Roadmap Indonesia 2021–2024: Building Back Better Low Carbon Development Post-COVID19. Bappenas and Low Carbon Development Indonesia (LCDI)*. https://lcdi-indonesia.id/wp-content/uploads/2021/10/Green-Recovery-Roadmap-REV-10-Oct-lowres.pdf

BloombergNEF. (2020). *Green Stimulus: Life, But Not As We Know It*. Bloomberg Finance L.P. https://data.bloomberglp.com/professional/sites/24/BloombergNEF-Green-Stimulus-Life-But-Not-As-We-Know-It.pdf

Cabinet Secretariat of the Republic of Indonesia. (2022, January 16). *Pemerintah Siapkan Rp451 Triliun untuk Program Pemulihan Ekonomi Nasional*. Sekretariat Kabinet Republik Indonesia. https://setkab.go.id/pemerintah-siapkan-rp451-triliun-untuk-program-pemulihan-ekonomi-nasional/

Climate Action Tracker. (2021, November). *Indonesia's Climate Action Country Summary*. https://climateactiontracker.org/countries/indonesia/

COVID-19 Handling Task Force. (2021). *Peta Sebaran COVID-19*. Covid19.Go.Id. https://covid19.go.id/peta-sebaran-covid19

CPI & SNU. (2021). *Leveraging fiscal stimulus to improve energy transition: Case of South Korea and Indonesia.* Climate Policy Initiative. https://www.climatepolicyinitiative.org/publication/leveraging-fiscal-stimulus-to-improve-energy-transition-case-of-south-korea-and-indonesia/

Energy Policy Tracker. (n.d.). *Public money commitments to fossil fuels, clean and other energy in Indonesia recovery packages since January 2020, USD billion, as of 15 September 2021.* Energy Policy Tracker. Retrieved September 17, 2021, from https://www.energypolicytracker.org/country/indonesia/

IESR. (2019). *Residential Rooftop Solar: Technical and Market Potential in 34 Provinces in Indonesia*. http://iesr.or.id/pustaka/residential-rooftop-solar-potential-in-34-provinces-in-indonesia/

IESR. (2020a). *Kajian investasi PLTS Atap sektor komersial di Bali untuk BKPM*. Unpublished.

IESR. (2020b). *Akselerasi Pembangunan PLTS Atap Sebagai Strategi Green Economic Recovery Pasca-COVID19 di Indonesia*. https://iesr.or.id/pustaka/policy-brief-akselerasi-pembangunan-plts-atap

IESR. (2021a). *Hitting Record-Low Solar Electricity Prices in Indonesia*. Institute for Essential Services Reform (IESR).

IESR. (2021b). *Indonesia Energy Transition Outlook 2022: Aiming for Net-Zero Emissions by 2050.* Institute for Essential Services Reform (IESR). https://iesr.or.id/en/pustaka/indonesia-energy-transition-outlook-ieto-2022

IESR. (2021c). *Indonesia Energy Transition Outlook 2021: Tracking Progress of Energy Transition in Indonesia*. Institute for Essential Services Reform. https://iesr.or.id/en/pustaka/indonesia-energy-transition-outlook-ieto-2021

IESR, Agora Energiewende, & LUT University. (2021). *Deep decarbonization of Indonesia's energy system: A pathway to zero emissions by 2050*. Institute for Essential Services Reform (IESR). https://iesr.or.id/en/pustaka/deep-decarbonization-of-indonesias-energy-system-a-pathway-to-zero-emissions-by-2050

IISD. (2021). *How Indonesia Can Achieve Both a COVID-19 Recovery and Its Climate Targets (p. 15)*. International Institute for Sustainable Development (IISD). https://www.iisd.org/system/files/2021-10/indonesia-achieve-covid-19-recovery-climate-targets.pdf

IMF. (2020a). *World Economic Outlook, April 2020: The Great Lockdown*. International Monetary Fund (IMF). https://www.imf.org/en/Publications/WEO/Issues/2020/04/14/weo-april-2020

IMF. (2020b). *Special Series on Fiscal Policies to Respond to COVID-19: Greening the Recovery.* International Monetary Fund (IMF). https://www.imf.org/~/media/Files/Publications/covid19-special-notes/en-special-series-on-covid-19-greening-the-recovery.ashx

IMF. (2021a). *World Economic Outlook Update, July 2021: Fault Lines Widen in the Global Recovery*. International Monetary Fund (IMF). https://www.imf.org/en/Publications/WEO/Issues/2021/07/27/world-economic-outlook-update-july-2021

IMF. (2021b). *World Economic Outlook, October 2021: Recovery During A Pandemic.* https://www.imf.org/en/Publications/WEO/Issues/2021/10/12/world-economic-outlook-october-2021

IMF. (2022). *World Economic Outlook Update, January 2022: Rising Caseloads, A Disrupted Recovery, and Higher Inflation.* IMF. https://www.imf.org/en/Publications/WEO/Issues/2022/01/25/world-economic-outlook-update-january-2022

Katadata. (2021, June 4). *Subsidi Listrik Tak Tepat Sasaran, ESDM Sisir Data Pelanggan 450 VA*. https://katadata.co.id/happyfajrian/berita/60b9d1857984d/subsidi-listrik-tak-tepat-sasaran-esdm-sisir-data-pelanggan-450-va

Katadata. (2022, February 14). *Pemerintah Akan Subsidi Rp 1 Juta/KK untuk Konversi Kompor Listrik.* https://katadata.co.id/happyfajrian/ekonomi-hijau/620a672b70d00/pemerintah-akan-subsidi-rp-1-jutakk-untuk-konversi-kompor-listrik

Kompas. (2021, September 1). *PPKM Berlanjut, BI Tetap Proyeksi Pertumbuhan Ekonomi Indonesia di Kisaran 3,5—4,3 Persen Halaman all*. KOMPAS.com. https://money.kompas.com/read/2021/09/01/195407726/ppkm-berlanjut-bi-tetap-proyeksi-pertumbuhan-ekonomi-indonesia-di-kisaran-35

Marquardt, M., & Fearnehough, H. (2021). *Economic stimulus of climate action in developing countries*. https://newclimate.org/2021/08/25/screen-tool-and-framework/

Ministry of Energy and Mineral Resources. (2020, August). *Pemberian Stimulus COVID-10 Melalui Diskon Tarif Tenaga Listrik*. Presentasi Direktorat Jenderal Ketenagalistrikan.

Ministry of Energy and Mineral Resources. (2021, June 17). *Indonesian Government Perspective on Energy Subsidy Reform.* International Experience on Energy Subsidy Reforms: How can Indonesia lead the way? https://www.iisd.org/gsi/news-events/international-experience-energy-subsidy-reforms-indonesia

Ministry of Environment and Forestry. (2021). *Laporan Inventarisasi Gas Rumah Kaca, Monitoring, Pelaporan, dan Verifikasi 2020*. http://ditjenppi.menlhk.go.id/reddplus/images/adminppi/dokumen/igrk/LAP_igrk2020.pdf

Ministry of Finance. (2021, July 15). *Realisasi Program PEN Tahun 2020 Capai Rp575,8 Triliun*. Kementerian Keuangan. https://www.kemenkeu.go.id/publikasi/berita/realisasi-program-pen-tahun-2020-capai-rp575-8-triliun/

NREL & USAID. (2020). *Distributed Photovoltaic Economic Impact Analysis in Indonesia* (NREL/TP--7A40-75281, 1602706, MainId:19621; p. NREL/TP--7A40-75281, 1602706, MainId:19621). https://doi.org/10.2172/1602706

O'Callaghan, B. J., & Murdock, E. (2021). *Are We Building Back Better? Evidence from 2020 and Pathways for Inclusive Green Recovery Spending.* Smith School of Enterprise and the Environment, University of Oxford. https://www.unep.org/resources/publication/are-we-building-back-better-evidence-2020-and-pathways-inclusive-green

O'Callaghan, B., Murdock, E., & Yau, N. (2021). *Global Recovery Observatory: Draft Methodology Document.* https://recovery.smithschool.ox.ac.uk/wp-content/uploads/2021/03/20210201-Global-Recovery-Observatory-Draft-Methodology-Document-.pdf

OECD. (2021). Coronavirus (COVID-19) vaccines for developing countries: An equal shot at recovery. https://www.oecd.org/coronavirus/policy-responses/coronavirus-covid-19-vaccines-for-%20developing-countries-an-equal-shot-at-recovery-6b0771e6/

Our World in Data. (n.d.). *Coronavirus Pandemic (COVID-19)*. Our World in Data. Retrieved January 17, 2022, from https://ourworldindata.org/covid-cases

PPSDM KEBTKE. (2021a, November). *Pelatihan Instalasi Pembangkit Listrik Tenaga Surya Atap (PLTS Atap) Untuk Rumah Tinggal*. https://ppsdmkebtke.esdm.go.id/berita/ppsdm-kebtke-selenggarakan-pelatihan-instalasi-rooftop-photovoltaic-untuk-rumah-tinggal-tXXtI

PPSDM KEBTKE. (2021b, November). *Pelatihan Studi Kelayakan Pembangkit Listrik Tenaga Surya Atap (PLTS Atap)*. https://ppsdmkebtke.esdm.go.id/berita/plts-rooftop-merupakan-solusi-yang-handal-bagi-penyediaan-energi-AztB4

Statistics Indonesia. (2021). *Berita Resmi Statistik Triwulan III, 2021*. https://www.bps.go.id/website/materi_ind/materiBrsInd-20211105101025.pdf

Statistics Indonesia. (2022, February). *Berita Resmi Statistik Triwulan IV, 2021*. https://www.bps.go.id/pressrelease/2022/02/07/1911/ekonomi-indonesia-triwulan-iv-2021-tumbuh-5-02-persen--y-on-y-.html

The Jakarta Post. (2019a, March 14). *Lack of awareness for green buildings in Jakarta.* The Jakarta Post. https://www.thejakartapost.com/news/2019/03/14/lack-of-awareness-for-green-buildings-in-jakarta.html

The Jakarta Post. (2019b, December 9). *Indonesia makes good progress in green building*. The Jakarta Post. https://www.thejakartapost.com/news/2019/12/09/indonesia-makes-good-progress-green-building.html

The Jakarta Post. (2020, March 2). *Jokowi announces Indonesia's first two confirmed COVID-19 cases.* The Jakarta Post. https://www.thejakartapost.com/news/2020/03/02/breaking-jokowi-announces-indonesias-first-two-confirmed-covid-19-cases.html

The Jakarta Post. (2022, February 16). *15 companies unable to get solar PV permits: Association.* The Jakarta Post. https://www.thejakartapost.com/business/2022/02/16/15-companies-unable-to-get-solar-pv-permits-association.html

WHO. (n.d.). *Timeline: WHO's COVID-19 response*. Retrieved January 17, 2022, from https://www.who.int/emergencies/diseases/novel-coronavirus-2019/interactive-timeline

About CASE

The program “Clean, Affordable, and Secure Energy for Southeast Asia (CASE) is jointly implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH and international and local expert organizations in the area of sustainable energy transformation and climate change: Agora Energiewende and NewClimate Institute (regional level), the Institute for Essential Services Reform (IESR) in Indonesia, the Institute for Climate and Sustainable Cities (ICSC) in the Philippines, the Energy Research Institute (ERI) and Thailand Development Research Institute (TDRI) in Thailand, and Vietnam Initiative for Energy Transition (VIET) in Vietnam. The DOE is the political partner of CASE in the Philippines and REMB is its main implementing partner bureau. Funded by the German Federal Ministry of the Environment, Nature Conservation and Nuclear Safety (BMU), CASE aims to support a narrative change in the region’s power sector towards an evidence-based energy transition, in the pursuit of the Paris Agreement goals. The program makes use of available research initiatives while generating new evidence grounded in local realities that can influence economic managers, power sector decision makers, industry leaders and electricity consumers to support early, speedy, and responsive strategic reforms in the power sector. To reach this objective, the program applies a joint fact-finding approach involving expert analysis and dialogue to work towards consensus by converging areas of disagreement. Furthermore, CASE is an aligned program of the Energy Transition Partnership (ETP), an alliance of international donors, philanthropies, and partner governments established to accelerate energy transition and to support sustainable development goals in Southeast Asia

About GIZ

The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH is owned by the German government and has operations around the globe. GIZ provides services in the field of international cooperation for sustainable development. GIZ also works on behalf of other public and private sector clients both in Germany and overseas. These include the governments of other countries, the European Commission, the United Nations, and other donor organizations. GIZ operates in more than 120 countries and employs approximately 22,000 staff worldwide.

About IESR

Institute for Essential Services Reform (IESR) is a think-tank in the field of energy and environment, IESR encourage transformation into a low carbon energy system by advocating a public policy that rests on data-driven and scientific studies, conducting capacity development assistance, and establishing strategic partnerships with non-governmental actors.

About Directorate of Electricity, Telecommunications and Informatics -- Ministry of National Development Planning/National Development Planning Agency (Bappenas)

The Directorate of Electricity, Telecommunications and Informatics has the task of coordinating, formulating and implementing policies, as well as monitoring, evaluating, and controlling national development plans in the fields of electricity, telecommunications, and informatics. The Directorate is CASE Political Partner in Indonesia.

CASE
for Southeast Asia

Clean, Affordable and Secure Energy for Southeast Asia

caseforsea.org

Kementerian PPN/ Bappenas

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

IESR Institute for Essential Services Reform