COALITION FOR URBAN TRANSITIONS

SEIZING INDONESIA'S URBAN OPPORTUNITY

COMPACT, CONNECTED, CLEAN AND RESILIENT CITIES AS DRIVERS OF SUSTAINABLE DEVELOPMENT

About the Seizing the Urban Opportunity series

This series, a collaborative effort by more than 36 organisations across five continents brought together by the Coalition for Urban Transitions, is being launched as a call to action ahead of COP26 in Glasgow. Our aim is to provide insights from six emerging economies demonstrating how fostering zero-carbon, resilient and inclusive cities can advance national economic priorities for shared prosperity for all.

This report focuses on how to seize the urban opportunity in Indonesia. It was informed by inputs from a webinar held on 6 November 2020 with speakers from national government and participants from a range of organisations.

The Coalition for Urban Transitions is a global initiative to support national governments in transforming cities to accelerate economic development and tackle dangerous climate change. Collectively, the contributors hope this report will provide the evidence and confidence that national governments need to submit more ambitious Nationally Determined Contributions in 2021 and to propel inclusive, zero-carbon cities to the heart of their COVID-19 economic recovery and development strategies.

Disclaimer

The analysis, arguments and conclusions presented here are a synthesis of the diverse views of the authors, contributors and reviewers and is an 18-month research effort building on the Coalition's 2019 *Climate Emergency, Urban Opportunity* report. The Coalition takes responsibility for selecting the areas of research. It guarantees its authors and researchers freedom of inquiry, while soliciting and responding to the guidance of advisory panels and expert reviewers. Coalition partners, some as organisations and others as individuals, endorse the general thrust of the arguments, findings and recommendations made in this report, but the text does not necessarily reflect the personal views or official policies of any of the contributors or their members.

Lead partner

WRI INDONESIA

Managing partners

WORLD RESOURCES INSTITUTE | WRI ROSS CENTER FOR SUSTAINABLE CITIES | C40 CITIES

A special initiative of

THE NEW CLIMATE ECONOMY
The Global Commission on the Economy and Climate

In partnership with

GLOBAL COVENANT of MAYORS for CLIMATE & ENERGY | THE RESILIENCE SHIFT | CIFF CHILDREN'S INVESTMENT FUND FOUNDATION | IKATAN AHLI PERENCANAAN INDONESIA IAP

Funded by

UK Government

This material has been funded by the UK government; however, the views expressed do not necessarily reflect the UK government's official policies.

CONTENTS

FIGURES

EXECUTIVE SUMMARY

Indonesia is urbanising rapidly, with about 55% of its population in urban areas as of 2018, up from 42% in 2000. By 2050, almost three-quarters of Indonesians are expected to live in cities. Urban areas produced nearly 60% of GDP in 2010–2016, and metro Jakarta alone, nearly a quarter. Yet Indonesia has not reaped the full rewards of urbanisation. A World Bank analysis found that for every percentage-point increase in the urban population share, Indonesia's GDP per capita rose by only 4%, versus 10% in China and 8% in Vietnam.

Cities have struggled to keep up with demand for basic services such as piped water and modern sanitation, especially for the poor. Indonesia also has a major housing deficit and affordability crisis, and its cities are plagued by traffic congestion and air pollution.

Urban expansion has consumed large swaths of cropland as well as vital ecosystems such as mangroves that store carbon and provide crucial buffers during coastal storms. Rapid land subsidence due to wetland drainage and uncontrolled groundwater abstraction has created severe flood risks, which climate change is exacerbating.

Indonesia is embracing nature-based solutions to build resilience and boost carbon storage and has set up a Low Carbon Development Initiative. It is also building social resilience by increasingly engaging residents of kampungs, or informal settlements, in flood management, community planning and environmental stewardship.

New analysis for this report shows that Indonesia could reduce urban GHG emissions by 50% (253 Mt CO2e) in 2030 and 96% (790 Mt CO2e) in 2050, relative to a baseline scenario, using existing low-carbon measures. Cities with less than 1 million residents today hold three-quarters of the abatement potential.

Modelling for the Coalition suggests that fully implementing these low-carbon measures would require incremental investments of US$1 trillion by 2050 – but they could provide returns with a net present value of US$2.7 trillion by 2050. In addition, they could support 2.3 million new jobs in 2030, mostly in energy efficiency and rooftop solar installation.

This is a pivotal time for Indonesia, as COVID-19 has taken a severe toll, with about 1.3 million confirmed cases by late February 2021 and over 34,000 deaths. It also brought about the first recession in two decades, with about 2.6 million left jobless by August 2020.

The government has responded with US$75 billion in stimulus spending as of February 2021, most recently in a US$28.5 billion infrastructure package focused on "labour-intensive" projects including housing construction, sanitation for 1.6 million homes and rooftop solar, but also several high-carbon investments. Future stimulus efforts could give greater priority to urban investments that reduce emissions and build resilience.

Opportunities for action are highlighted throughout the report. Four that stand out as particularly promising are:

- **Invest in sustainable urban mobility**, including both public transport, and walking and biking infrastructure, as well as in transit-oriented development.
- **Scale up ecosystems restoration in and around cities** to build resilience, including mangroves and peatlands. Healthy coastal ecosystems also support livelihoods, especially for the poor.
- **Accelerate the transition to clean electricity**, as more than half the urban abatement potential identified in this analysis depends on it.
- **Leverage the Smart Cities movement to advance sustainability, resilience-building and inclusion**, with measures to ensure that small and mid-size cities can fully participate, and so can lower-income people, including *kampung* residents.

Jakarta, Indonesia. Source: Tresia Hoban/Pixabay

INTRODUCTION

In Indonesia and around the world, national leaders face a triple challenge right now: ensuring a successful recovery from the devastation of COVID-19, pushing forward on their longer-term vision for development, and addressing the enormous threats posed by climate change. The pandemic has wrought havoc on the global economy, with particularly severe impacts on the poor. It has also highlighted the urgency of building resilience to a wide range of shocks, especially the growing impacts of climate change.

Cities are at the centre of that triple challenge. As population hubs and economic engines, they will play a crucial role in the recovery and in countries' long-term economic vitality. Many have also been particularly hard-hit by the pandemic, however. So now, more than ever, national leadership is crucial to ensure cities can "bounce back" and fully realise their potential as engines of sustainable, inclusive growth. As outlined in the Coalition's 2019 flagship report, *Climate Emergency, Urban Opportunity*,[1] only national governments can mobilise resources at the scale needed, and they control key policy realms: from energy, to transport, to social programmes.

Recognising that developing and emerging economies face particularly complex challenges, the Coalition is focusing on six key countries in the lead-up to COP26 in Glasgow: China, India, Indonesia, Brazil, Mexico and South Africa. Together, they produce about a third of global GDP[2] and 41% of CO_2 emissions from fossil fuel use.[3] They are also home to 42% of the world's urban population.[4] The extent to these six major emerging economies can unleash the power of cities to catalyse sustainable, inclusive and resilient growth is therefore critical not only for their future trajectory, but for the whole planet.

This paper presents the results of policy analysis and modelling on Indonesia, delving deeper into findings summarised in the Coalition's new *Seizing the Urban Opportunity* report.[5] But first, for context, we outline our key findings across the six countries, and how they fit with the Coalition's previous work.

Powering the recovery and long-term sustainable growth through cities

Climate Emergency, Urban Opportunity showed that a bundle of technically feasible low-carbon measures could cut emissions from buildings, transport, materials use and waste by almost 90% by 2050; support 87 million jobs in 2030 and 45 million jobs in 2050, and generate energy and material savings worth US$23.9 trillion by 2050.[6] Compact, connected, clean and resilient cities have significant wider economic, social and environmental benefits as well. With deliberate attention to equity and inclusion, low-carbon measures can also help lift people out of poverty by improving their access to jobs, education and vital services. And by avoiding urban sprawl, countries can protect agricultural land and natural ecosystems around cities, with benefits for food security and resilience.

The COVID-19 pandemic has mobilised historic levels of public spending in many countries, but only a fraction promotes sustainability or climate resilience, and very little focuses on cities.[7] Local leaders, meanwhile, have continued to raise their ambition: from embracing the concept of "15-minute cities" where people can get almost anything they need within a 15-minute walk or bike ride,[8] to joining the Cities Race to Zero, pledging to reach net-zero carbon emissions by mid-century or sooner.[9]

Aiming to inform and inspire national leaders in the lead-up to COP26, the Coalition set out to answer three questions: 1. How can national governments in these six key economies leverage cities to build shared prosperity while decarbonising and building resilience? 2. How can they make the most of the potential for compact, connected, clean and inclusive cities to drive the COVID-19 recovery? 3. How can insights from these six countries inform efforts by other national governments, development partners and financial institutions to support a shift towards low-carbon, inclusive and resilient cities?

Three themes emerge clearly from our analysis:

1. **A low-carbon urban transformation is within reach, with broad benefits.** National governments can significantly accelerate decarbonisation by investing in compact, connected, clean and inclusive cities – and reap substantial economic, social and environmental benefits.
2. **Building resilience to climate change is as urgent as decarbonisation.** In all six countries, climate risks are immediate and severe, especially for the urban poor. Resilience-building is a multifaceted challenge: from embedding climate resilience in infrastructure and urban development, to adopting new technologies and practices to reduce climate risks, to addressing the socio-economic drivers of vulnerability in cities.
3. **There are many ways to foster low-carbon, resilient and inclusive cities.** National governments have a wide range of options to choose from, including low-cost and immediate opportunities, and there are many synergies between decarbonisation, resilience-building, COVID recovery efforts, and development programmes.

The global report lays out an agenda for action for national and local leaders as well as for the broader development community, including financial institutions. Transforming cities to become catalysts of sustainable, inclusive and resilient growth is a major undertaking, and it is likeliest to succeed if we all come together behind a shared vision. In the sections that follow, we delve into the challenges and opportunities for Indonesia in particular.

THE PROMISE – AND CHALLENGES – OF INDONESIA'S CITIES

Indonesia is a unique and growing power on the world stage, the seventh-largest economy (in PPP terms)**.**[10] Its GDP in 2019 was US$3.2 trillion, almost six times the 1990 level,[11] with robust growth averaging 5.3% per year since 2000.[12] GNI per capita has grown sevenfold since 2000, reaching US$4,050 in 2019, which brought Indonesia into the ranks of upper-middle-income countries for the first time.[13] The share of people living below the national poverty line was almost halved from 2000 to 2018, to 9.8%,[14] and the share in extreme poverty (living on less than US$1.90 per day) dropped to 3.6%, one-tenth the level in 1999.[15] One in every five Indonesians is now in the middle class, and another 115 million people are out of poverty and aspiring to join them.[16] However, inequality has increased; the Gini index rose from 28.6 in 2000 to 37.8 in 2018.[17]

Indonesia is also urbanising rapidly, and its cities are economic hubs. As of 2018, about 55% of the population – almost 147 million people – lived in urban areas, up from just 42% in 2000. By 2050, almost three-quarters of Indonesians are expected to live in cities.[18] Urbanisation has been uneven, however; almost 70% of the urban population is concentrated in Java-Bali, the only island region with more than half its population in urban areas as of 2016.[19] A large share of economic activity is clustered in cities: urban areas generated nearly 60% of Indonesia's GDP in 2010–2016, and metro Jakarta alone, nearly a quarter.[20]

Yet Indonesia has not reaped the full socio-economic rewards of urbanisation. A World Bank analysis found that for every percentage-point increase in urbanisation, Indonesia's GDP per capita rose by only 4%, versus 13% in India, 10% in China, and 8% in Vietnam.[21] Indonesia's cities offer better job opportunities than rural areas, but about 70% of the total output of metro cores comes from the service sector,[22] and low-end service jobs far outnumber high-end service jobs – except in Jakarta, where they are more balanced. Poverty rates in urban areas are generally lower than in rural areas, with residents of metro cores doing best, especially in Jakarta.[23]

Cities have also struggled to keep up with demand for basic services. This has led to uncontrolled groundwater abstraction, land subsidence (which increases flood risks), and waste management problems, among other challenges.[24] As of 2011, only 42% of urban households had access to piped water supply, and only 72% had access to improved sanitation facilities.[25] For those in the poorest quintile, the shares were 9% and 36%, respectively. The urban poor in Indonesia pay 10–30 times more to buy clean water from private sellers than what wealthier households pay for piped water.

Building affordable housing is a top priority. More than a fifth of Indonesia's urban population lives in slum conditions,[26] and more than half of poor and vulnerable households in metro cores are overcrowded; in Jakarta's core, 35% of *all* households are overcrowded.[27] Affordability is a major challenge: only one-fifth of Indonesians can afford to buy formal housing without subsidies, and 40% can't afford even a basic starter unit. Across the nation, there is a significant housing shortage. An estimated 820,000 to 1 million new units per year need to be added just to keep up with population growth, migration to urban areas and new household formation, but

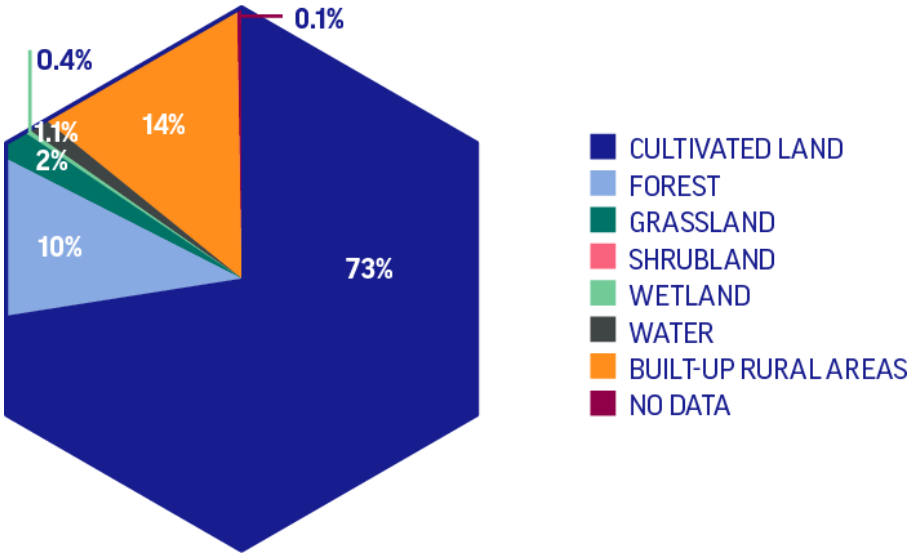
the market only produces about 400,000 units per year.[28] In 2015, with World Bank support, President Joko Widodo launched the One Million Houses programme, aiming to build that many units annually to close the housing gap. The target was finally met in 2018,[29] and in 2020, despite the pandemic, 965,217 units were built, 80% of them for low-income people.[30] Still, large housing deficits remain.

Urban inefficiencies cost Indonesia dearly. Traffic congestion is a major problem, especially in Jakarta**.** For decades, the government has focused on building and expanding roads while underinvesting in urban transport – especially public transit and non-motorised options.[31] In most large cities, the share of trips on public transit is 20% or less, while traffic congestion has soared, especially in metro Jakarta, but increasingly in other cities as well. Both Jakarta and Surabaya rank among the world's most congested cities,[32] and in metro Jakarta alone, the cost of congestion is estimated at US$3 billion per year.[33] Nationwide, car ownership grew from less than 2.5 million to 14.5 million from 1995 to 2014, and motorcycle ownership, from 10 million to more than 100 million. Traffic accidents cost about 28,000 lives in 2014.

Urban air pollution is severe and getting worse. A World Bank analysis of 28 metro areas in Indonesia found 20 had unsafe outdoor air pollution in 2015.[34] Pekanbaru has the worst air, but Jakarta also ranks among the most polluted cities in the Asia-Pacific region; an estimated 60% of its residents suffer from air pollution-related diseases. Coal power and industry cause some of this pollution, but 70–80% is attributable to transportation,[35] which is also a significant source of greenhouse gas emissions. Urban air pollution reduces life expectancy in Jakarta by an estimated 2.3 years, and in Kalimantan, by 4 years. Additionally, forest fires are a major source of air pollution – an unsolved but solvable problem.[36]

Urban expansion, meanwhile, has consumed large swaths of cropland as well as vital ecosystems such as mangroves. Between 2000 and 2014, analysis for this report shows, Indonesian cities grew by 3.9% or 6,904 km^2, more than the land area of Bali.[37] Nearly three-quarters of this expansion was onto cultivated land, consuming cropland and protective ecosystems, such as mangroves, around cities (Figure 1). This deprives cities of a key source of protection from flooding,[38] with particularly dire implications for poor and vulnerable populations. For instance, in December 2018, with the Sundra Strait Tsunami, many lives were saved in areas protected by mangroves systems.[39]

Figure 1. Land converted to urban purposes in Indonesia by type of land cover, 2000–2014



Source: Marron Institute of Urban Management, New York University, for the Coalition for Urban Transitions and the Food and Land Use Coalition. See Annex 3 for full methodology.[40]

Flooding has long been part of life in many Indonesian cities, but subsidence is making it much worse. As noted earlier, excessive groundwater abstraction, by industry and households, is a serious problem, and wetland drainage for agriculture also continues to drive subsidence.[41] Jakarta is sinking by almost 20 cm per year,[42] and Semarang is sinking by 7–11 cm per year.[43] Both face increased flood risks as a result, and so do many other Indonesian cities. Building resilience to floods has thus been a longstanding government priority, especially in *kampungs* (traditional and informal settlements) along riverbanks.[44] For decades, resettlement was the standard approach, but after strong community resistance, there are growing efforts to work with residents to make them safer where they are (e.g. through land consolidation and safety improvements).[45]

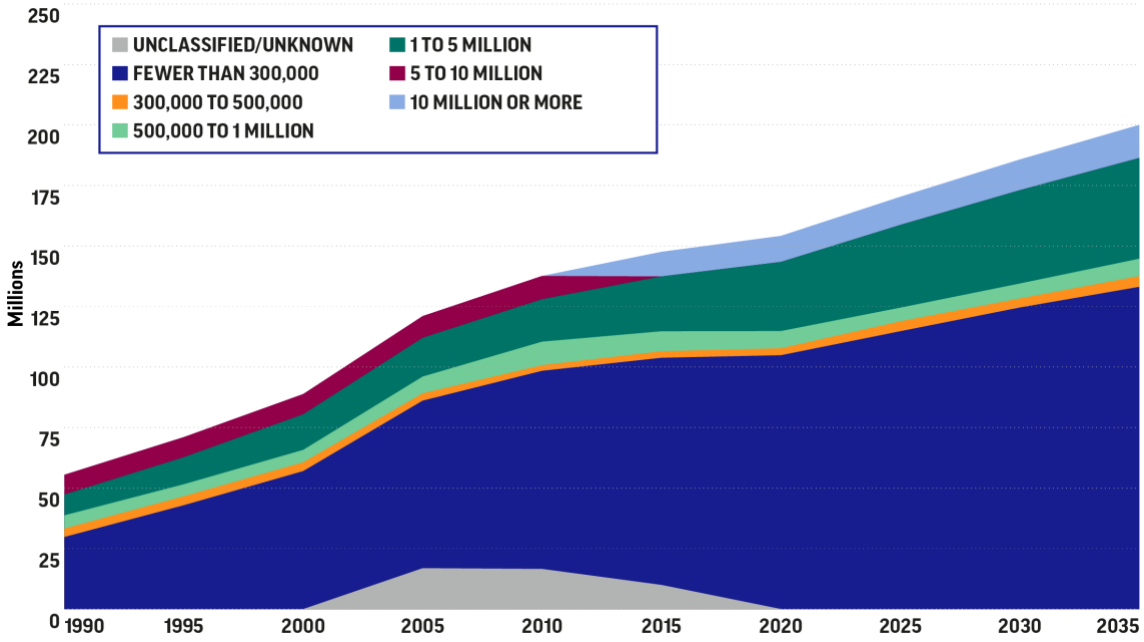
Indonesia's plan to build a new capital is a major opportunity to demonstrate compact, connected, clean and resilient urbanisation. The city is to be built in eastern Borneo and is envisioned as a "forest city" with at least 50% green space, surrounded by healthy ecosystems, including reforested former oil palm fields and mines.[46] Ensuring that the city lives up to its promise will be a critical challenge. If successful, the project can serve as a role model for other Indonesian cities and showcase the country's commitment to protect biodiversity assets and promote urbanisation that is both low-carbon and resilient.

The Smart Cities movement could help Indonesia's cities become more sustainable, efficient and resilient. Indonesia launched the "Gerakan 100 Smart City" (Movement Towards 100 Smart Cities) in 2017, building on the early successes of the Jakarta Smart City project, launched in 2014.[47] Jakarta has used Internet of Things (IoT) technologies to better understand its residents' needs and improve service delivery, while attracting startups and tech companies to the city.[48] Working with

partners, the city also created PetaJakarta.org, an online platform that gathers real-time flood reports and visualises the data on a map. Bandung and Surabaya were the next to launch Smart City projects, and through the national movement, another 97 cities have followed.[49] Each city tailors the concept to fit its own priorities.[50] There are challenges, however, including cost – cities need to pay for their own tech infrastructure, which is more difficult for smaller municipalities[51] – and unequal access to the internet. Indonesia has the lowest internet penetration rate in Southeast Asia, just about 65%,[52] and it struggles to ensure affordable mobile and fixed broadband data.[53] Still, there is enormous potential: from using mobility data to improve public transport, to connecting people to urban services and jobs.[54] The key is to ensure high-quality internet access for all, including the urban poor, and to prioritise projects with broad benefits.

Indonesia's small and mid-size cities need strong national support to address key challenges. More than two-thirds of Indonesia's urban residents live in settlements of fewer than 300,000 people (Figure 2).[55] In contrast with Jakarta and other major metro areas, these smaller cities have severely limited institutional and fiscal capacities to meet the needs of rapid urbanisation. Since decentralisation in the early 2000s, the number of autonomous districts has also risen, to 508 today.[56] Provinces, which have the authority to coordinate districts, will play a key role in supporting municipal-level planning and programmes. The Jakarta metro region (Jabodetabek), however, straddles multiple provinces, requiring coordination by the national government.

Figure 2. Indonesia's urban population by city size class, 1990–2035



Source: Coalition for Urban Transitions analysis based on data from UN DESA, 2018. Data to 2015 are historical, 2020–2035 are projections. The "unclassified" segment denotes a discrepancy in size class vs. total population data. The disappearance of the 5–10 million size class reflects Jakarta surpassing 10 million people.[57]

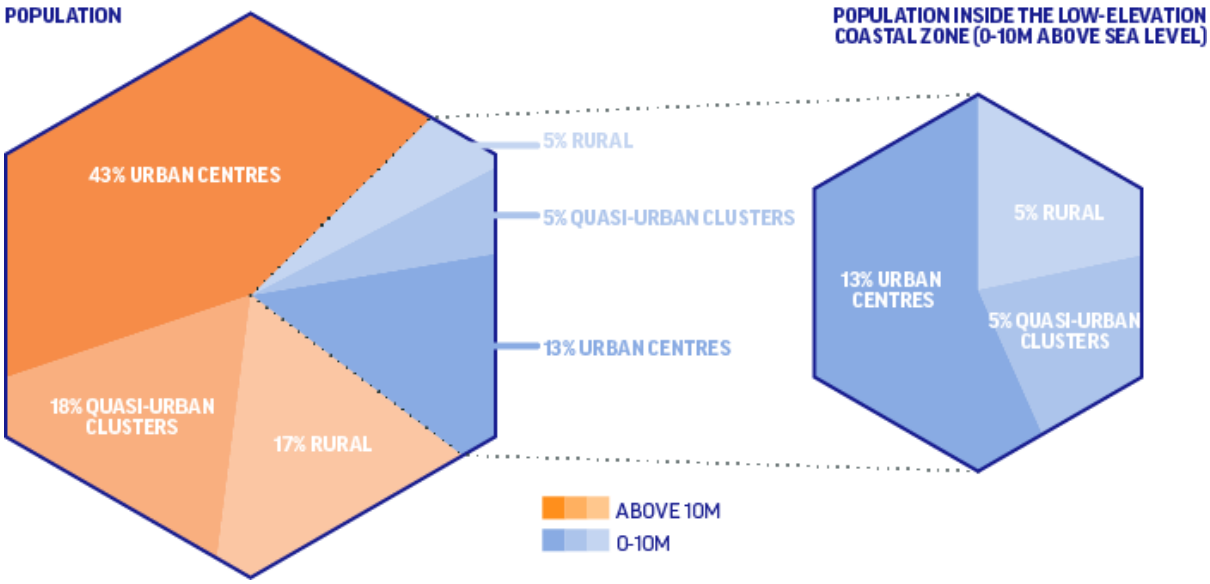
Confronting climate change

Indonesia faces serious climate risks in the decades ahead, even if significant efforts are made to limit global warming. An analysis by Indonesian and international experts convened by the government found that even if the global mean temperature rose by less than 1.5°C by mid-century,[58] and certainly if emissions continue to rise rapidly, the country would face "significant shifts to average daytime and night-time temperatures in all months, extreme heat events, increasing heavy rainfall and drought events, as well as increasing ocean temperatures, sea level rise and ocean acidification".[59] Those shifts, in turn, could undermine sustainable development in several key sectors of the economy.

Cities are already experiencing climate change, and the costs are escalating fast. Extreme heat is becoming more common and more severe,[60] with temperatures nearing 40°C in several regions in October 2019,[61] and construction crews face ever-harsher conditions.[62] And though overall rainfall is projected to decrease slightly in the coming decades, heavy downpours could become more common.[63] In early January 2020, torrential rains delivered 38 cm of water in Jakarta in a single day, causing flash floods that killed 67 people.[64] A recent study projected that annual flood costs in the capital city would rise by 322% to 402% by 2050, as the impacts of climate change were exacerbated by land subsidence, shrinking green spaces, and other factors.[65]

Coastal cities accumulate risks as they continue to cluster people and wealth in the face of sea-level rise. As an archipelago nation, Indonesia has a particularly large share of its cities and urban population on the coast. As of 2015, 57.7 million people lived in coastal areas less than 10 metres above sea level, about four-fifths of them in urban or quasi-urban areas (see Figure 3).[66] The median sea-level rise projection for Indonesia is 0.44 metres by 2050 (relative to 2000 levels),[67] but even coastal urban areas that remain above water are still in peril. Indonesia's location on the Pacific Ring of Fire means tsunamis are a persistent threat.[68] It is also in the path of frequent typhoons and accompanying storm surges,[69] and climate change may increase the number of very intense such storms.[70] Overall, a 2015 analysis found some 110 million people in 60 Indonesian cities are regularly exposed to coastal storms, tsunamis, earthquakes and other disasters combined.[71]

Figure 3. Share of Indonesia's population inside and outside the low-elevation coastal zone by settlement type, 2015



Source: CUNY Institute for Demographic Research, Institute for Development Studies and Center for International Earth Science Information Network, Columbia University for the Coalition for Urban Transitions.[72]

Coastal infrastructure investments could intensify climate risks – even when they aim to reduce them. Large projects continue to be built in low-lying coastal areas, at enormous cost, in investments that typically have lifespans of 50 years or longer.[73] In Semarang, for instance, a major expansion of Tanjung Emas Port announced in 2017 involves reclaiming more than 100 hectares of coastal land to build storage tanks, docks, warehouses and other facilities; the first phase alone was budgeted at Rp 150 billion (US$11.2 million).[74] In 2018, the city's Ahmad Yani International Airport opened a 58,652 m^2 terminal built on a reclaimed marsh and designed to look as if it is "floating" – an Rp 2.2 trillion project.[75] Another major project is in the works: a 27 km toll road to the district of Demak, including 10 km atop a levee on reclaimed land, meant to prevent tidal flooding.[76] Not only could many of these assets' lifespans be cut short by subsidence and sea-level rise; by removing protective ecosystems and further hardening the shoreline, they may exacerbate disaster risks.

Map 1. Semarang coastal development, 1986 and 2021

Source: Google Earth, Image © 2021 Maxar Technologies, Image © 2021 TerraMetrics, Data SIO, NOAA, U.S. Navy, NGA, GEBCO (accessed March 2021).

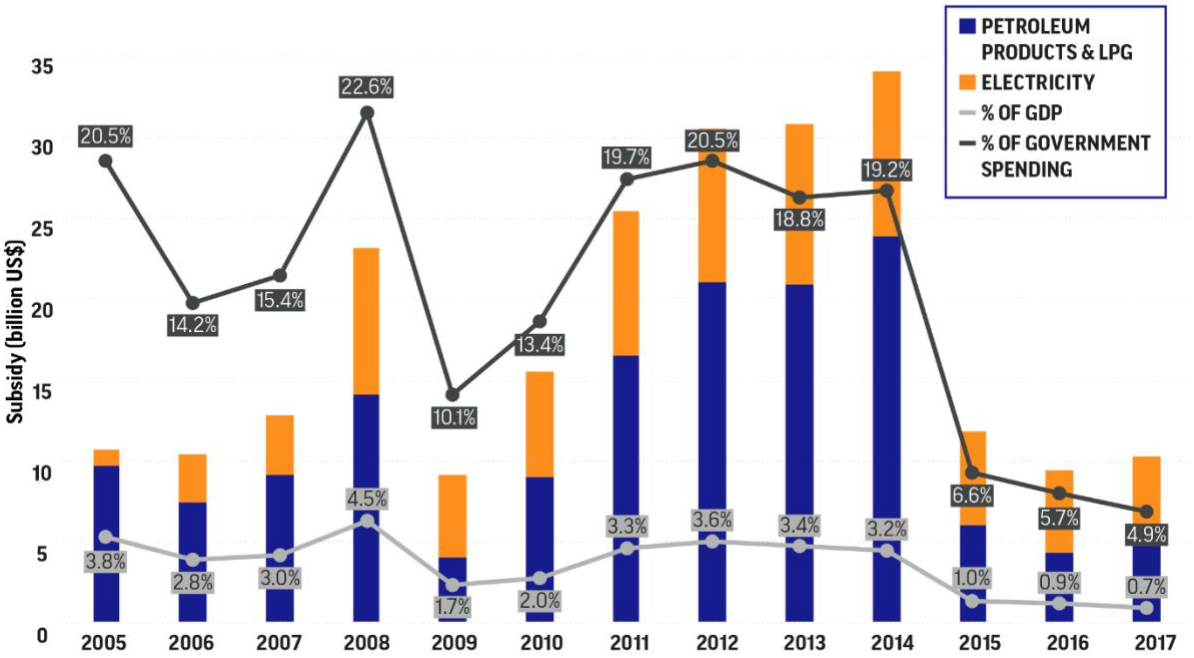
Protecting and restoring coastal ecosystems is crucial for building resilience. For a long time, Indonesia's flood prevention strategies relied mainly on building "hard" infrastructure such as sea walls and embankments. But in Jakarta, for example, it has become clear that a sea wall will not provide the necessary protection.[77] Instead, policy-makers are increasingly combining built infrastructure with nature-based solutions, such as greening floodplains to increase water absorption[78] and restoring coastal ecosystems. Without intervention to stop peatland drainage, coastal peatland subsidence alone is estimated to average 5 cm per year nationwide.[79] Protecting mangroves is also crucial. Indonesia has the largest area of mangrove forests in the world, 3.1 million hectares, or almost 23% of the global total.[80] And mangroves and peatlands are critical biodiversity reserves that tend to be overshadowed by a focus on forest conservation.

Restoring and protecting coastal ecosystems can sharply reduce Indonesia's greenhouse gas emissions while improving urban air quality. Not only does draining wetlands drive subsidence; it also releases stored carbon and intensifies fire risks. Indonesia is the top land-based GHG emitter, producing 53% of the world's land-based emissions in 2014, despite having the third-largest forest area.[81] In the wake of the devastating 2015 fires, which sharply increased air pollution and produced an estimated 1.75 Gt of CO_2-e of GHG emissions,[82] the government established a Peatland Restoration Agency in 2016, aiming to restore 2 million hectares within five years.[83] Peatlands can provide a vital carbon sink, as they store 30% more carbon than Indonesia's forests.[84] Mangroves are also major carbon sinks, so protecting them would not only shield coastal areas during storms, but avoid large releases of carbon into the atmosphere.[85]

Building social resilience in vulnerable communities is an urgent need, and it can go hand in hand with decarbonisation and compact, connected urban development. In Surabaya, where 60% of the population lives in *kampungs,* city officials have empowered local residents to shape their own environment.[86] Established in 2014, the Green Kampung programme fosters participatory planning and budgeting and environmental management. The Citizen Park Space Programme relocates people from high-risk riverbanks and converts the areas into parks. There is also a community-based waste management system. Other municipalities are embracing these approaches – in Jakarta, for example, through the Community Action Plan programme launched in 2018.[87] The capital has more than 600 kampungs, and the Mid-term Development Plan of DKI Jakarta (2017–2022) for the first time explicitly embraced a people-centred approach to development, with citizens, including the poor, seen as co-creators of policies and programmes, and actively engaged in monitoring the effectiveness of adaptation strategies.[88] At the national level, the Kampung Iklim (Climate Village) programme, launched in 2015, supports communities of all sizes in building capacity for both adaptation and mitigation.[89]

Indonesia has steadily reduced fossil fuel subsidies – and used the proceeds to advance development priorities.[90] Indonesia has reduced fossil fuel subsidies from about 20% of its government spending in 2005 to less than 5% today through an iterative process of sustained reforms (Figure 4 and Table 1). This included targeted subsidies to reduce the transitional burden on the poor and vulnerable groups. The resulting savings also enabled the government to make major new investments in social welfare and infrastructure, boosting budgets for ministries and state-owned enterprises as well as transfers to regions and villages. For example, funds were allocated to provide homes for 60,000 poor households and clean water access to 10.3 million households.[91]

Figure 4. Iterative dismantling of Indonesian fossil fuel subsidies



Source: Coalition for Urban Transitions analysis based on Central Government Financial Reports (LKPP) for 2005–2017 and Government of Indonesia, 2019.[92]

Table 1. General timeline of energy subsidy reforms in Indonesia

Year	Initiative
1977	Indonesia starts subsidising seven types of fossil fuel.
1999	Subsidies are limited to only five types of fuel.
2004	Indonesia becomes a net oil importer.
2005	Gasoline price increases by 80% and subsidies to industry are withdrawn. Government gives unconditional cash transfer to middle- and lower-income people to compensate for the price increase.
	Only three types of fuel subsidised by government: gasoline, diesel and kerosene.
2007	Kerosene-to-LPG conversion programme established; by 2014, it will reduce kerosene consumption by 9 million KL.
2010	Electricity rates increase by 10% in July.
2013	Electricity rates increase by 15%, excluding the two lowest user tiers (450 and 900 VA).
	Government increases cash transfers to middle- and lower-income people to compensate for the price increase.
2014	Electricity tariff adjusted, and electricity subsidy for industry reduced.

2015	Government completely eliminates gasoline subsidies and sets fixed subsidies of Rp 1,000 per litre for diesel.
	12 groups of electricity consumers are no longer subsidised.
2016	Subsidy for diesel set at Rp 500 per litre.
2017	Electricity subsidy for household consumers with 900 VA power limited to the poor and vulnerable.

Source: Government of Indonesia, 2019.[93]

Indonesia's economy is carbon-intensive, so a new approach is needed – and not just in land-based sectors. The Master Plan for the Acceleration and Expansion of Indonesia's Economic Development (MP3EI) 2011–2025 identified as a key challenge that the economy "is primarily focused on agriculture and industries which extract and harvest natural resources," with "only limited" added-value industries.[94] The industries that do exist are also highly energy-intensive, accounting for almost half of Indonesia's energy consumption.[95] The government's latest projections show energy demand rising by 5% per year under business as usual; even in a scenario with increased efficiency measures, it rises by 4.3% per year.[96] Emissions from energy reached 453.2 Mt CO_2e in 2010 and would nearly triple by 2030 even in the country's more ambitious mitigation scenario. And though industry and transportation are the main drivers of energy demand, lifestyle changes in cities are also making an impact. For example, while only about 10% of Indonesian homes now have air conditioners, the number of residential AC units is expected rise from 12 million in 2020, to 129 million by 2040.[97] Food waste has also proliferated, reaching 300 kilograms per person per year, among the highest levels in the world,[98] closely linked to urbanisation, new shopping patterns, and class dynamics.[99]

Indonesia has already begun to embrace the potential economic, social and environmental benefits of a new, more sustainable development pathway. The 2020–2024 National Medium-Term Development Plan includes climate action and resilience-building as one of its seven core programmes, with mitigation policies projected to reduce GHG emissions by 27.3% by 2024 relative to a baseline scenario, as well as adaptation measures.[100] The plan is informed by Indonesia's Low Carbon Development Initiative (LCDI), launched in 2017 to foster economic growth that reduces emissions, builds climate resilience and minimises exploitation of natural resources.[101] The LCDI identifies haphazard, sprawling urbanisation as one of the problems to be addressed by putting Indonesia on a more sustainable path. It calls for a faster transition to renewable energy, greater investment in energy efficiency and more sustainable infrastructure investments, along with protection of forests, mangroves, and peatlands. These are important first steps.

Box 1: How we built our analysis

This report combines original climate and economic modelling, spatial analysis, policy research and analysis, and country-specific insights gathered by consulting iteratively with urban, energy and climate policy experts in China, India, Indonesia, Brazil, Mexico and South Africa.

First, the Stockholm Environment Institute (SEI) modelled the urban greenhouse gas abatement potential in six countries, using a bottom-up assessment of mitigation options in **residential and commercial buildings, road transport, waste management, and materials for urban buildings and transport infrastructure**.

The model covers CO_2 emissions from energy consumption, process emissions from the production of cement and aluminium used in urban infrastructure, and methane (CH_4) emissions from landfills. It is important to note that emissions from industries within cities are not included. Thus, the urban share of emissions may appear smaller than in other studies. It is also important to note that this analysis was undertaken prior to the full impacts of COVID-19 being known. Hence, the baseline scenario, for example, does not factor in the potential economic impacts of COVID-19 on emissions pathways. Any planned future analysis will be adjusted to take this into account.

The baseline scenario reflects countries' commitments in their first round of Nationally Determined Contributions (NDCs) under the Paris Agreement, but not the latest updates. **This means the abatement potential between 2020 and 2050 identified in the analysis is all additional to the first NDCs.** For details on data sources, measure-specific assumptions and analytical steps, see Annex 1.

Second, Vivid Economics modelled the **incremental investments through 2050** – that is, investments beyond baseline levels – needed to realise the abatement potential identified by SEI, using existing technologies and practices, and accounting for learning that would reduce costs over time. They also modelled the cumulative returns on those investments through 2050. Across all countries, the estimates presented in this report are net returns (i.e. net present value, or the extent to which benefits exceed costs over the period to 2050), discounted at 3.5% per year, assuming a 1% annual increase in real energy prices from 2014 levels. That is the central scenario in the analysis; for a comparison of results with different assumptions, see Annex 2, Part 3. Note that the economic returns estimate only considers direct energy and material cost savings and is thus partial. The returns would be higher if factors such as time savings from avoided congestion, increased productivity, improved health and environmental quality, and avoided climate change impacts were taken into account.

Finally, the Vivid analysis estimates the **direct, indirect and induced jobs** (full-time equivalent) that the modelled measures could support in 2030 and 2050, taking into account technology-specific labour productivity factors and adjusted to reflect typical differences in labour productivity between OECD and non-OECD countries. The estimates are based on uniform labour productivity assumptions for the six countries and provide indicative job numbers. Further work should collect more country-specific information to refine the results. **The job numbers reflect an estimate of net jobs by comparing green investment with an equivalent investment in fossil fuel projects**, while fully recognising the uncertainties in such counterfactuals. In all of these categories, we provide overall numbers as well as selected sector- and measure-specific estimates. For details on data sources and the full methodology, see Annex 2.

The third modelling exercise that informed our analysis was by the Marron Institute of Urban Management at New York University, which examined the **scale and composition of the conversion of land to urban purposes** in each of the six countries in the period 2000–2014. The results show not only how much cities' collective footprint grew in that time, but also what they displaced: farmland, built-up rural areas, forests, grassland, etc. For a detailed methodology, see Annex 3.

Finally, recognising that coastal populations are particularly exposed to climate change impacts, including sea-level rise, storm surges and other hazards, we drew on the work of the Institute for Demographic Research at City University of New York, the Center for International Earth Science Information Network at Columbia University, and the Institute of Development Studies to estimate the **share of each country's population living in coastal zones at less than 10 metres above sea level**, and the urban share of that population. While a detailed mapping of coastal climate risks in the six countries is beyond the scope of this report, this analysis provides some indication of the extent of the risk. For a detailed methodology, see Annex 4.

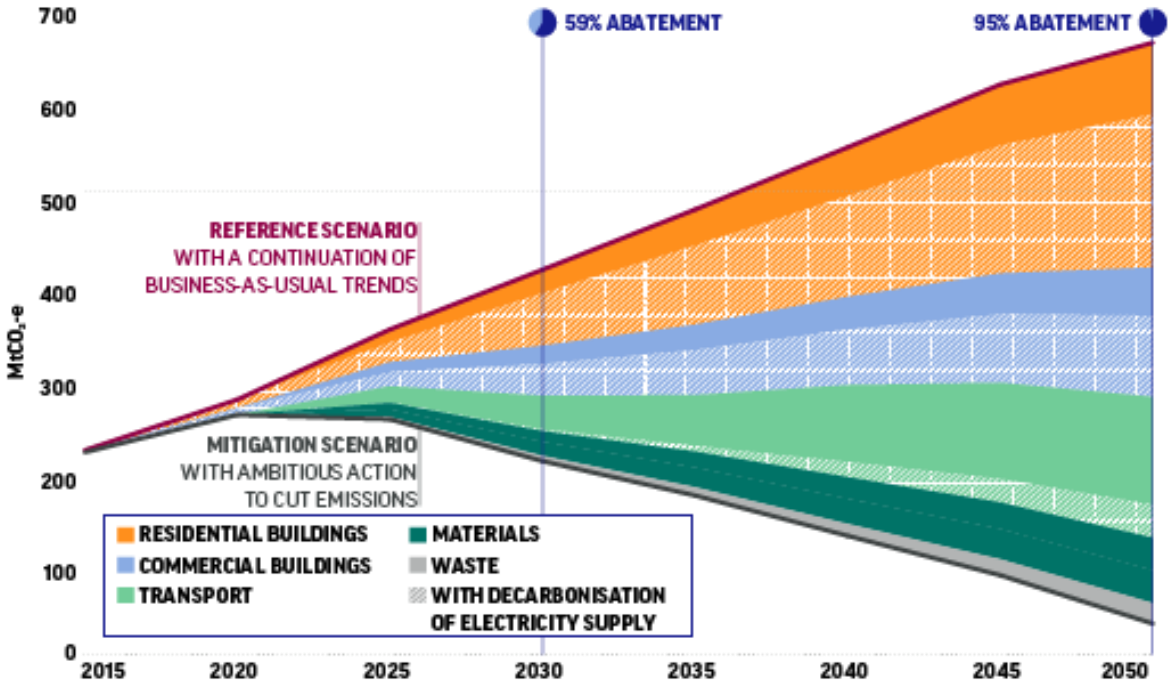
The four modelling exercises inform analysis in this report as well as the Coalition's global synthesis report, drawing on detailed literature reviews (including policy documents, peer-reviewed studies, grey literature and media coverage) and close collaboration with experts in the six countries, with additional input from a wide range of Coalition partners. The resulting recommendations are meant as illustrative examples, and should not be seen as an exhaustive list of options for national policy-makers in each country.

HOW URBAN ACTION CAN DRIVE DECARBONISATION AND ECONOMIC GROWTH

Indonesia is on track to surpass its first NDC commitment and can raise its ambition. Indonesia pledged to reduce GHG emissions by 26% by 2020 and 29% by 2030, relative to business-as-usual.[102] The NDC includes a conditional target of reducing emissions by up to 41% by 2030, subject to international support. As of early 2020, Indonesia was on target to surpass its unconditional target and possibly even the conditional one.[103] Protecting mangroves and peatlands is crucial to reducing emissions from land use and forestry; shifting away from fossil fuels and onto renewables is also key. More compact, connected, and inclusive urbanisation can support both those objectives and yield benefits of its own.

Indonesian cities hold significant GHG abatement potential. New analysis for this report shows that deploying a bundle of currently available low-carbon technologies and practices could reduce emissions from urban buildings, transport and waste by 50% (253 Mt CO_2e) in 2030 and 96% (790 Mt CO_2e) in 2050, relative to a baseline scenario (see Figure 5).[104] The buildings sector accounts for over 60% of the identified emission reductions in 2050, transport for nearly a quarter, and materials and waste, for 12% and 3%, respectively.

Figure 5. GHG abatement potential in key urban sectors in Indonesia to 2050

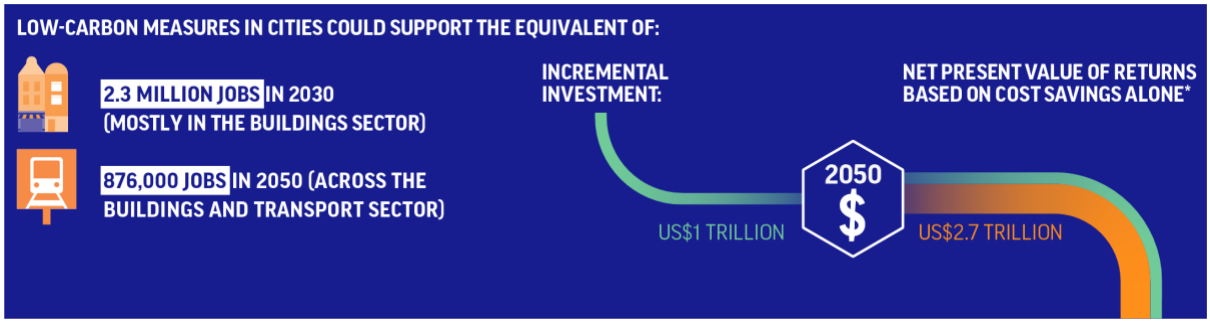


Source: Modelling by the Stockholm Environment Institute for the Coalition for Urban Transitions.[105]

These low-carbon measures would require incremental investments of about US$1 trillion by 2050, but could provide significant economic benefits.[106]

Modelling for this report suggests the investments would more than pay for themselves in energy and materials savings alone, and yield cumulative returns with a net present value of US$2.7 trillion by 2050 (Figure 6). The analysis also provides indicative numbers of jobs that could be supported by the investments. In 2030, the modelling shows, those measures could potentially support 2.3 million new jobs, mostly in energy efficiency and rooftop solar installation in the buildings sector.[107] These would be large, long-term investments, however: an estimated US$723 billion to 2050 that would take a few decades to fully pay off.

Figure 6. The economics of selected low-carbon measures in Indonesian cities



Source: Modelling by Vivid Economics for the Coalition for Urban Transitions.[108] Note that these job and growth numbers are indicative estimates only and not forecasts of future outcomes. The job numbers in particular are subject to a high level of uncertainty, as explained in Annex 2, and should be interpreted with caution.

The most economically attractive measures are in compact urbanisation (which reduces travel demand) and public transport. The modelling indicates that they would require US$24.4 billion and US$90.9 billion, respectively, in incremental investment, but could yield energy and material savings with a net present value of US$731.2 billion and US$1.97 trillion, respectively. This does not take into account the benefits of improved urban accessibility, cleaner air, or avoided congestion. A shift to electric vehicles would have high upfront costs, but could yield estimated annual returns of US$3.0 billion in 2030 and US$6.8 billion in 2050, the modelling shows; it could also support about 132,000 jobs in 2030 and 406,000 in 2050. The national government has already recognised some of this potential, aiming to start manufacturing electric vehicles (EVs) in Indonesia by 2022 and have EVs make up 20% of the country's auto production by 2025.[109]

More than three-quarters of Indonesia's urban abatement potential to 2050 is in cities with populations under 1 million. This means that unlocking Indonesia's full urban mitigation potential will depend on the national government supporting and enabling these smaller cities, which have less capacity and resources. The modelling shows that Jakarta, Indonesia's only city with over 5 million residents, has 7% of the urban abatement potential, while cities with 1–5 million residents have 17%.

Across sectors, 52% of the total abatement potential depends on decarbonising electricity, the modelling shows. In 2019, 84% of Indonesia's power came from fossil

fuels – mainly coal, but with a growing share from natural gas.[110] The share of fossil fuels in Indonesia's overall energy mix has declined modestly in the past decade, from 96% in 2009, to 91% in 2019, but energy use has grown so fast that in absolute terms, fossil fuel use actually rose by 47%.[111] Indonesia's National Energy Policy calls for 23% of the primary energy supply to come from renewables by 2025.[112] However, as of May 2020, total renewable generation capacity was only 10.4 GW, or 14.7% of total installed capacity, with no plan in place to close the gap.[113] The latest national power procurement plan envisions 16.7 GW of added renewable capacity, but 27.1 GW of coal, between 2019 and 2028.[114]

UNLOCKING THE POTENTIAL OF INDONESIA'S CITIES

COVID-19 has taken a toll on Indonesia, with over 1.4 million confirmed cases by March 12, 2021, and over 38,000 deaths.[115] It also brought about Indonesia's first recession in two decades,[116] with about 2.6 million left jobless by August 2020.

The government has responded with US$75 billion in stimulus spending as of February 2021,[117] most recently in a US$28.5 billion infrastructure package to support infrastructure developments in industry, tourism, water, sanitation, housing and national health. The "labour-intensive" projects it funds include housing construction, sanitation for 1.6 million homes and rooftop solar, but also a natural gas network and 965 km of roads.[118] During the pandemic, Indonesia has also deregulated mining and provided substantial funds to high-carbon industries.[119] Future stimulus efforts could give greater priority to urban investments that reduce emissions and build resilience to climate change and other shocks.

There are many opportunities to leverage existing initiatives to accelerate urban decarbonisation and resilience-building. Jakarta has already joined the Cities Race to Zero, pledging to reach net-zero carbon emissions by mid-century or sooner, with yearly reporting on progress.[120] With strong national support and encouragement, several more Indonesian cities could join. Making compact, connected, clean and resilient cities a key part of Indonesia's updated Nationally Determined Contribution (NDC) under the Paris Agreement would send a powerful message about the country's vision for a more sustainable, and less land use-dependent, future.

We have highlighted opportunities for action throughout this report. Four that we see as particularly promising are:

Invest in sustainable urban mobility, including both public transport, and walking and biking infrastructure. Transit-oriented development is essential as well. Not only is improving sustainable mobility a highly cost-effective way to reduce GHG emissions; it would also tackle the urgent crises of traffic congestion and air pollution, and particularly benefit lower-income people who can't afford cars.

Scale up ecosystems restoration within and around cities to build resilience. Protecting peatlands is crucial to slow subsidence, and mangroves provide buffers from growing coastal storm threats; both are also major carbon sinks. Moreover, healthy coastal ecosystems support livelihoods, especially for the poor.

Nature-based solutions are already being deployed in several cities; it is important to keep scaling them up, relying more on green infrastructure or hybrid green/grey solutions and less on "hard" barriers to protect shorelines, for example. Coastal land reclamation projects that replace these vital ecosystems with carbon-intensive development, on the other hand, should be avoided to the extent possible.

Accelerate the transition to clean electricity. Indonesia is already scaling up renewable energy but has prioritised liquid biofuels.[121] Scaling up wind and especially solar power is crucial to realising the country's full urban abatement potential, making the most of electrification. It could also better position Indonesia to become a regional EV market leader.[122] Investing in energy efficiency will be crucial as well, as energy demand is growing rapidly as incomes rise and industry grows.

Leverage the Smart Cities movement to advance sustainability, resilience-building and inclusion. As Jakarta and its 99 fellow Smart Cities are already showing, information technology can be a powerful tool for improving city services. There is enormous untapped potential still to engage citizens in solving infrastructure, mobility and other challenges. There are more great examples to be found across Asia and around the world.[123] An immediate priority is to ensure that small and mid-size cities can access the resources and technical expertise they need to seize these opportunities. At the same time, it is important to ensure that city residents at all income levels, including in kampungs, can access the internet easily and affordably and find content relevant to their needs. As plans for the new capital take shape, making the most of Smart Cities technologies from the outset could make the city even more attractive for residents and investors alike.

Tanjungpandan, Indonesia. Source: Eddie Cheever/Shutterstock

ENDNOTES

[1] CUT, 2019, "Climate Emergency, Urban Opportunity."
[2] Their collective share in 2019 was 31.7%, including 17.3% from China. Authors' calculations based on World Bank GDP data (PPP, in current international $). See https://data.worldbank.org/indicator/NY.GDP.MKTP.PP.CD.
[3] Authors' calculations based on 2018 data from the International Energy Agency (total CO_2 emissions): https://www.iea.org/data-and-statistics.
[4] Authors' calculations based on 2018 data from UN DESA, 2018, "World Urbanization Prospects: The 2018 Revision." China alone is home to 20% of the world's urban residents, and India, to another 11%.
[5] CUT, 2021, "Seizing the Urban Opportunity: How National Governments Can Recover from COVID-19, Tackle the Climate Crisis, and Secure Shared Prosperity through Cities."
[6] CUT, 2019, "Climate Emergency, Urban Opportunity."
[7] Vivid Economics, 2021, "Greenness of Stimulus Index: An Assessment of COVID-19 Stimulus by G20 Countries and Other Major Economies in Relation to Climate Action and Biodiversity Goals (February 2021 Release)."
[8] C40 Cities, 2020, "How to Build Back Better with a 15-Minute City."
[9] See http://www.citiesracetozero.org and the listing of cities in the Climate Ambition Alliance, at https://climateaction.unfccc.int/views/cooperative-initiative-details.html?id=94.
[10] See World Bank global data: https://data.worldbank.org/indicator/NY.GDP.MKTP.PP.KD?most_recent_value_desc=true.
[11] See World Bank Indonesia data: https://data.worldbank.org/indicator/NY.GDP.MKTP.PP.KD?locations=ID.
[12] See World Bank data: https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=ID. Indonesia's economy had been growing even faster before the economic crisis of 1997–1998.
[13] Serajuddin and Hamadeh, 2020, "New World Bank Country Classifications by Income Level: 2020-2021," World Bank Data Blog (blog). See also World Bank data: https://data.worldbank.org/indicator/NY.GNP.PCAP.CD?locations=ID. The Bank's income classifications are based on GNI per capita, not GDP, as GNI – which includes net receipts of primary income from abroad as well – is seen as a more complete measure of people's purchasing power.
[14] See World Bank data: https://data.worldbank.org/indicator/SI.POV.NAHC?locations=ID. The poverty level in 2000 was 19.1%.
[15] See World Bank data: https://data.worldbank.org/indicator/SI.POV.DDAY?locations=ID. However, 30% of the population is still either poor or considered vulnerable to falling back into poverty; see World Bank, 2020, "Indonesia: Poverty & Equity Brief."
[16] World Bank, 2019, "Aspiring Indonesia—Expanding the Middle Class." The Bank's analysis identifies five consumption classes: poor, vulnerable, aspiring middle class, middle class and upper class.
[17] The Gini index, a measure of the distribution of income or consumption across the population, varies from 0 when income is equally shared across the population, to 100 when it is concentrated in one recipient. See World Bank data: https://data.worldbank.org/indicator/SI.POV.GINI?locations=ID.
[18] UN DESA, 2018, "World Urbanization Prospects: The 2018 Revision."
[19] Roberts, Sander, and Tiwari, 2019, Time to ACT: Realizing Indonesia's Urban Potential.
[20] See Figure 2.3 in Time to ACT; Jakarta's core produced 16.4% of GDP, and its periphery, another 7.2%.

[21] World Bank, 2016, "Indonesia's Urban Story."
[22] See Figure 2.6 and related discussion in Roberts, Sander, and Tiwari, 2019, Time to ACT: Realizing Indonesia's Urban Potential.
[23] Roberts, Sander, and Tiwari, 2019, Time to ACT: Realizing Indonesia's Urban Potential. See Figures O.4 and 2.4 and related discussions.
[24] Jones and Mulyana, 2015, "Urbanization in Indonesia."
[25] Baker and Gadgil, 2017, "East Asia and Pacific Cities: Expanding Opportunities for the Urban Poor." The report combines data from several recent World Bank analyses that used official data.
[26] World Bank, 2017, "Indonesia – National Affordable Housing Program Project."
[27] See Figure 2.27 and related discussion in Roberts, Sander, and Tiwari, 2019, Time to ACT: Realizing Indonesia's Urban Potential.
[28] World Bank, 2017, "Indonesia – National Affordable Housing Program Project."
[29] The Jakarta Post, 2019, "Housing Program Exceeds 1 Million Target in 2018," The Jakarta Post.
[30] PUPR, 2021, "Di Tengah Pandemi COVID-19, Realisasi Program Sejuta Rumah TA 2020 Capai 965.217 Unit," Kementerian Pekerjaan Umum Dan Perumahan Rakyat – Info PUPR; Rahman, 2021, "Govt Housing Program Falls Short of 1 Million Target Last Year," The Jakarta Post.
[31] Roberts, Sander, and Tiwari, 2019, Time to ACT: Realizing Indonesia's Urban Potential.
[32] See, e.g., the Castrol Magnatec Stop-Start Index: http://interone2.azurewebsites.net/campaigns/stop-start-index.html.
[33] Roberts, Sander, and Tiwari, 2019, Time to ACT: Realizing Indonesia's Urban Potential. See chapters 6 and 7.
[34] Roberts, Sander, and Tiwari, 2019, Time to ACT: Realizing Indonesia's Urban Potential. See Figure O.10 and related discussion; the analysis focused on fine particulate matter ($PM_{2.5}$).
[35] Greenstone and Fan, 2019, "Indonesia's Worsening Air Quality and Its Impact on Life Expectancy."
[36] University of Exeter, 2020, "Indonesian Wildfires a 'Fixable Problem,'" Research News.
[37] Analysis by the Marron Institute of Urban Management, New York University. See Annex 3 for a detailed methodology: https://urbantransitions.global/urban-opportunity/seizing-the-urban-opportunity/annexes/.
[38] van Oudenhoven et al., 2015, "Effects of Different Management Regimes on Mangrove Ecosystem Services in Java, Indonesia," Ocean & Coastal Management.
[39] Bappenas, 2019, "Low Carbon Development: A Paradigm Shift Towards a Green Economy in Indonesia."
[40] This analysis combines spatial datasets of land cover to estimate the total amount of land, and the relative shares of different land cover categories, converted to urban use between 2000 and 2014. For a full description of the data sources, approach and limitations, see Annex 3: https://urbantransitions.global/urban-opportunity/seizing-the-urban-opportunity/annexes/.
[41] Bappenas, 2019, "Low Carbon Development: A Paradigm Shift Towards a Green Economy in Indonesia."
[42] Erkens et al., 2015, "Sinking Coastal Cities," Proceedings of the International Association of Hydrological Sciences; see also Lin and Hidayat, 2018, "Jakarta, the Fastest-Sinking City in the World," BBC News.
[43] Husnayaen et al., 2018, "Physical Assessment of Coastal Vulnerability under Enhanced Land Subsidence in Semarang, Indonesia, Using Multi-Sensor Satellite Data," Advances in Space Research.
[44] See, e.g., Dwirahmadi et al., 2019, "Understanding the Operational Concept of a Flood-Resilient Urban Community in Jakarta, Indonesia, from the Perspectives of Disaster Risk Reduction, Climate Change Adaptation and Development Agencies," International Journal of Environmental Research and Public Health.

[45] See, e.g., Simarmata and Surtiari, 2020, "Adaptation to Climate Change: Decision Making and Opportunities for Transformation in Jakarta, Indonesia"; Shirleyana et al., 2020, "Narratives of Everyday Resilience: Lessons from an Urban Kampung Community in Surabaya, Indonesia," International Journal of Disaster Resilience in the Built Environment.
[46] Gokkon, 2019, "Indonesia Picks Coal and Oil Heartland as Site of New Capital City," Mongabay Environmental News; Diela, 2019, "Sleepy to Sleepless? Indonesia's Future Capital in the Forest," Reuters.
[47] See http://smartcity.jakarta.go.id.
[48] UNESCAP and UN Habitat, 2019, "The Future of Asian and Pacific Cities 2019: Transformative Pathways Towards Sustainable Urban Development."
[49] Davy, 2019, "What Lies Ahead of Indonesia's 100 Smart Cities Movement?," The Jakarta Post.
[50] Pratama, 2018, "Smart City Narrative in Indonesia: Comparing Policy Documents in Four Cities," Public Administration Issues.
[51] Davy, 2019, "What Lies Ahead of Indonesia's 100 Smart Cities Movement?," The Jakarta Post.
[52] APJII, 2020, "Laporan Survei Internet APJII 2019–2020," Asosiasi Penyelenggara Jasa Internet Indonesia.
[53] The Economist Group, 2021, "EIU Inclusive Internet Index," The Inclusive Internet Index.
[54] UNESCAP and UN Habitat, 2019, "The Future of Asian and Pacific Cities 2019: Transformative Pathways Towards Sustainable Urban Development."
[55] UN DESA, 2018, "World Urbanization Prospects: The 2018 Revision."
[56] Roberts, Sander, and Tiwari, 2019, Time to ACT: Realizing Indonesia's Urban Potential.
[57] UN DESA, 2018, "World Urbanization Prospects: The 2018 Revision."
[58] The analysis examined multiple studies to compare potential climate change impacts in Indonesia on the RCP4.5 and RCP8.5 pathways. The projected global mean temperature increase in RCP4.5, would be 1.4°C by 2046–2065, and 1.8°C by 2018–2100, relative to the 1986–2005 average. In RCP8.5, representing uncontrolled emissions growth, the projected mean temperature increase by 2041 would be 2.0°C, and by 2081–2100, 3.7°C. For a simplified overview of the RCPs, see this infographic from CoastAdapt in Australia: https://coastadapt.com.au/infographics/what-are-rcps.
[59] Bappenas, 2019, "Low Carbon Development: A Paradigm Shift Towards a Green Economy in Indonesia." The passage cited is on p. 135; for details, including a comparison between RCP4.5 and RCP8.5, see Table 9 on pp. 96–97.
[60] Mulhern, 2020, "Indonesia Will Be Too Hot to Live In by 2070," Earth.Org.
[61] Rikin, 2019, "Indonesia Sees Record Temperatures, Expects Blistering Heat to Continue Until Next Week," Jakarta Globe.
[62] Septiane, 2017, "Jakarta's Construction Workers on the Front Lines as Heat Extremes Grow," Thomson Reuters Foundation (blog).
[63] Bappenas, 2019, "Low Carbon Development: A Paradigm Shift Towards a Green Economy in Indonesia."
[64] The Economist, 2020, "Flooding in Jakarta Is the Worst for over a Decade."
[65] Januriyadi, 2020, "Jakarta's Flood Costs Will Increase by up to 400% by 2050, Research Shows," The Conversation (blog); see also Suroyo and Diela, 2020, "Indonesia Suffers First Recession in over 20 Years, Finmin Says 'Worst Is Over,'" Reuters.
[66] Analysis by the City University of New York Institute for Demographic Research, Institute for Development Studies, and the Center for International Earth Science Information Network, Columbia University, 2019, for the Coalition for Urban Transitions and the Global Commission on Adaptation. See Annex 4 for a detailed methodology: https://urbantransitions.global/urban-opportunity/seizing-the-urban-opportunity/annexes/. This is significantly higher than the 42 million estimated in Bappenas, 2019, "Low Carbon Development: A Paradigm Shift Towards a Green Economy in Indonesia."

[67] Bappenas, 2019, “Low Carbon Development: A Paradigm Shift Towards a Green Economy in Indonesia.”
[68] Hutchinson, 2018, “Tsunami in Indonesia Is Latest in Rash of Disasters on Active ‘Ring of Fire,’” ABC News.
[69] Paton and Sagala, 2018, Disaster Risk Reduction in Indonesia: Environmental, Social and Cultural Aspects.
[70] Hoegh-Guldberg et al., 2018, “Impacts of 1.5°C of Global Warming on Natural and Human Systems,” in Global Warming of 1.5°C. An IPCC Special Report on the Impacts of Global Warming of 1.5°C above Pre-Industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty.
[71] Gunawan et al., 2015, “City Risk Diagnostic for Urban Resilience in Indonesia.”
[72] This analysis merged three types of data: elevation, urban/rural classification, and population. For a full description of the data sources, approach and limitations, see Annex 4: https://urbantransitions.global/urban-opportunity/seizing-the-urban-opportunity/annexes/.
[73] Hallegatte, Rentschler, and Rozenberg, 2019, Lifelines: The Resilient Infrastructure Opportunity; Val et al., 2019, “Climate Change-Related Risks and Adaptation of Interdependent Infrastructure Systems,” in Climate Adaptation Engineering; Rodrigue, 2020, The Geography of Transport Systems.
[74] Wirayani, 2017, “Port Operator to Implement Reclamation at Tanjung Emas Port,” The Jakarta Post.
[75] Suherdjoko, 2018, “Ahmad Yani Airport Opens New Terminal,” The Jakarta Post.
[76] Gokkon, 2020, “Indonesian Levee Project Serves Industry over Community, Study Says,” Mongabay Environmental News.
[77] Bappenas, 2019, “Low Carbon Development: A Paradigm Shift Towards a Green Economy in Indonesia.”
[78] Simarmata and Surtiari, 2020, “Adaptation to Climate Change: Decision Making and Opportunities for Transformation in Jakarta, Indonesia.”
[79] Bappenas, 2019, “Low Carbon Development: A Paradigm Shift Towards a Green Economy in Indonesia.”
[80] Giri et al., 2011, “Status and Distribution of Mangrove Forests of the World Using Earth Observation Satellite Data,” Global Ecology and Biogeography.
[81] Bappenas, 2019, “Low Carbon Development: A Paradigm Shift Towards a Green Economy in Indonesia.”
[82] See Global Fire Emissions Database: http://www.globalfiredata.org/updates.html#2015_indonesia. It is important to note that there is “substantial uncertainty” about this estimate, but it is provided as an indication of the severity of the fires.
[83] See https://brg.go.id/rencana-strategis-badan-restorasi-gambut-2016-2020/.
[84] Warren et al., 2017, “An Appraisal of Indonesia’s Immense Peat Carbon Stock Using National Peatland Maps: Uncertainties and Potential Losses from Conversion,” Carbon Balance and Management; for a global perspective on the enormous importance of peatlands for climate change mitigation, see Leifeld and Menichetti, 2018, “The Underappreciated Potential of Peatlands in Global Climate Change Mitigation Strategies,” Nature Communications.
[85] Sidik et al., 2018, “Mangrove Conservation for Climate Change Mitigation in Indonesia,” WIREs Climate Change.
[86] UNESCAP and UN Habitat, 2019, “The Future of Asian and Pacific Cities 2019: Transformative Pathways Towards Sustainable Urban Development.”
[87] Pangeran and Akbar, 2020, “Cities for Marginal Community: Lesson Learned from Indonesia’s Slum Alleviation Program,” ISOCARP Review.

[88] Simarmata and Surtiari, 2020, "Adaptation to Climate Change: Decision Making and Opportunities for Transformation in Jakarta, Indonesia."
[89] See https://proklim.org.
[90] Government of Indonesia, 2019, "Indonesia's Effort to Phase out and Rationalise Its Fossil-Fuel Subsidies."
[91] Pradiptyo et al., 2016, "Financing Development with Fossil Fuel Subsidies: The Reallocation of Indonesia's Gasoline and Diesel Subsidies in 2015."
[92] See https://www.kemenkeu.go.id/publikasi/laporan/laporan-keuangan-pemerintah-pusat/ and Government of Indonesia, 2019, "Indonesia's Effort to Phase out and Rationalise Its Fossil-Fuel Subsidies."
[93] Government of Indonesia, 2019, "Indonesia's Effort to Phase out and Rationalise Its Fossil-Fuel Subsidies."
[94] Government of Indonesia, 2011, "Master Plan for the Acceleration and Expansion of Indonesia's Economic Development (MP3EI) 2011-2025 (Master Plan Percepatan Dan Perluasan Pembangunan Ekonomi Indonesia (MP3EI) 2011-2025)."
[95] Tharakan, 2015, "Summary of Indonesia's Energy Sector Assessment."
[96] National Energy Council, 2019, "Indonesia Energy Outlook 2019."
[97] IEA, 2019, "The Future of Cooling in Southeast Asia."
[98] See Economist Intelligence Unit analysis: https://foodsustainability.eiu.com/food-loss-and-waste/.
[99] Soma, 2018, "(Re)Framing the Food Waste Narrative: Infrastructures of Urban Food Consumption and Waste in Indonesia," Indonesia; 2017, "Gifting, Ridding and the 'Everyday Mundane': The Role of Class and Privilege in Food Waste Generation in Indonesia," Local Environment.
[100] Bappenas, 2019, "2020-2024 National Medium-Term Development Plan (Rencana Pembangunan Jangka Menengah Nasional 2020-2024)."
[101] Bappenas, 2019, "Low Carbon Development: A Paradigm Shift Towards a Green Economy in Indonesia."
[102] Republic of Indonesia, 2016, "First Nationally Determined Contribution."
[103] See Climate Action Tracker: https://climateactiontracker.org/countries/indonesia/.
[104] Modelling for the Coalition by the Stockholm Environment Institute. See Annex 1 for a detailed methodology: https://urbantransitions.global/urban-opportunity/seizing-the-urban-opportunity/annexes/.
[105] This analysis estimates global urban GHG abatement potential using a bottom-up assessment of mitigation options in urban buildings, transportation, infrastructure construction and waste management. For a detailed methodology, including assumptions and data sources, see Annex 1: https://urbantransitions.global/urban-opportunity/seizing-the-urban-opportunity/annexes/.
[106] Modelling for the Coalition by Vivid Economics. These estimates are indicative only, and do not yet account for potential changes due to COVID-19. For a detailed methodology, see Annex 2: https://urbantransitions.global/urban-opportunity/seizing-the-urban-opportunity/annexes/.
[107] These estimates are indicative only, and include direct, indirect and induced jobs.
[108] These estimates of annual returns and net present value are sensitive to discount rates, energy prices, learning rates, and other factors. Job creation estimates are only indicative and include direct, indirect and induced full-time equivalent jobs. For a detailed methodology and data sources, see Annex 2: https://urbantransitions.global/urban-opportunity/seizing-the-urban-opportunity/annexes/.
[109] Reuters, 2019, "Indonesia President Signs New EV Decree to Bolster Industry."
[110] IEA electricity generation by source data at https://www.iea.org/countries/indonesia.

[111] Ministry of Energy and Mineral Resources, 2020, "Handbook Of Energy & Economic Statistics Of Indonesia." Coal use grew even faster, by 146%, even as its share of the primary energy mix declined from 47.35% in 2009 to 35.03% in 2019.
[112] Government of Indonesia, 2014, "Government Regulation No. 79/2014 on National Energy Policy."
[113] Mulyana, 2020, "Energi terbarukan ditargetkan sumbang 23% kebutuhan energi nasional pada 2025," Kontan Online.
[114] Ministry of Energy and Mineral Resources, 2017, "Electricity Supply Business Plan (Rencana Usaha Penyediaan Tenaga Listrik, RUPTL) 2019-2028."
[115] See Johns Hopkins University Coronavirus Resource Center: https://coronavirus.jhu.edu/data/mortality.
[116] Suroyo and Diela, 2020, 'Indonesia Suffers First Recession in over 20 Years, Finmin Says "Worst Is Over"', Reuters.
[117] Vivid Economics, 2021, "Greenness of Stimulus Index: An Assessment of COVID-19 Stimulus by G20 Countries and Other Major Economies in Relation to Climate Action and Biodiversity Goals (February 2021 Release)."
[118] Ministry of Finance, 2020, "Pemerintah Siapkan Anggaran Infrastruktur Rp417,8 Triliun untuk Tahun 2021," Kementerian Keuangan – Berita.
[119] Vivid Economics, 2020, "Greenness of Stimulus Index: An Assessment of COVID-19 Stimulus by G20 Countries and Other Major Economies in Relation to Climate Action and Biodiversity Goals (December 2020 Release)."
[120] See http://www.citiesracetozero.org and the listing of cities in the Climate Ambition Alliance, at https://climateaction.unfccc.int/views/cooperative-initiative-details.html?id=94.
[121] IRENA, 2017, "Renewable Energy Prospects: Indonesia."
[122] Indonesia aims to start manufacturing electric vehicles (EVs) by 2022 and have EVs make up 20% of the country's auto production by 2025. See Reuters, 2019, "Indonesia President Signs New EV Decree to Bolster Industry."
[123] UNESCAP and UN Habitat, 2019, "The Future of Asian and Pacific Cities 2019: Transformative Pathways Towards Sustainable Urban Development"; Foo, Priantono, and Vincent, 2015, "Building Indonesia's Future Through Smarter Cities," PwC Indonesia (blog).

REFERENCES

APJII. 2020. “Laporan Survei Internet APJII 2019–2020.” Asosiasi Penyelenggara Jasa Internet Indonesia. 2020. https://apjii.or.id/survei.

Baker, J.L., and G.U. Gadgil. 2017. “East Asia and Pacific Cities: Expanding Opportunities for the Urban Poor.” Washington, DC: World Bank. http://hdl.handle.net/10986/27614.

Bappenas. 2019. “2020-2024 National Medium-Term Development Plan (Rencana Pembangunan Jangka Menengah Nasional 2020-2024).” Jakarta: Ministry of National Development Planning, Government of Indonesia. https://www.bappenas.go.id/files/rpjmn/Narasi%20Rancangan%20RPJMN%202020-2024.pdf.

Bappenas. 2019. “Low Carbon Development: A Paradigm Shift Towards a Green Economy in Indonesia.” Low Carbon Development Initiative (LCDI) report. Jakarta: Ministry of National Development Planning, Government of Indonesia. https://www.bappenas.go.id/id/berita-dan-siaran-pers/pembangunan-rendah-karbon-pergeseranparadigma-menuju-ekonomi-hijau-di-indonesia/.

C40 Cities. 2020. “How to Build Back Better with a 15-Minute City.” Implementation guide. C40 Cities Climate Leadership Group and C40 Knowledge Hub. https://www.c40knowledgehub.org/s/article/How-to-build-back-better-with-a-15-minute-city?language=en_US.

CUT. 2019. “Climate Emergency, Urban Opportunity.” Global Report. London and Washington, DC: Coalition for Urban Transitions, in partnership with C40 Cities Climate Leadership Group and Ross Center for Sustainable Cities, World Resources Institute. https://urbantransitions.global/en/publication/climate-emergency-urban-opportunity/.

CUT. 2021. “Seizing the Urban Opportunity: How National Governments Can Recover from COVID-19, Tackle the Climate Crisis, and Secure Shared Prosperity through Cities.” London and Washington, DC: Coalition for Urban Transitions. https://urbantransitions.global/publications/.

Davy, J. 2019. “What Lies Ahead of Indonesia’s 100 Smart Cities Movement?” The Jakarta Post, December 5, 2019. https://www.thejakartapost.com/life/2019/12/05/what-lies-ahead-of-indonesias-100-smart-cities-movement.html.

Diela, T. 2019. “Sleepy to Sleepless? Indonesia’s Future Capital in the Forest.” Reuters, September 5, 2019. https://www.reuters.com/article/us-indonesia-capital-idUSKCN1VP01Y.

Dwirahmadi, F., S. Rutherford, D. Phung, and C. Chu. 2019. “Understanding the Operational Concept of a Flood-Resilient Urban Community in Jakarta, Indonesia, from the Perspectives of Disaster Risk Reduction, Climate Change Adaptation and Development Agencies.” International Journal of

Environmental Research and Public Health 16 (20): 3993. doi:10.3390/ijerph16203993.

Erkens, G., T. Bucx, R. Dam, G. de Lange, and J. Lambert. 2015. “Sinking Coastal Cities.” Proceedings of the International Association of Hydrological Sciences 372 (November): 189–98. doi:https://doi.org/10.5194/piahs-372-189-2015.

Foo, M., A. Priantono, and C. Vincent. 2015. “Building Indonesia’s Future Through Smarter Cities.” PwC Indonesia (blog). 2015. https://www.pwc.com/id/en/media-centre/pwc-in-news/2015/english/indonesia-smarter-cities.html.

Giri, C., E. Ochieng, L.L. Tieszen, Z. Zhu, A. Singh, T. Loveland, J. Masek, and N. Duke. 2011. “Status and Distribution of Mangrove Forests of the World Using Earth Observation Satellite Data.” Global Ecology and Biogeography 20 (1): 154–59. doi:https://doi.org/10.1111/j.1466-8238.2010.00584.x.

Gokkon, B. 2019. “Indonesia Picks Coal and Oil Heartland as Site of New Capital City.” Mongabay Environmental News, August 26, 2019, sec. Environmental news. https://news.mongabay.com/2019/08/indonesia-picks-coal-and-oil-heartland-as-site-of-new-capital-city/.

Gokkon, B. 2020. “Indonesian Levee Project Serves Industry over Community, Study Says.” Mongabay Environmental News, May 22, 2020, sec. Environmental news. https://news.mongabay.com/2020/05/indonesian-levee-project-serves-industry-over-community-study-says/.

Government of Indonesia. 2011. “Master Plan for the Acceleration and Expansion of Indonesia’s Economic Development (MP3EI) 2011-2025 (Master Plan Percepatan Dan Perluasan Pembangunan Ekonomi Indonesia (MP3EI) 2011-2025).” Jakarta: Coordinating Ministry for Economic Affairs, Republic of Indonesia Ministry of National Development Planning/ National Development Planning Agency. https://www.bappenas.go.id/id/berita-dan-siaran-pers/kegiatan-utama/master-plan-percepatan-dan-perluasan-pembangunan-ekonomi-indonesia-mp3ei-2011-2025/.

Government of Indonesia. 2014. “Government Regulation No. 79/2014 on National Energy Policy.” Jakarta: President of the Republic of Indonesia. https://policy.asiapacificenergy.org/sites/default/files/National%20Energy%20Policy%202014_0.pdf.

Government of Indonesia. 2019. “Indonesia’s Effort to Phase out and Rationalise Its Fossil-Fuel Subsidies.” Self report on the G20 peer review of inefficient fossil fuel subsidies that encourage wasteful consumption in Indonesia. Jakarta: Ministry of Energy and Mineral Resources and Ministry of Finance.

Greenstone, M., and Q. Fan. 2019. “Indonesia’s Worsening Air Quality and Its Impact on Life Expectancy.” Air Quality Life Index Update March 2019. Chicago, IL, US: Energy Policy Institute at the University of Chicago. https://aqli.epic.uchicago.edu/wp-content/uploads/2019/03/Indonesia-Report.pdf.

Gunawan, I., S. Sagala, S. Amin, H. Zawani, and R. Mangunsong. 2015. “City Risk Diagnostic for Urban Resilience in Indonesia.” Jakarta: World Bank. https://openknowledge.worldbank.org/handle/10986/23771.

Hallegatte, S., J. Rentschler, and J. Rozenberg. 2019. Lifelines: The Resilient Infrastructure Opportunity. Sustainable Infrastructure Series. Washington, DC: The World Bank. doi:10.1596/978-1-4648-1430-3.

Hoegh-Guldberg, O., D. Jacob, M. Taylor, M. Bindi, S. Brown, I. Camilloni, A. Diedhiou, et al. 2018. “Impacts of 1.5°C of Global Warming on Natural and Human Systems.” In Global Warming of 1.5°C. An IPCC Special Report on the Impacts of Global Warming of 1.5°C above Pre-Industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty, edited by V. Masson-Delmotte, P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, et al. Geneva: Intergovernmental Panel on Climate Change. https://www.ipcc.ch/sr15/.

Husnayaen, A.B. Rimba, T. Osawa, I.N.S. Parwata, Abd.R. As-syakur, F. Kasim, and I.A. Astarini. 2018. “Physical Assessment of Coastal Vulnerability under Enhanced Land Subsidence in Semarang, Indonesia, Using Multi-Sensor Satellite Data.” Advances in Space Research 61 (8): 2159–79. doi:10.1016/j.asr.2018.01.026.

Hutchinson, B. 2018. “Tsunami in Indonesia Is Latest in Rash of Disasters on Active ‘Ring of Fire.’” ABC News, December 24, 2018. https://abcnews.go.com/US/scientists-rash-earthquakes-volcanic-eruptions-ring-fire-connected/story?id=52548632.

IEA. 2019. “The Future of Cooling in Southeast Asia.” Paris: International Energy Agency. https://www.iea.org/reports/the-future-of-cooling-in-southeast-asia.

IRENA. 2017. “Renewable Energy Prospects: Indonesia.” Abu Dhabi: International Renewable Energy Agency. /publications/2017/Mar/Renewable-Energy-Prospects-Indonesia.

Januriyadi, N.F. 2020. “Jakarta’s Flood Costs Will Increase by up to 400% by 2050, Research Shows.” The Conversation (blog). January 11, 2020. http://theconversation.com/jakartas-flood-costs-will-increase-by-up-to-400-by-2050-research-shows-129698.

Jones, G., and W. Mulyana. 2015. “Urbanization in Indonesia.” UNFPA Indonesia Monograph Series No. 4. The Monograph Series No. 4. Jakarta: United Nations Population Fund. https://indonesia.unfpa.org/en/publications/monograph-series-no-4-urbanization-indonesia.

Leifeld, J., and L. Menichetti. 2018. “The Underappreciated Potential of Peatlands in Global Climate Change Mitigation Strategies.” Nature Communications 9 (1): 1071. doi:10.1038/s41467-018-03406-6.

Lin, M.M., and R. Hidayat. 2018. “Jakarta, the Fastest-Sinking City in the World.” BBC News, August 12, 2018, sec. Asia. https://www.bbc.com/news/world-asia-44636934.

Ministry of Energy and Mineral Resources. 2017. “Electricity Supply Business Plan (Rencana Usaha Penyediaan Tenaga Listrik, RUPTL) 2019-2028.” Jakarta: Government of Indonesia. http://web.pln.co.id/stakeholder/ruptl.

Ministry of Energy and Mineral Resources. 2020. “Handbook Of Energy & Economic Statistics Of Indonesia.” Jakarta: Government of Indonesia. https://www.esdm.go.id/en/publication/handbook-of-energy-economic-statistics-of-indonesia-heesi.

Ministry of Finance. 2020. “Pemerintah Siapkan Anggaran Infrastruktur Rp417,8 Triliun untuk Tahun 2021.” Kementerian Keuangan – Berita. November 17, 2020. https://www.kemenkeu.go.id/publikasi/berita/pemerintah-siapkan-anggaran-infrastruktur-rp417-8-triliun-untuk-tahun-2021/.

Mulhern, O. 2020. “Indonesia Will Be Too Hot to Live In by 2070.” Earth.Org. October 19, 2020. https://earth.org/data_visualization/extreme-temperatures-in-indonesia-will-be-too-hot-to-live-in/.

Mulyana, R.N. 2020. “Energi terbarukan ditargetkan sumbang 23% kebutuhan energi nasional pada 2025.” Kontan Online, August 20, 2020, sec. industri. http://industri.kontan.co.id/news/pln-targetkan-energi-terbarukan-sumbang-23-kebutuhan-energi-nasional-pada-2025.

National Energy Council. 2019. “Indonesia Energy Outlook 2019.” Jakarta: Government of Indonesia. https://www.esdm.go.id/en/publication/indonesia-energy-outlook.

Oudenhoven, A.P.E. van, A.J. Siahainenia, I. Sualia, F.H. Tonneijck, S. van der Ploeg, R.S. de Groot, R. Alkemade, and R. Leemans. 2015. “Effects of Different Management Regimes on Mangrove Ecosystem Services in Java, Indonesia.” Ocean & Coastal Management 116 (November): 353–67. doi:10.1016/j.ocecoaman.2015.08.003.

Pangeran, A., and R.J. Akbar. 2020. “Cities for Marginal Community: Lesson Learned from Indonesia’s Slum Alleviation Program.” ISOCARP Review 15 (August): 20.

Paton, D., and S. Sagala. 2018. Disaster Risk Reduction in Indonesia: Environmental, Social and Cultural Aspects. Charles C Thomas Publisher. https://www.ccthomas.com/details.cfm?P_ISBN13=9780398092276.

Pradiptyo, R., A. Susamto, A. Wirotomo, A. Adisasmita, and C. Beaton. 2016. “Financing Development with Fossil Fuel Subsidies: The Reallocation of Indonesia’s Gasoline and Diesel Subsidies in 2015.” Global Subsidies Initiative report. Winnipeg: International Institute for Sustainable Development. https://www.iisd.org/publications/financing-development-fossil-fuel-subsidies-reallocation-indonesias-gasoline-and.

Pratama, A.B. 2018. “Smart City Narrative in Indonesia: Comparing Policy Documents in Four Cities.” Public Administration Issues, no. 6: 65–83.

PUPR. 2021. “Di Tengah Pandemi COVID-19, Realisasi Program Sejuta Rumah TA 2020 Capai 965.217 Unit.” Kementerian Pekerjaan Umum Dan Perumahan Rakyat –

Info PUPR. January 8, 2021. https://pu.go.id/berita/di-tengah-pandemi-covid-19-realisasi-program-sejuta-rumah-ta-2020-capai-965217-unit.

Rahman, D.F. 2021. “Govt Housing Program Falls Short of 1 Million Target Last Year.” The Jakarta Post, January 11, 2021. https://www.thejakartapost.com/news/2021/01/10/govt-housing-program-falls-short-of-1-million-target-last-year.html.

Republic of Indonesia. 2016. “First Nationally Determined Contribution.” UNFCCC. NDC Registry. https://www4.unfccc.int/sites/NDCStaging/Pages/All.aspx.

Reuters. 2019. “Indonesia President Signs New EV Decree to Bolster Industry,” August 9, 2019. https://www.reuters.com/article/indonesia-electric-idINL4N255133.

Rikin, A.S. 2019. “Indonesia Sees Record Temperatures, Expects Blistering Heat to Continue Until Next Week.” Jakarta Globe. October 24, 2019. https://jakartaglobe.id/news/indonesia-sees-record-temperatures-expects-blistering-heat-to-continue-until-next-week.

Roberts, M., F.G. Sander, and S. Tiwari. 2019. Time to ACT: Realizing Indonesia’s Urban Potential. Washington, DC: World Bank. http://hdl.handle.net/10986/31304.

Rodrigue, J.-P. 2020. The Geography of Transport Systems. 5th ed. Routledge. Chapter 3.1 Transportation and Economic Development: https://transportgeography.org/?page_id=5423.

Septiane, E. 2017. “Jakarta’s Construction Workers on the Front Lines as Heat Extremes Grow.” Thomson Reuters Foundation (blog). December 20, 2017. https://news.trust.org/item/20171220110721-1grn6/.

Serajuddin, U., and N. Hamadeh. 2020. “New World Bank Country Classifications by Income Level: 2020-2021.” World Bank Data Blog (blog). July 1, 2020. https://blogs.worldbank.org/opendata/new-world-bank-country-classifications-income-level-2020-2021.

Shirleyana, S. Hawken, R.Y. Sunindijo, and D. Sanderson. 2020. “Narratives of Everyday Resilience: Lessons from an Urban Kampung Community in Surabaya, Indonesia.” International Journal of Disaster Resilience in the Built Environment, January. doi:10.1108/IJDRBE-06-2020-0056.

Sidik, F., B. Supriyanto, H. Krisnawati, and M.Z. Muttaqin. 2018. “Mangrove Conservation for Climate Change Mitigation in Indonesia.” WIREs Climate Change 9 (5): e529. doi:https://doi.org/10.1002/wcc.529.

Simarmata, H.A., and G.A.K. Surtiari. 2020. “Adaptation to Climate Change: Decision Making and Opportunities for Transformation in Jakarta, Indonesia.” Research Paper 2020-3, prepared for the UNRISD project Transformative Adaptation to Climate Change in Southeast Asian Coastal Cities. Geneva: United Nations Research Institute for Social Development. https://www.unrisd.org/unrisd/website/document.nsf/(httpPublications)/FA1FD6C0607E095380258639005271FA?OpenDocument.

Soma, T. 2017. “Gifting, Ridding and the ‘Everyday Mundane’: The Role of Class and Privilege in Food Waste Generation in Indonesia.” Local Environment 22 (12): 1444–60. doi:10.1080/13549839.2017.1357689.

Soma, T. 2018. “(Re)Framing the Food Waste Narrative: Infrastructures of Urban Food Consumption and Waste in Indonesia.” Indonesia 105 (1): 173–90. doi:10.1353/ind.2018.0007.

Suherdjoko. 2018. “Ahmad Yani Airport Opens New Terminal.” The Jakarta Post, June 6, 2018. https://www.thejakartapost.com/news/2018/06/06/achmad-yani-airport-opens-new-terminal.html.

Suroyo, G., and T. Diela. 2020. “Indonesia Suffers First Recession in over 20 Years, Finmin Says ‘Worst Is Over.’” Reuters, November 5, 2020. https://www.reuters.com/article/us-indonesia-economy-gdp-idUSKBN27L0GL.

Tharakan, P. 2015. “Summary of Indonesia’s Energy Sector Assessment.” Papers and Briefs ADB Papers on Indonesia No. 09. Manila: Asian Development Bank. https://www.adb.org/publications/summary-indonesias-energy-sector-assessment.

The Economist. 2020. “Flooding in Jakarta Is the Worst for over a Decade,” January 11, 2020. https://www.economist.com/asia/2020/01/11/flooding-in-jakarta-is-the-worst-for-over-a-decade.

The Economist Group. 2021. “EIU Inclusive Internet Index.” The Inclusive Internet Index. 2021. https://theinclusiveinternet.eiu.com/explore/countries/performance.

The Jakarta Post. 2019. “Housing Program Exceeds 1 Million Target in 2018.” The Jakarta Post, January 9, 2019. https://www.thejakartapost.com/news/2019/01/09/housing-program-exceeds-1-million-target-in-2018.html.

UN DESA. 2018. “World Urbanization Prospects: The 2018 Revision.” New York: United Nations Department of Economic and Social Affairs, Population Division. https://population.un.org/wup/Country-Profiles/.

UNESCAP, and UN Habitat. 2019. “The Future of Asian and Pacific Cities 2019: Transformative Pathways Towards Sustainable Urban Development.” Bangkok: United Nations Economic and Social Commission for Asia and the Pacific and United Nations Human Settlements Programme. https://www.unescap.org/publications/future-asian-and-pacific-cities-2019-transformative-pathways-towards-sustainable-urban.

University of Exeter. 2020. “Indonesian Wildfires a ‘Fixable Problem.’” Research News. November 20, 2020. https://www.exeter.ac.uk/news/research/title_827766_en.html.

Val, D.V., D. Yurchenko, M. Nogal, and A. O’Connor. 2019. “Climate Change-Related Risks and Adaptation of Interdependent Infrastructure Systems.” In Climate Adaptation Engineering, edited by E. Bastidas-Arteaga and M.G. Stewar, 207–42. Butterworth-Heinemann. doi:10.1016/B978-0-12-816782-3.00007-3.

Vivid Economics. 2021. “Greenness of Stimulus Index: An Assessment of COVID-19 Stimulus by G20 Countries and Other Major Economies in Relation to Climate Action and Biodiversity Goals (February 2021 Release).” Finance for Biodiversity Initiative. https://www.vivideconomics.com/casestudy/greenness-for-stimulus-index/.

Warren, M., K. Hergoualc’h, J.B. Kauffman, D. Murdiyarso, and R. Kolka. 2017. “An Appraisal of Indonesia’s Immense Peat Carbon Stock Using National Peatland Maps: Uncertainties and Potential Losses from Conversion.” Carbon Balance and Management 12 (May). doi:10.1186/s13021-017-0080-2.

Wirayani, P. 2017. “Port Operator to Implement Reclamation at Tanjung Emas Port.” The Jakarta Post, February 22, 2017. https://www.thejakartapost.com/news/2017/02/22/port-operator-to-implement-reclamation-at-tanjung-emas-port.html.

World Bank. 2016. “Indonesia’s Urban Story.” The Role of Cities. Jakarta: World Bank Group. https://www.worldbank.org/en/news/feature/2016/06/14/indonesia-urban-story.

World Bank. 2017. “Indonesia – National Affordable Housing Program Project.” Project Appraisal Document PAD1788. Washington, DC. https://documents.worldbank.org/en/publication/documents-reports/documentdetail/121201489975262694/Indonesia-National-Affordable-Housing-Program-Project.

World Bank. 2019. “Aspiring Indonesia—Expanding the Middle Class.” Washington, DC. http://hdl.handle.net/10986/33237.

World Bank. 2020. “Indonesia: Poverty & Equity Brief.” Text/HTML. Washington, DC. https://www.worldbank.org/en/topic/poverty/publication/poverty-and-equity-briefs.

This report should be cited as:

Coalition for Urban Transitions. 2021. “Seizing Indonesia’s Urban Opportunity.” World Resources Institute (WRI) Ross Center for Sustainable Cities and C40 Cities. London and Washington, DC. Available at: https://urbantransitions.global/en/publication/seizing-the-urban-opportunity.

ACKNOWLEDGEMENTS

Co-authored by: Marion Davis, Shagun Mehrotra, Hendricus Andy Simarmata, Retno Wihanesta, Robin King, Alfredo Redondo, Anna Kustar, Christopher Gillespie, Freya Stanley-Price, Jessica Hanlon, Leah Lazer, Nick Godfrey (Programme Director), Pandora Batra, and Sophia Vitello.

With guidance, support and contributions from Andrea Fernández, Andrew Steer, Angelo Angel, Ani Dasgupta, Catlyne Haddaoui, Giulia De Giovanni, Kalpa Taylor, Kerry LePain, Larissa da Silva, Manisha Gulati, Mark Watts, Nirarta ‘Koni’ Samadhi, Rachel Spiegel, and Tom Lindsay.

Modelling and related analysis were conducted by the following researchers:

Annex 1: Technically feasible urban mitigation potential of buildings, transport, waste, and energy sectors

Derik Broekhoff – Stockholm Environment Institute

Annex 2: Economic impacts of urban mitigation investments

Jake Wellman, James Patterson-Waterston and Jason Eis – Vivid Economics

Annex 3: Global conversion of land to urban purposes

Alejandro Blei, Shlomo Angel and Xinyue Zhang – Marron Institute of Urban Management, New York University

Annex 4: Proportion of urban residents and urban land less than 10 meters above sea level

Deborah Balk – CUNY Institute for Demographic Research, City University of New York; Gordon McGranahan – Institute for Development Studies; Kytt MacManus – Center for International Earth Science Information Network, Columbia University; and Hasim Engin – CUNY Institute for Demographic Research, City University of New York

Expert reviewers

Our warm thanks to the many Coalition members and partners who reviewed and helped shape this report:

Adi Pradana (WRI Indonesia), Aditi Maheshwari (UN Secretary-General's Office, Climate Action Team, Anindita Nur Annisa (WRI Indonesia), Anjali Mahendra (World Resources Institute), Ari Mochamad Arif (ICLEI), Arief Wijaya (WRI Indonesia), Aykut Mert Yakut (Economic & Social Research Institute), Aziza Akhmouch (Organisation for Economic Cooperation and Development), Clorinda Wibowo (WRI Indonesia), Cynthia Maharani (WRI Indonesia), Daniel Schensul (UN Secretary-General's Office, Climate Action Team), Dean Affandi (WRI Indonesia), Egi Suarga (WRI Indonesia), Harriet Tregoning (World Resources Institute), Helen Civil (The Resilience Shift), Juliet Mian (The Resilience Shift), Laura Malaguzzi Valeri (World Resources Institute), Mario Finch (World Resources Institute), Matthew Coghlan (UN Secretary-General's Office, Climate Action Team), Neelam Singh (World Resources Institute), Panmao Zhai, Philipp Rode (LSE Cities), Rebecca Laberenne (The Resilience Shift), Rogier Vandenberg (World Resources Institute), Seth Schultz (The Resilience Shift), Suryani Amin (C40 Cities), Tadashi Matsumoto (Organisation for Economic Cooperation and Development), Teti Armiati Argo (Indonesian Association of Urban and Regional Planners), and Tiza Mafira (Climate Policy Initiative).

This report incorporates inputs from a webinar with national government institutions held on 6 November 2020. We express our gratitude to the speakers from the Directorate of Environment and Directorate of Local Development – Ministry of National Development Planning (*Bappenas*); the Regional Infrastructures Development Agency – Ministry of Public Works and Housing; the Directorate of National Spatial Planning – Ministry of Agrarian and Spatial Planning; and the Association of the Indonesia Municipalities (*Asosiasi Pemerintah Kota Seluruh Indonesia/APEKSI*) and participants from the Indonesian Association of Regional and Urban Planners (*Ikatan Ahli Perencanaan Indonesia/IAP*), ICLEI, C40 and the Research Center for Climate Change – University of Indonesia (RCCC UI).

Reviewers from Her Majesty's Government—Department of Business, Energy, and Industrial Strategy, Cabinet Office and the Foreign, Commonwealth & Development Office—provided local expertise, guidance and support throughout this project as part of a consultation process with the COP26 high-level champions team and diplomatic actors in the six focus countries.

Advisory boards

Urban Leadership Council

Amanda Eichel (Global Covenant of Mayors for Climate & Energy), Andrew Higham (Mission 2020), Andrew Steer (WRI), Dominic Waughray (World Economic Forum), Emilia Sáiz (World Economic Forum/United Cities and Local Governments), Gino Van Begin (ICLEI – Local Governments for Sustainability), Guido Schmidt-Traub (formerly UN Sustainable Development Solutions Network/transitioned from the Council), Helen Clarkson (Climate Group), Helen Mountford (WRI /New Climate Economy), Jeremy Oppenheim (Energy Transitions Commission/SYSTEMIQ), Mark Watts (C40 Cities Climate Leadership Group), Nigel Topping (formerly We Mean Business/recently transitioned from the Council), Richard Baron (2050 Pathways Platform), Sheela Patel (Slum Dwellers International/Society for the Promotion of Area Resource Centres), Tasneem Essop (Climate Action Network), William Cobbett (Cities Alliance), supported by Alice Charles (World Economic Forum), Andy Deacon (Global Covenant of Mayors for Climate & Energy), Heather McGeory (We Mean Business), Yunus Arikan (ICLEI – Local Governments for Sustainability).

Steering Group

Andrew Gouldson (University of Leeds), Andrew Tucker (African Centre for Cities), Aziza Akhmouch (Organisation for Economic Co-operation and Development), Dan Dowling (PwC), David Dodman (International Institute for Environment and Development), Martin Powell (Siemens), Molly Webb (Energy Unlocked), Philip Rode (LSE Cities), Rajat Kathuria (Indian Council for Research on International Economic Relations), Sarah Colenbrander (Overseas Development Institute), Shannon Bouton (McKinsey.org), Ye Qi (The Hong Kong University of Science and Technology), supported by Anton Cartwright (African Centre for Cities) and Tadashi Matsumoto (Organisation for Economic Co-operation and Development)

PARTNERS

The Coalition partners listed endorse the general thrust of the arguments, findings and recommendations made in this report.*

Lead partner

WRI INDONESIA

Managing partners

WORLD RESOURCES INSTITUTE | WRI ROSS CENTER FOR SUSTAINABLE CITIES | C40 CITIES

A special initiative of

THE NEW CLIMATE ECONOMY
The Global Commission on the Economy and Climate

In partnership with

GLOBAL COVENANT of MAYORS for CLIMATE & ENERGY | THE RESILIENCE SHIFT | CHILDREN'S INVESTMENT FUND FOUNDATION | IKATAN AHLI PERENCANAAN INDONESIA IAP

Funded by

UK Government

This material has been funded by the UK government; however, the views expressed do not necessarily reflect the UK government's official policies.

2050 PATHWAYS PLATFORM | AFRICAN CENTRE FOR CITIES | ARUP | Cities Alliance | CITIES CLIMATE FINANCE LEADERSHIP ALLIANCE | CLIMATE GROUP

CLIMATE POLICY INITIATIVE | Center for International Earth Science Information Network | CUNY INSTITUTE FOR DEMOGRAPHIC RESEARCH | Durham University | eit Climate-KIC | Energy Transitions Commission

ENERGYUNLOCKED | European Bank for Reconstruction and Development | GLOBAL COMMISSION ON ADAPTATION | GGGI | ICLEI Local Governments for Sustainability | IKATAN AHLI PERENCANAAN INDONESIA IAP

iied International Institute for Environment and Development | ITUC CSI IGB | LSE The London School of Economics and Political Science | PART OF THE M2020 CAMPAIGN | #IMAGINETHEFUTURE | NYU Marron Institute of Urban Management

OECD | ODI | pwc | SIEMENS | sdi. | SEI Stockholm Environment Institute

香港科技大學 THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY | 清華大學 Tsinghua University | UN HABITAT FOR A BETTER URBAN FUTURE | UCLG United Cities and Local Governments | University of Cape Town | ACDI African Climate & Development Initiative

UNIVERSITY OF LEEDS | vivideconomics | WWF

*The text does not necessarily reflect the personal views or official policies of any of the contributors or their members.

COALITION FOR URBAN TRANSITIONS
C/O WORLD RESOURCES INSTITUTE
10 G ST NE, SUITE 800
WASHINGTON DC, 20002, USA

C40 CITIES CLIMATE LEADERSHIP GROUP
3 QUEEN VICTORIA STREET
LONDON, EC4N 4TQ
UNITED KINGDOM

WRI ROSS CENTER FOR SUSTAINABLE CITIES
WORLD RESOURCES INSTITUTE
10 G ST NE, SUITE 800
WASHINGTON DC, 20002, USA

WRI INDONESIA
WISMA PMI 7TH FL JL. WIJAYA I NO. 63,
KEBAYORAN BARU
JAKARTA SELETAN 12170
INDONESIA

#URBANOPPORTUNITY
URBANTRANSITIONS.GLOBAL