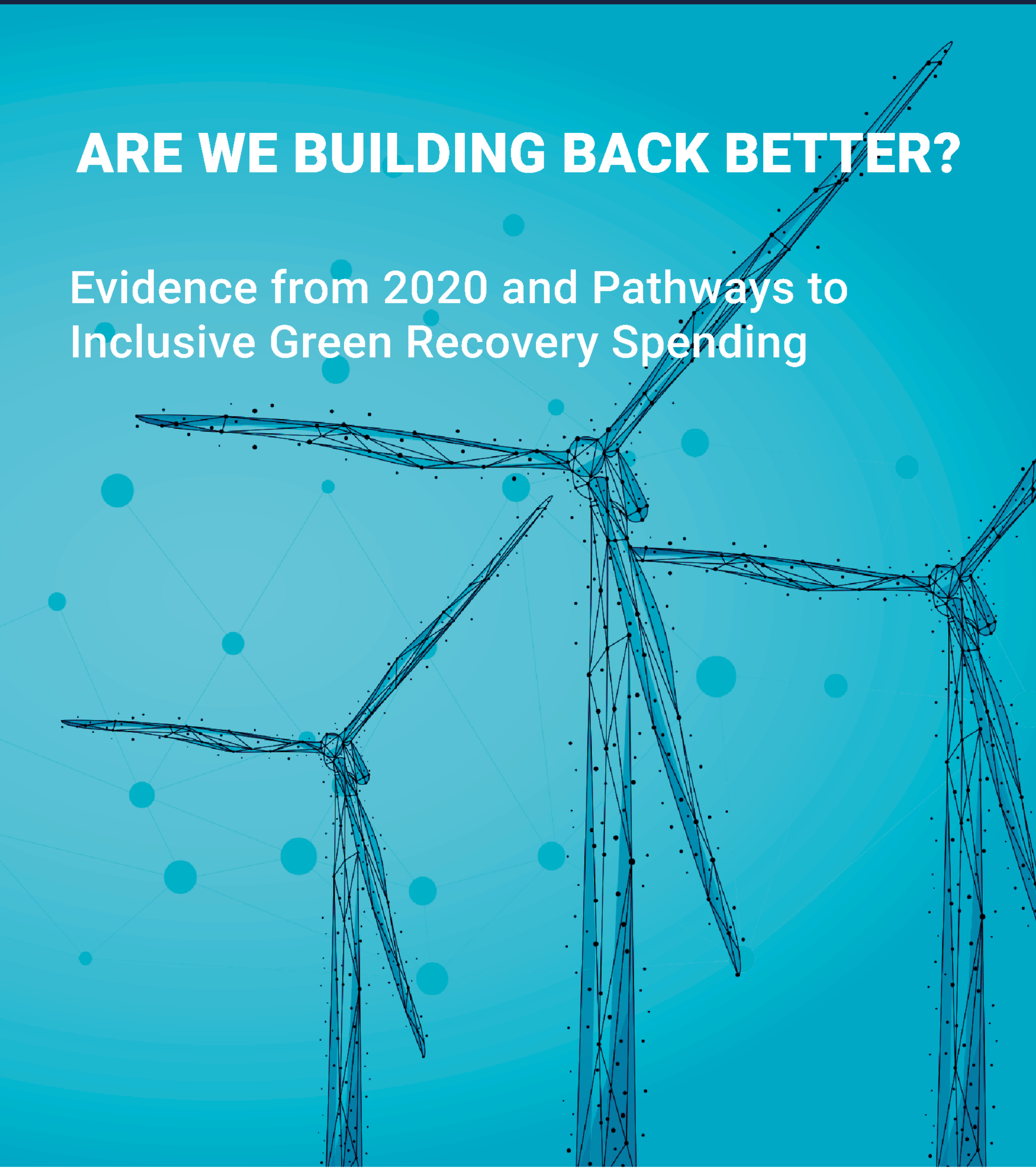
ARE WE BUILDING BACK BETTER?

Evidence from 2020 and Pathways to Inclusive Green Recovery Spending



Global Recovery Observatory

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ECONOMIC RECOVERY PROJECT

UNIVERSITY OF OXFORD

UN environment programme

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FOREWORD

One year ago, the world woke up to find itself unprepared for a public health crisis whose proportions far exceeded anything within our lifetimes. A crisis in all probability linked with nature loss and shrinking habitats – a message from nature. And one that comes on top of the existential, man-made crises of climate instability and growing levels of toxicity and pollution, making us painfully aware that the lack of resilience in our economies and societies is exacerbating existing inequalities within and between countries. The fiscal response to the pandemic from governments around the world has been admirably swift and ambitious in scale. Most governments, and those with the most capacity to do so, have taken extraordinary actions to tackle an unprecedented challenge. But as this paper shows, we risk wasting an opportunity to course correct and heed nature's warning by continuing to allocate spending to investments which degrade the natural environment and our more basic life support systems.

Let me be clear – we understand that rescue spending was and is absolutely essential to provide short-term and immediate relief to boost health services and to households and businesses to keep them afloat, and that governments have little discretion when it comes to designing rescue packages. But they do have choices when thinking about planning recoveries once short-term relief has been provided. This paper, and work by our partners from the Oxford Smith School of Enterprise and the Environment, clearly shows that we are not yet building back better when it comes to recovery spending. On the whole, so far global green spending does not match the severity of the three planetary crises of climate change, nature loss, and pollution, leaving significant social and long-term economic benefits off the table. With this paper, we hope to shine a light on the choices countries have made in 2020 and provide a preliminary idea of how to align recovery spending at a global and national level with the 2030 Agenda and Paris Agreement. While looking back and measuring progress is a part of this exercise, this is not our main objective. Recoveries are just getting started and the bulk of recovery spending is yet to come.

Through the Global Recovery Observatory, and the work UNEP has been doing over the past year to bring evidence to bear on the benefits of investing and making peace with nature, we hope that countries will have the resources and knowledge needed to embed the environment into recovery plans and national economic policymaking. We are thankful for the partnership with the Oxford Smith School of Enterprise and the Environment in developing the framework which has allowed this novel analysis to come to fruition.

Inger Andersen
Executive Director
United Nations Environment Programme

CONTENT

ABSTRACT

A growing body of evidence, including Hepburn et al. (2020), suggests that green fiscal spending can deliver stronger economic returns than traditional spending alternatives. Additionally, studies show that well-designed green spending can counter the environmental crises of climate change, pollution, and biodiversity loss, while also delivering significant social benefits. In response to COVID-19, we find that the fifty largest economies announced USD14.6tn in fiscal spending in 2020, of which USD1.9tn (13.0%) was for long-term economic recovery. But have spending patterns aligned with the Sustainable Development Goals and Paris targets? In this paper, we analyse the characteristics of 2020 COVID-19 spending using over 3,000 spending policies from the Global Recovery Observatory's tracking of the fifty largest economies.

To the question, "Are we building back better?" the answer is: not yet. Early findings suggest that global green spending is so far incommensurate with the scale of ongoing environmental crises and that associated economic and social gains are not being fully captured. Excluding currently uncertain packages from the European Commission, 18.0% of recovery spending, and only 2.5% of total spending, is expected to enhance sustainability. The vast majority of green spending has come from a small set of high-income nations. Debt constraints have restricted spending in emerging market and developing economies, suggesting that substantial concessional finance from international partners will be needed to dampen growing poverty and worsening inequality.

At the time of writing, the largest window for green spending is only now opening, as nations shift attention from short-term rescue measures to recovery. Using examples from 2020 spending, we highlight five major green investment opportunities to be prioritised in 2021: green energy, green transport, green building upgrades & energy efficiency, natural capital, and green research and development.

INTRODUCTION

The effect of the COVID-19 pandemic on lives, livelihoods, and economies has been profound and devastating. Emerging data reveals the extent of the damage, with the global economy contracting an estimated 3.5% in 2020 (IMF, 2021) and global extreme poverty increasing for the first time in over two decades (UNDP, 2020). Widespread business closures, extensive job losses, and deep recessions are just some of the immediate economic effects (World Bank, 2020a). Beyond economic impact, COVID-19 has exposed and, in some cases, exacerbated underlying social and environmental issues. These challenges have spurred calls to 'build back better' from political, corporate, and academic actors.

Chief among the pre-existing issues are widespread inequality and climate change. For the former, both the employment impacts and the health impacts of the pandemic are disproportionately burdening low-income communities, women and gender minorities, and other marginalised individuals (Mongey et al., 2020; Shadmi et al., 2020; Wenham et al., 2020), groups that are already set to be hit hardest by the unfolding climate crisis (Roberts, 2001). For the latter, while an early fall in greenhouse gas (GHG) emissions over the pandemic may seem like a positive effect, this came with significant costs and a full rebound in emissions is now all but inevitable (Le Quéré et al., 2020; Liu et al., 2020).

Countries with fiscal capacity have responded to the economic challenge of COVID-19 with massive spending packages and more is expected. In the first phase of response, packages mainly functioned as emergency rescue spending; to protect lives and livelihoods. In some nations, subsequent packages have focused on recovery spending to repair struggling economies by stimulating consumer demand and economic growth. Whilst some of these fiscal packages have supported supplementary objectives to counter social and environmental challenges, in many cases these needs have been ignored.

A one-dimensional focus on short-term economic recovery risks further exacerbating long-term social and environmental crises. Given the harsh consequences of the pandemic and high costs of inaction, public policy and finance are front and centre for reenergizing growth and ensuring more inclusive and sustainable recovery pathways. Transparency is required to track government progress against long-term economic, environmental, and social objectives, as well as alignment with debt obligations, and contributions to the 2030 Agenda for Sustainable Development and the UNFCCC Paris Agreement.

In response to this critical need, Oxford University, UNEP, and partners have produced the Global Recovery Observatory (the Observatory), supported by IMF and GIZ through the Green Fiscal Policy Network (GFPN).[1] The Observatory tracks the fiscal rescue and recovery spending initiatives of the fifty largest economies at the policy level. Additionally, the Observatory assigns each policy to an exhaustive and mutually exclusive taxonomy of 40 archetypes and 158 sub-archetypes, including spending and some taxation measures.

Based on archetypes, policies are assessed on a variety of economic, environmental, and social impact characteristics, providing indications of potential impacts on major global crises including

[1] *The views represented in this paper do not necessarily reflect the view of the GFPN partners, including the UNEP, GIZ, and IMF.*

climate change, nature loss, pollution, and inequality.

Here, we present early data outputs from the Observatory to understand COVID-19 fiscal spending priorities in 2020 and which environmentally and economically desirable policies are facing underinvestment. We explore generalised policy types that present positive characteristics and countries that may reap particularly high benefits from these policies. In chapter 1 we examine the economic impacts of COVID-19 on countries in 2020 and consider the temporal dimension of global spending. Chapters 2-6 each explore the characteristics of announced spending in one of five priority green policy areas: green energy investment, green transport investment, green building upgrades and energy efficiency investment, natural capital investment, and green research and development (R&D) investment. Throughout these chapters, policy examples from countries were selected based on congruence to the green spending archetype categories to illustrate how these policies are being applied.

These should not be interpreted as examples of perfect policy making. Policy design and uptake will vary significantly between nations depending on their specific contexts and needs. We conclude by highlighting next steps for nations to realise their ambitions for a more sustainable and inclusive recovery.[2]

[2] *This report and the Observatory do not in any way aim to project the precise impacts of policy. Indeed, evolving economic circumstances and inherent difficulties in a priori assessment render any such exercise impossible at a global scale. Instead, this report aims to explore government spending practices thus far, giving broad indications as to actions that may affect GHG emissions, nature loss, air pollution, inequality, and broader sustainability goals.*

1. THE 2020 STORY OF GLOBAL COVID SPENDING

1.1 The economy is on a ventilator

One year after the onset of COVID-19, it is difficult to appreciate the tremendous damage done to economies around the world. Few sectors have remained immune to the pandemic's effects. The most recent World Economic Outlook update (January 2021) paints a grim picture, estimating ~3.5% global growth in 2020 (IMF, 2021). At the time of writing in January 2021, extensive mobility restrictions remain in place in many countries, with a large proportion of businesses closed or operating at reduced capacity. Due to both health and economic factors, the pandemic has had far reaching consequences on lives and livelihoods, likely to last for many years (IMF, 2020b). Job losses, long-term furlough schemes, and impeded schooling have all acted to erode human capital with negative long-term effects to social wellbeing and economic productivity.

Reduced human capital also acts as a headwind against efforts to effectively grow clean industries and transition to a low-carbon future. Existing inequalities in healthcare access and pre-existing conditions have pushed the disease burden onto vulnerable groups (Rollston & Galea, 2020). These groups have also disproportionately carried the economic strain of the pandemic. Both job losses and wage cuts have disproportionately impacted with low-income earners (Aspachs et al., 2020), acting to "reverse the progress made since the 1990s in reducing global poverty and …[increasing] inequality (IMF, 2020b) and exceeding the impacts of previous epidemics on economies of all income levels (Gabriela & Narita, 2020). Women and gender minorities have also been disproportionately impacted (Wenham et al., 2020).

Figure 1 illustrates the potential impacts of the pandemic on low-income earners globally under various Gini scenarios,[3] with even a 2% Gini increase leading to 225 million more people living under $3.20 a day (equivalent to more than two thirds of the entire US population). The World Bank's most recent Global Economic Prospects (2021a) estimates that total new people in poverty in 2020 was likely 119-124 million under the $1.90 poverty line, and 228-236 million under the $3.20 poverty line, with the vast majority concentrated in South Asia (respectively, accounting for 60% and 67% of new poor under the $1.90 and $3.20 baselines).

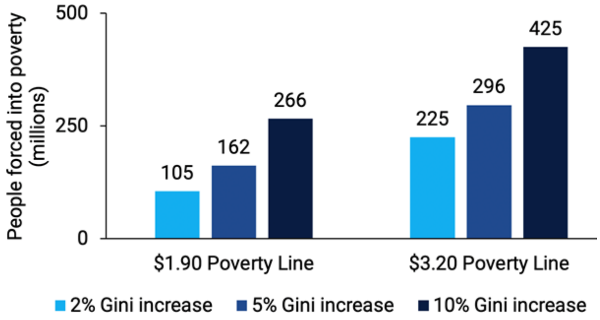

Figure 1. World Bank baseline projection for number of people forced into poverty by COVID-19 economic contraction (World Bank, 2020c).[4]

[3] *The Gini index is a measure for the distribution of income (or sometimes consumption expenditure) between individuals within an economy compared to a perfectly equal distribution (OECD, 2020a).*

[4] *The World Bank baseline scenario projects -2.5% GDP growth for emerging market and developing economies (EMDEs) in 2020 (World Bank, 2020b), more than the IMF January 2021 World Economic Outlook projections of -2.4% (IMF, 2020b).*

The economic and social impacts of COVID-19 demand that governments take immediate action to both support short-term stability and develop investment initiatives to 'build back better'. In most cases, short-term stability is achieved through rescue-type spending, while economic reinvigoration comes with recovery-type spending. As in figure 2, governments in high income nations have rapidly provided short-term rescue-type support, with smaller recovery-type spending driven in part by nations that effectively contained the virus in 2020, like Australia.

In 2020, advanced economies (AE's) in the Observatory announced spending measures worth 22.5% of combined gross domestic product (GDP), while Emerging Market and Developing Economies (EMDEs) introduced measures worth 10.6% of GDP. On a per capita basis AE spending was 17 times greater EMDE spending.

In part this disparity is driven by unequal capacity to spend. For most high-income economies, the current cost of additional debt is close to 0% p.a. despite relatively high debt burdens (OECD, 2020c). Low interest rates, combined with yield suppression through quantitative easing measures, ensures that high-income economies can borrow significant funds with the expectation of 'outgrowing debt', even with relatively low economic growth rates, provided these exceed the interest rate. Here, debt as a proportion of GDP will shrink over time with a reduced burden on the national balance sheet, though the primary balance must remain stagnant or grow to ensure a debt ratio decline.

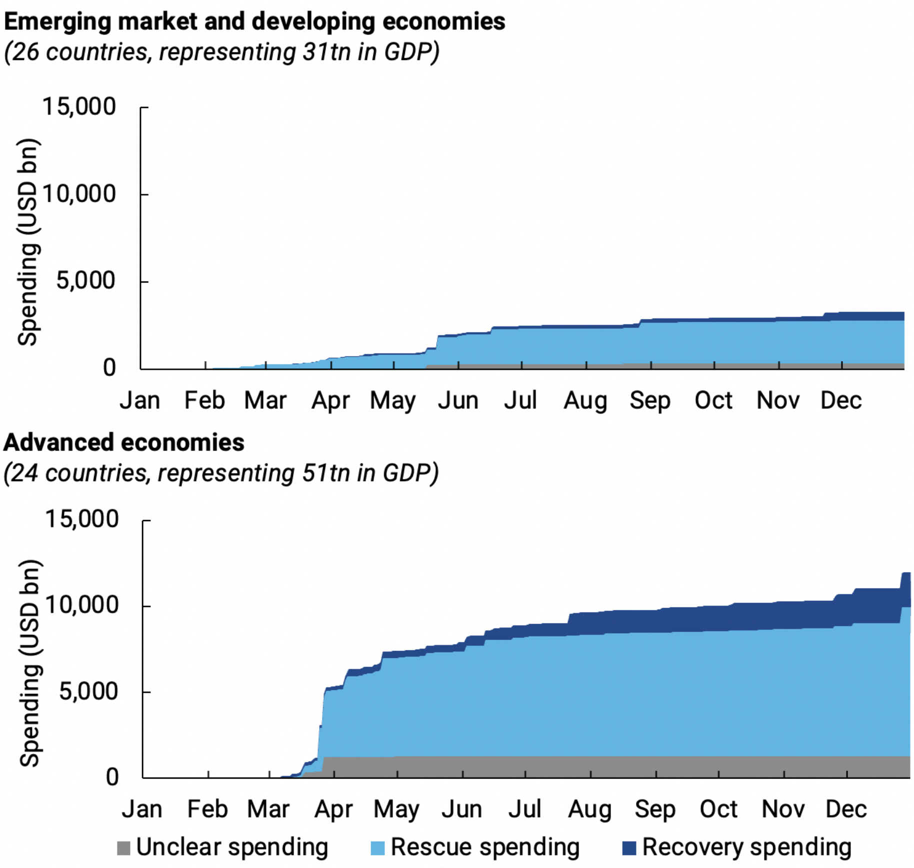

Figure 2. Global announced COVID-19 spending through 2020 (cumulative). Advanced, emerging market, and developing economies defined by IMF 2020a and limited to those covered by the Observatory (Appendix B). Source: Global Recovery Observatory.

By contrast, in many EMDEs, credit ratings are low and fiscal budgets already stretched. For South Africa, the long-run interest rate for new debt is around 10% p.a., and for many lower income nations like India, the interest rate is around 6% (OECD, 2020c). Plagued by high interest rates, increasing debt in these nations is expensive.

Though most countries have taken on new debt during the pandemic (Appendix C), debt in most EMDEs was already rising before the pandemic (Han et al., 2021), and the new spending required to deal with the crisis has made a precarious situation much worse (figure 3). It is in this context that calls for debt forgiveness and foreign aid are growing. Some nations and development institutions have already contributed significantly to these causes (UNEP, 2020a), however the need is orders of magnitude higher than current commitments (UN, 2020).

External support provides an opportunity for funders to ensure that planned fiscal intervention is productive and meets long-term environmental, social, and economic objectives (UNEP, 2020a). In other words, international support can advance both developmental and environmental objectives, and in a recovery context, support can bring accelerated and higher impact.

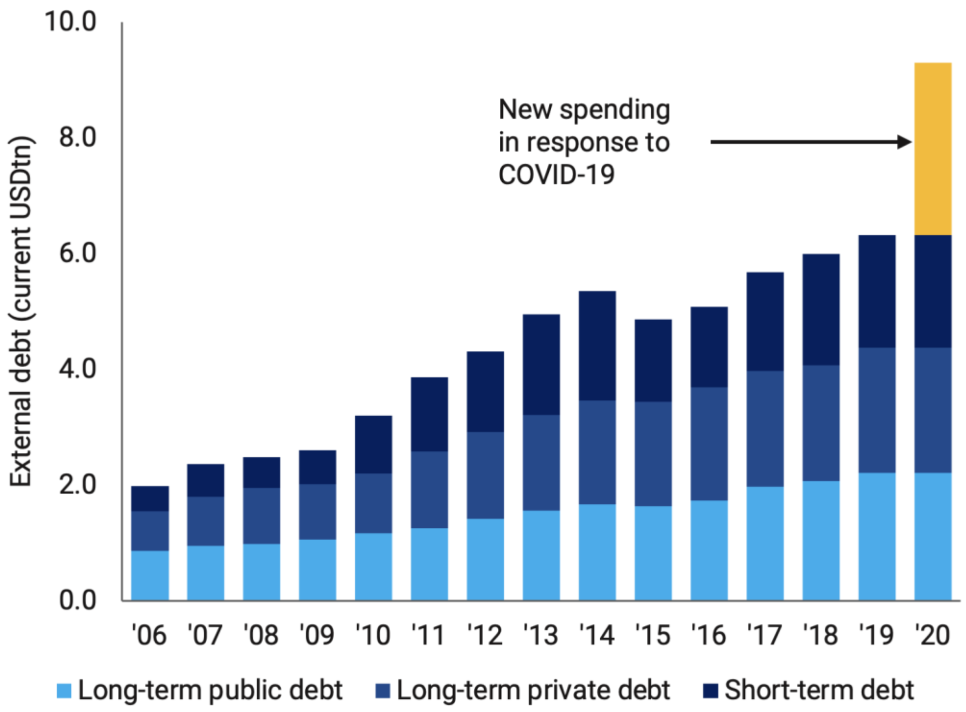

Figure 3. Increasing debt among 19 EMDE countries included in the Observatory.[5] *Source: World Bank (2021b) and Global Recovery Observatory.*

[5] *New spending is not necessarily equivalent to new debt as (i) many announcements include medium-term funding commitments beyond 2020 and (ii) not all new spending is debt-financed.*

1.2 Understanding impacts before the money leaves the purse

1.2.1 The Observatory approach and methodology

The Global Recovery Observatory brings transparency to government COVID-19 spending practices, both highlighting where funds are going and their potential economic, environmental, and social impacts. The Observatory tracks and assesses fiscal spending policy of the fifty largest economies globally, plus the European Commission (EC)[6]. Policies are assigned to one of 40 policy archetypes and 158 sub-archetypes, which are mutually exclusive and attempt to encompass the full universe of fiscal spending options.

Archetypes and sub-archetypes are assessed for environmental impacts (short-term and long-term GHG emissions, air pollution and natural capital), social impacts (wealth inequality, quality of life and rural livelihoods), and economic impacts (long-run economic multiplier and speed of policy implementation) based on evidence in academic literature, contributions by a 2020 survey of over 230 leading practitioners in fiscal economics (Hepburn et al., 2020), and the ongoing input of leading economists and scientists. Assessments are made relative to a scenario in which the policy is not implemented. The Observatory assessments are not predictions and do not include a quantitative component.

Multi-year spending announcements are included in the Observatory when categorised by the relevant government entity as COVID-19 spending.[7] A methodology document including a full list of archetypes, sub-archetypes, and assessments is available in O'Callaghan et al., 2020. As of December 2020, the Observatory contains over 3,000 policies and is updated weekly.

Importantly, as with any a priori economic exercise, Observatory assessments of policy characteristics are bounded by several key limitations. Three major challenges are expounded at length in O'Callaghan et. al (2020). These include that government spending is taken at face value (announced spending may not align with actual expenditure), that archetyping requires some degree of simplification, and that impact assessments of archetypes and sub-archetypes cannot account for real-time variation in the economic and political environments. Steps have been taken to minimise the impact of these effects on the data set but, as with any a priori assessment, residual effects remain. The environmental and climate impacts of a country's business as usual policies are not considered here, however for broad policies such as unspecified liquidity spending, climate assessments are adjusted based on the emissions intensity of a nation's GDP.[8]

[6] *To avoid double counting, funds approved through the European Commission are included in the Observatory under member state accounts only. Policies are hence included only once member states have confirmed policy actions that require the funds. Funds that have been given a designated purpose by the EU but have not yet been allocated to a member country are counted under European Union (EU) spending. Further details are provided in O'Callaghan et al., 2020.*

[7] *The Observatory currently tracks the announcement date of spending, however in part due to lack of information, it has not been possible to track proposed policy implementation timelines.*

[8] *Further information about the treatment of unspecified liquidity spending is available in (O'Callaghan et al., 2020).*

1.2.2 Other approaches to a priori assessment

Similarly to the present crisis, the 2008 Global Financial Crisis and associated economic contraction necessitated extensive fiscal stimulus to minimise the depth and duration of the downturn. Two studies from that era lay the foundation for our work today: the HSBC's 2009 analysis of the climate-friendly components of 20 large stimulus packages (Robins et al., 2009), and Edward Barbier's 2010 work examining the green recovery policies of the G20 (Barbier, 2010).

Barbier's work defined five low carbon fiscal policy stimulus categories. Barbier used these to sort G20 fiscal spending into green and non-green spending, illustrating which countries led the way in green recovery. By contrast, HSBC used 18 climate-related investment themes to categorise spending and taxation measures. These themes were split into six overarching categories, and a classification system developed by the London School of Economics was employed to rate each of these categories on economic and environmental criteria using a three-point Likert scale.

In part due to greater access to real time data today, the Observatory expands significantly on the work of these studies. It introduces a temporal component to GHG considerations including social impacts of policies, develops a significantly more granular standalone categorisation taxonomy, and builds the depth of category-based assessments. Several other groups are also tracking and evaluating fiscal spending in response to the COVID-19 crisis, with widely varying aims and methodologies. None of these trackers cover global spending in quite the same depth or breadth as the Observatory. As highlighted by UNEP (2020a), some restrict their data set to consider policies in one specific area, such as the Energy Policy Tracker (EPT) (2020). The EPT tracks only the G20 countries, while the 'Greenness of Stimulus Index' by Vivid Economics (2020) covers 30 countries. ING (Carnell et al., 2020) focus their analysis on major economies in the Asia-Pacific region, and the Climate Action Tracker (CAT, 2020) has only closely tracked policies from China, the EU, India, South Korea, and the USA. Most trackers base their analysis on publicly available data, while the IMF's Fiscal Monitor (IMF, 2020a) relies on reporting from member states.

For transparency, it is generally preferable to use publicly available data to enable full government accountability, as individual reporting enables states to imprecisely report intended spending, include fiscal measures unrelated to recovery efforts, or frame policies in an overly favourable light. In the context of these studies, the Observatory provides some of the most granular data available and a detailed methodology for describing potential GHG impacts.

1.3 Fifteen trillion dollars in 2020

In 2020, the world's fifty largest economies announced **USD14.6tn** in fiscal measures to address the crisis. When European Commission (EC) commitments not yet designated to a member state are included, total spending approaches USD17tn. Excluding these EC commitments, approximately USD11.1tn was directed to immediate rescue efforts to manage the short-term effects of the pandemic, while USD1.9tn was devoted to long-term recovery measures. An additional USD1.6tn was recorded as unclear spending.

This report primarily addresses recovery-type measures, as these measures will have a particular role in shaping the economic trajectory of nations after the immediate crisis has faded, and because governments have greater discretion in composing them.

Figure 4 describes the shape of this spending to date, suggesting that while green or environmentally positive spending grew over 2020, it remains low as a proportion of recovery spending (18.0%). South Korea, Spain and Germany lead in total green spending. Yet, for comparing the positive impacts of spending, green spending as a proportion of GDP is a more relevant measure; under this lens, Spain, South Korea, and the United Kingdom lead, in part because these nations have all spent significantly more on overall recovery compared to others.

Considering both the relative size and green characteristics of recovery spending, figure 5 portrays the most relevant image to COVID recovery in 2020. From this, Denmark, Finland, Germany, France, Norway, and Poland were 2020's global leaders, with Spain and South Korea also notable for introducing comprehensive green packages.[9]

Despite the efforts of these nations and others highlighted in later sections, most countries lacked a green focus in 2020 COVID-19 related spending and will need to reorient to ensure a sustainable global recovery.

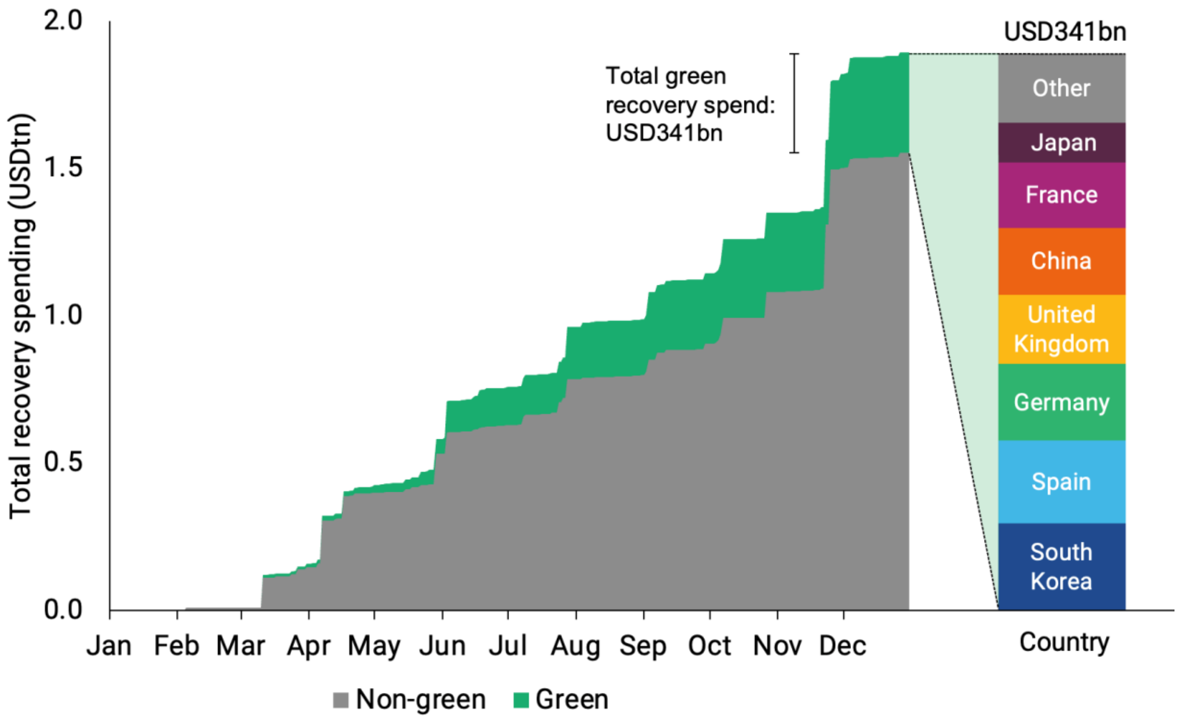

Figure 4. Recovery spending over the course of the pandemic with total green spending described by sector and country. Source: Global Recovery Observatory.

[9] *Although South Korea and Spain do not feature as 'current leaders' in figure 5, their early green spending commitments have helped steer global sustainable recovery narratives. The South Korean 'Green New Deal', announced in July 2020, brought a clear commitment to an equitable and sustainable recovery (Lee & Woo, 2020), while Spain's 'Plan de Recuperación, Transformación y Resiliencia' makes impactful contributions across a wide range of sectors (Government of Spain, 2020).*

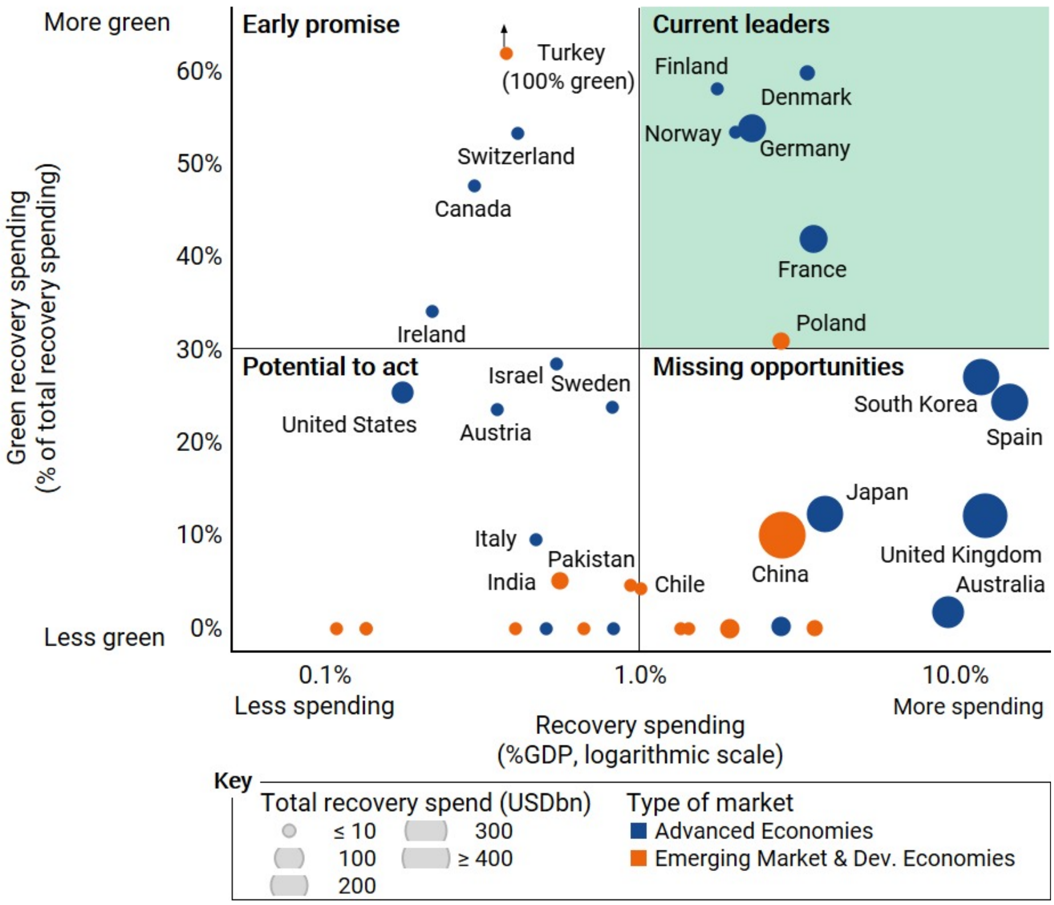

Figure 5. Green recovery spending as a percentage of total recovery spending versus recovery spending as %GDP. Colour represents market type. Turkey's recovery spending (0.4% of GDP; 100% green) is a commendable outlier, not accurately represented on the graph due to visual limitations. Many countries are clustered at 0% green recovery spending, from left to right on the figure: South Africa, Thailand, Malaysia, Egypt, Saudi Arabia, Argentina, Portugal, Nigeria, Peru, Iraq, Mexico, the Netherlands, and the Philippines. Countries with less than 0.1% recovery spending as %GDP do not feature and are listed in Appendix A. Advanced, emerging market, and developing economies are as defined by the IMF (2020a) and are limited to those covered by the Observatory (Appendix B). Sources: Global Recovery Observatory; interest rate data from OECD (2020c) and CEIC (2021).

Announced spending has also been deeply unequal between advanced economies and EMDEs, driven in part by more exigent debt burdens and higher interest rates on borrowing, noted in section 1.1. The relationship between development status and COVID-19 fiscal spending is illustrated in figure 6, suggesting that some countries with lower development indices have spent both less in total and less in long-term recovery measures than some with high development indices.

A similar trend is evident in consideration of green spending with respect to conventional measures for development in figure 7. This could have dire implications for poverty, health outcomes, and the trajectory of sustainable development in EMDEs, re-affirming the need for foreign aid and debt forgiveness, going beyond debt suspensions which merely postpone the worst pain and see interest accrued on existing debt loads.

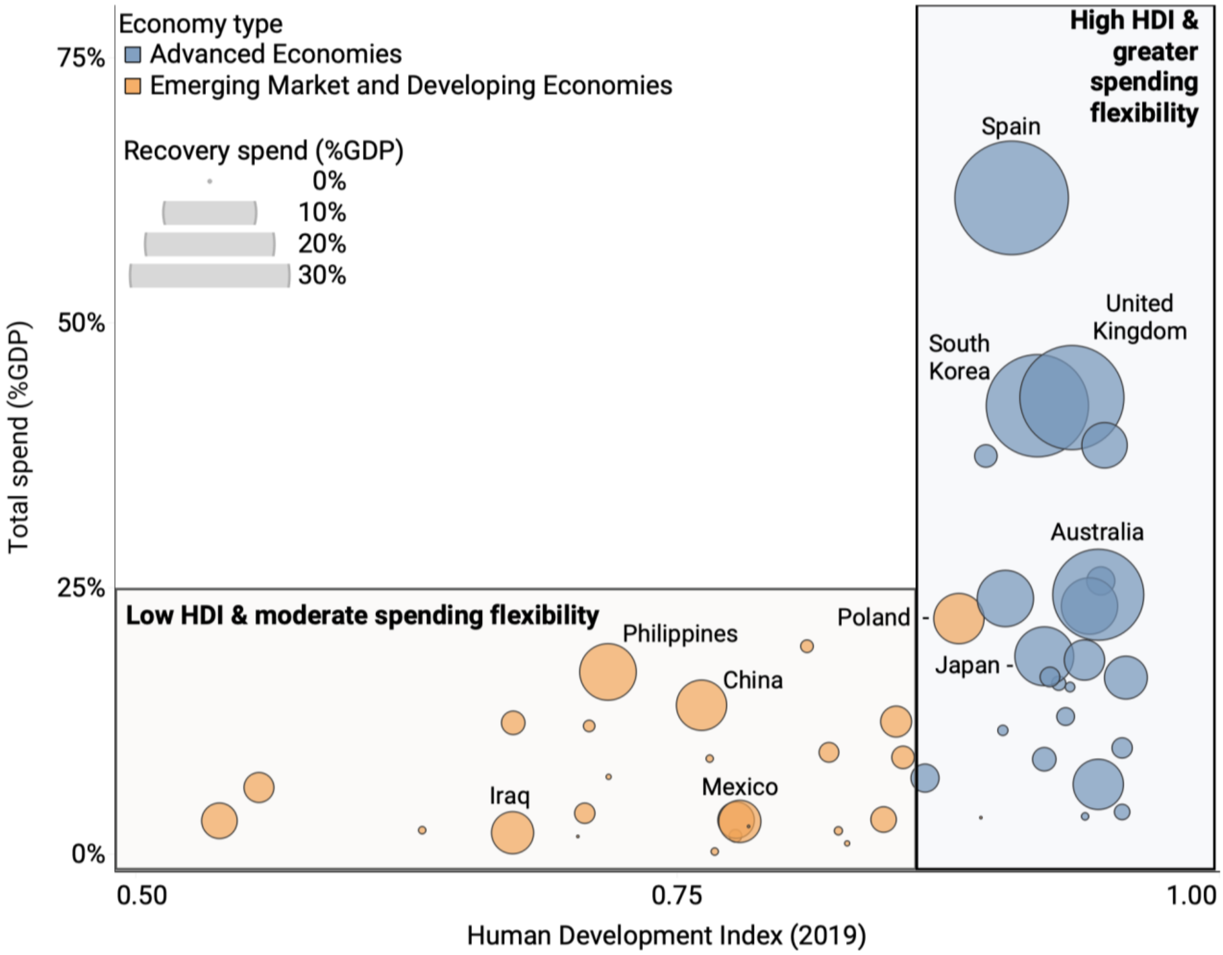

Figure 6. Total spending versus 2019 Human Development Index (HDI) value, with bubble size representing recovery spending as a percentage of GDP. Blue bubbles are AEs, orange bubbles are EMDEs, and the five largest bubbles are labelled from each. Sources: Global Recovery Observatory; HDI data obtained from UNDP (2019).

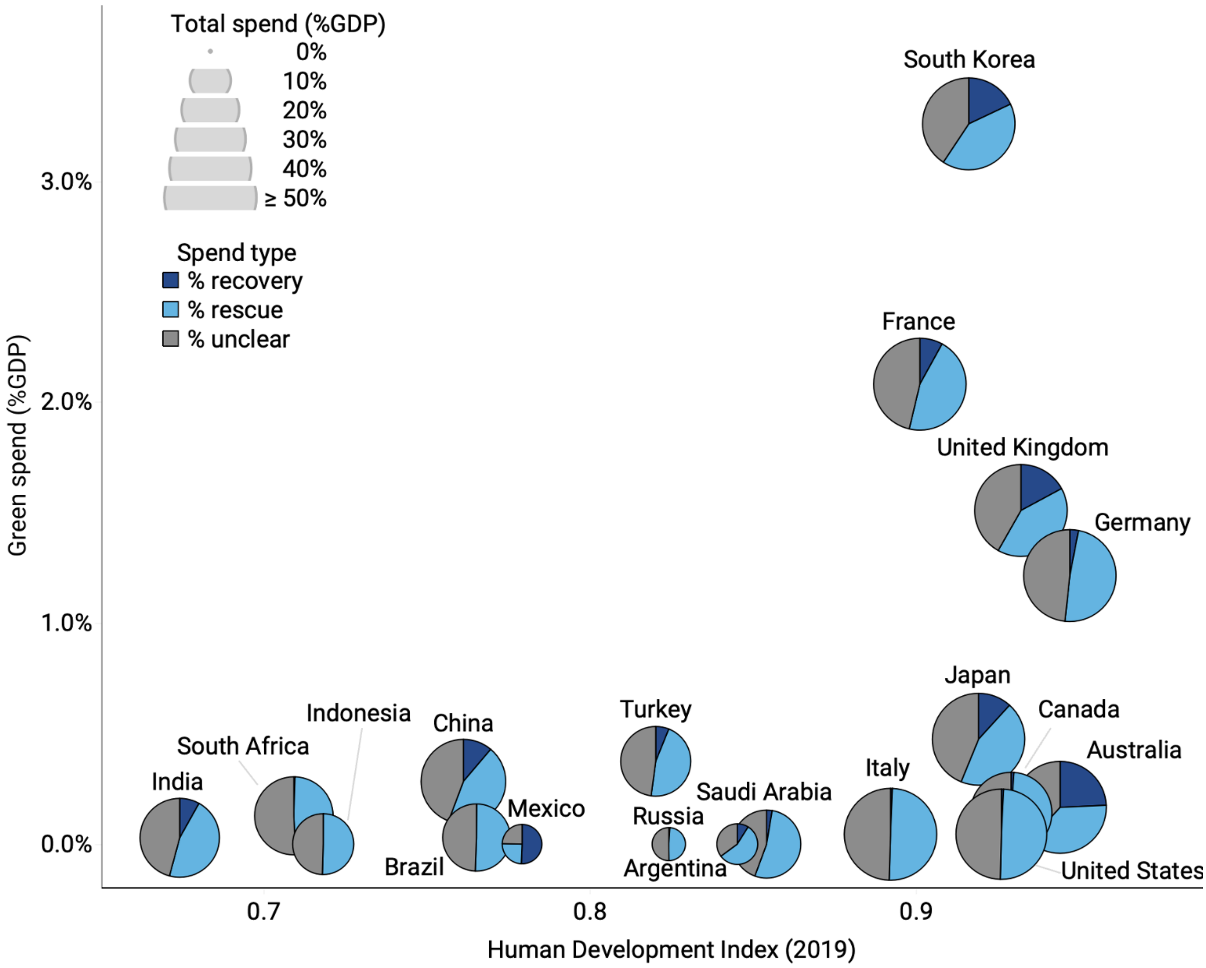

Figure 7. Green spending versus 2019 UNDP Human Development Index (HDI), with pie size representing total spending as a percentage of GDP and bubble segments denoting the percentage of recorded spending that is rescue, recovery, and unclear. Sources: Global Recovery Observatory; HDI data obtained from UNDP (2019).

1.4 How green are we?

To the question, “Are we building back better?”, the answer is: not yet. The spending announced in 2020 paints a disappointing picture for overall efforts thus far to build forward with green priorities. In our assessment, a green spending policy is one that is likely to reduce GHG emissions, reduce air pollution, and/or strengthen natural capital, compared to a scenario in which the policy was not implemented. While total green spending is sizeable, at USD368bn excluding the European Commission and up to USD697bn including the European Commission, this spending reflects a minor portion of total spending.[10] Only 18.0% of recovery spending and 2.5% of total announced spending is likely to reduce GHG emissions (respectively 23.4% and 4.2% including European Commission). Regarding air pollution impacts, excluding the European Commission, 16.0% of recovery spending may bring positive impacts, but 16.4% may act to increase net air pollution. Only 3% of recovery spending is deemed positive for natural capital and up to 17% may negatively impact natural capital, mainly through expanded road transportation and defense services. For the vast majority of countries recovery spending in 2020 was low and minimally green. This is true even of countries with high carbon intensity of GDP (figure 8), which is of particular concern as countries strive to meet the goals set during the Paris Agreement. Many dirty policies that are likely to increase GHG emissions have been recorded in both rescue and recovery tallies. Although some dirty rescue-type expenditure may have been necessary to ensure that lives and livelihoods were saved, many of the largest of these policies could have included positive green attributes. For instance, airline bailouts in nations all over the world, including South Africa, South Korea, the United Kingdom, and the United States could have included green conditions.

Green conditions tied to liquidity support, like requirements to reach net-zero emissions by 2050 or mandates to increase sustainable fuel use, can ensure short term relief while also promoting investment in long-term technological development and acting as a strong guide in national efforts to meet climate targets (O’Callaghan & Hepburn, 2020).

[10] To avoid double counting, funds approved through the European Commission are included in the Observatory under member state accounts only. Policies are hence included only when member states have confirmed policy actions that require the funds. Funds that have been assigned a designated purpose by the EU but have not yet been allocated to a member country are counted under EU spending. Further details are provided in O’Callaghan, 2020.

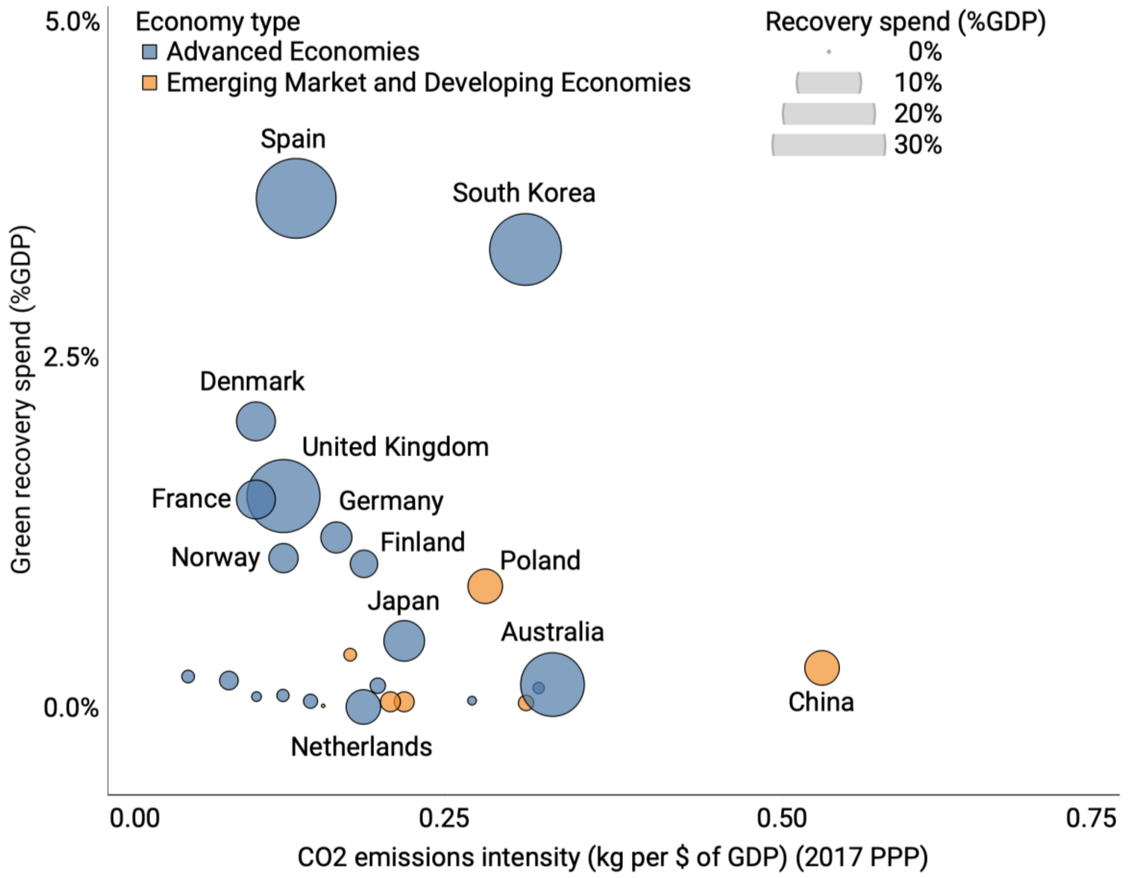

Figure 8. Clean spending versus emission intensity. Bubble size represents total value of recovery spending. The smallest unlabeled bubbles are, from left to right: Switzerland, Sweden, Ireland, Austria, Italy, Brazil, Turkey, Israel, Chile, Pakistan, United States, India, and Canada. Sources: Global Recovery Observatory; 2019 GDP data from World Bank (2020b); Emissions data from 2016, except for Italy and France, where only 2014 data was available (World Bank, 2017).

In advanced economies, green spending was spread across a wide range of policy areas, while in emerging markets and developing economies, spending skewed towards clean energy and natural capital projects (figure 9). For many EMDEs, clean opportunities in other sectors can be limited, amongst other factors, by high technological barriers to entry, low prevalence of enabling technologies (for instance, reliable electric grids for powering electric vehicles), low absorptive capacity in R&D, a domestic labour force without sufficient skills to implement investments, and an absence of existing assets to upgrade or retrofit.

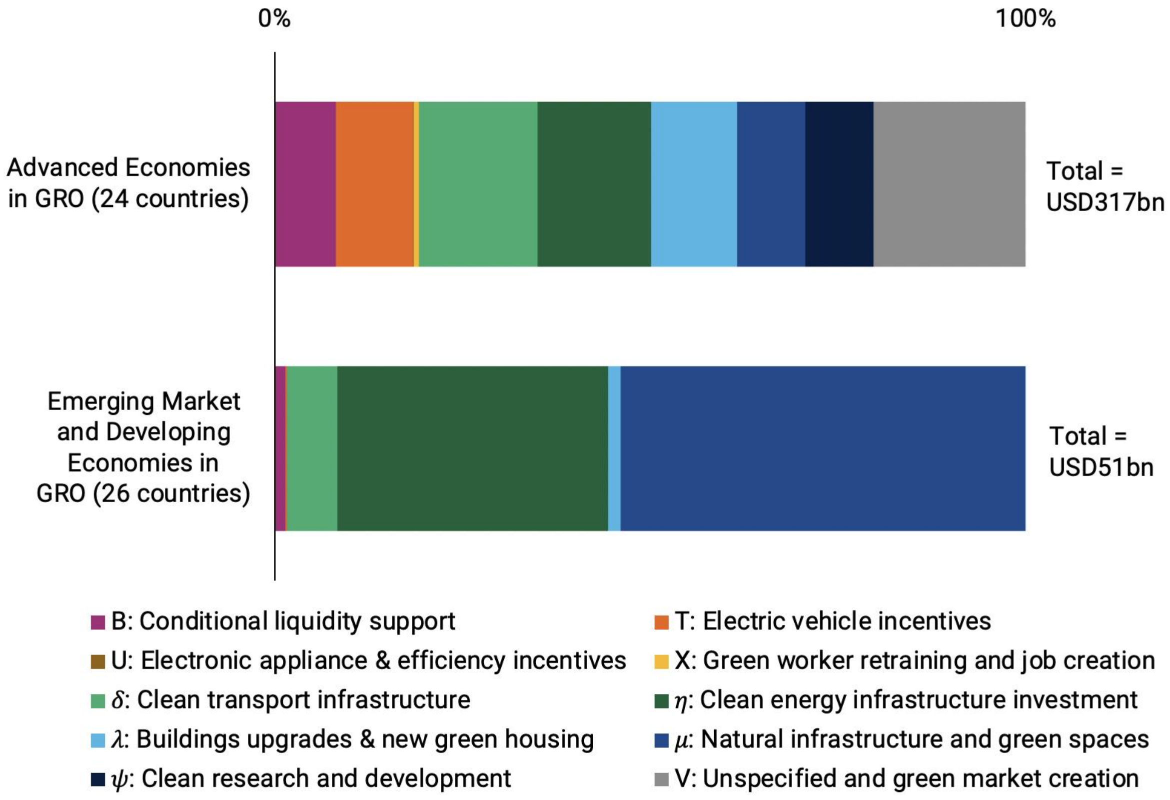

Figure 9. Green spending by policy area across AEs and EMDEs. Source: Global Recovery Observatory.

Of particular note, despite continuing high global unemployment and widespread damage to human capital, spending on worker retraining in 2020 was small and almost exclusively non-green. Nations transitioning to a low-carbon economy must invest in human capital to enable and match future growth priorities. Structural changes in major sectors, including energy, agriculture, transport, and construction, require shifts in the structure and capabilities of the domestic labour force. Future-oriented policy making should prioritise green skill-building initiatives in response to (i) continuing high levels of unemployment, (ii) new injections to green projects in the form of recovery spending, and (iii) the great need to invest in human capital for the low-carbon transition. Prioritisation of green skill development can help expand the domestic absorptive capacity, or short-term ceiling, of green spending. This ceiling is otherwise influenced by general macro factors as well as sector-specific factors, all of which will vary significantly between countries and subnational regions. General macro factors include the availability of local experienced contractors, adequate materials supply, and administrative capacity to manage regulatory procedures and process approvals. Most of these factors can be positively supported by strong enabling policy, for instance skill development programs. Sector-specific factors include, for example, the stability of the domestic electricity grid (for increasing renewable energy penetration), the size of the agricultural industry (for sustainable agriculture investments), and demand for transport services.

The following chapters explore the nature of green spending in 2020 amongst these nations and several others. The chapters each focus on a priority policy area, selected for their relative size. Green investment areas not explored in this report include incentives for energy efficient appliances where Spain is a leader, green conditional liquidity support where France leads, and tax exemptions for green investments and green worker retraining programs, which have seen little investment. Importantly, there are significant parcels of green spending that have not been allocated to specific policy areas in this report. Notable examples include the USD897bn Next Generation EU plan which intends to support the green transition and resilience efforts of member states, and a USD19bn green transition fund introduced by Japan with the nation's third COVID fiscal package.

The election of Joe Biden and Kamala Harris to the United States Executive Office, as well as a reshaped Senate, paves the way for a significant acceleration in US green spending in 2021. The current Biden-Harris climate action plan lays out a USD2tn investment including measures for the power sector, infrastructure, transportation, and agriculture among others, with a key focus on environmental justice (Glueck & Friedman, 2020).

2. GREEN ENERGY

2.1 Benefits: high multipliers, private investment, economy-wide decarbonisation, and more

With energy use accounting for 73% of global GHG emissions, the decarbonisation of the energy sector is the most crucial first step in global efforts to minimise the worst impacts of climate instability and meet the targets of the Paris Agreement. This involves increasing generation capacity for renewables such as solar, wind, hydroelectric power, and enabling the rapidly growing green hydrogen market. Renewable energy systems require different methods of transmission and distribution than their fossil-fuel based counterparts (Klass & Wilson, 2012; Rodríguez et al., 2014), and in many geographies, the expansion of transmission infrastructure, distribution-level grid visibility, as well as batteries and other energy storage technologies are all vital enablers. Shifting to green energy production can bring a wide array of environmental, social, and economic benefits. The contribution of conventional 'dirty' energy generation to climate change and dangerous air pollution is well documented (Kampa & Castanas, 2008).

While investments in renewable energy generation may lead to new GHG emissions and air pollution during the manufacturing and construction stages, displacement of fossil energy production is likely to result in sizeable reductions in long-term GHG emissions and lasting improvements to air quality (Lott et al., 2017; Alvarez-Herranz et al., 2017; Shindell & Smith, 2019). This displacement may be immediate in AEs and anticipatory in some EMDEs. Additionally, green energy is a vital enabler of emerging low carbon technologies covering transportation, agriculture, industry, and more.

Emissions reductions targets signposted in the Paris Agreement are simply unreachable without a significant expansion of green energy investment globally (McCollum et al., 2018).

Green energy investments have some of the strongest economic characteristics amongst both green and traditional stimulus policies. Investment in green energy can provide long-term, high quality employment opportunities in operations and management, in addition to shorter term employment in construction (Dvořák et al., 2017; Lehr et al., 2012; M. Wei et al., 2010). Given significant private sector interests, green energy spending is particularly useful for 'crowding-in' additional private capital, in effect multiplying the impact of every public dollar of investment. Green energy assets also typically garner high long-run economic multipliers, particularly when technological components are manufactured domestically (Garrett-Peltier, 2017). Finally, when paired with appropriate storage solutions, large scale investment into renewable energy infrastructure can improve electricity affordability (Dowling et al., 2020).

Country level variations play a significant role in shaping the optimum approach for selecting, designing, and implementing green energy investment policy. For countries with thriving private renewable energy asset markets, stimulus funds may be better directed to support enabling energy storage and energy transportation solutions. The social benefits of green energy investment are also significant and include health benefits resulting from reduced air pollution (Alvarez-Herranz et al., 2017; Kampa & Castanas, 2008).

The need to reduce air pollution is staggering; 8 million people perish annually due to air pollution exposure and 9 out of 10 humans breathe unsafe air daily (Vohra et al., 2021; WHO, 2020a), with household air pollution disproportionately affecting women and gender minorities (WHO, 2018). Additionally, renewable energy generation facilities are often more distributed than fossil-equivalents leading to a system with greater resilience in the face of increasing natural disasters and extreme weather events, thus improving energy security (IEA, 2007). Bringing together each of these impacts, rapid scaling of green energy investment in COVID-19 recovery could be crucial for making progress to the 2030 Sustainable Development Goals (SDGs), most notably goals 3, 7, and 13, but also goals 8, 9, 10, 11, and 15 (UN, 2015).

2.2 Announced investment: 66bn in green energy

The Global Recovery Observatory presents one archetype and eight sub-archetypes related to green energy investments. They are:

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

All green energy spending that cannot be categorised into one of the above sub-archetypes is categorised as “unclear spending”. Nuclear spending ($\eta 1$) is tracked in the Observatory and included in zero carbon (clean) assessments but not in green assessments.

Figure 10 illustrates the breakdown of green energy investment in 2020 by sub-archetype and country.

USD66.1bn in green energy spending was announced as COVID-19 recovery packages in 2020. Much of this investment (USD25.3bn) was directed towards new or refurbished renewable energy generation facilities, with a large portion of this resulting from a Chinese policy that increases subsidies for renewable energy generation projects, and from the Korean Green New Deal. Significant investment was also announced in hydrogen (USD18.5bn). Very little investment was recorded for battery and storage infrastructure or biofuels.

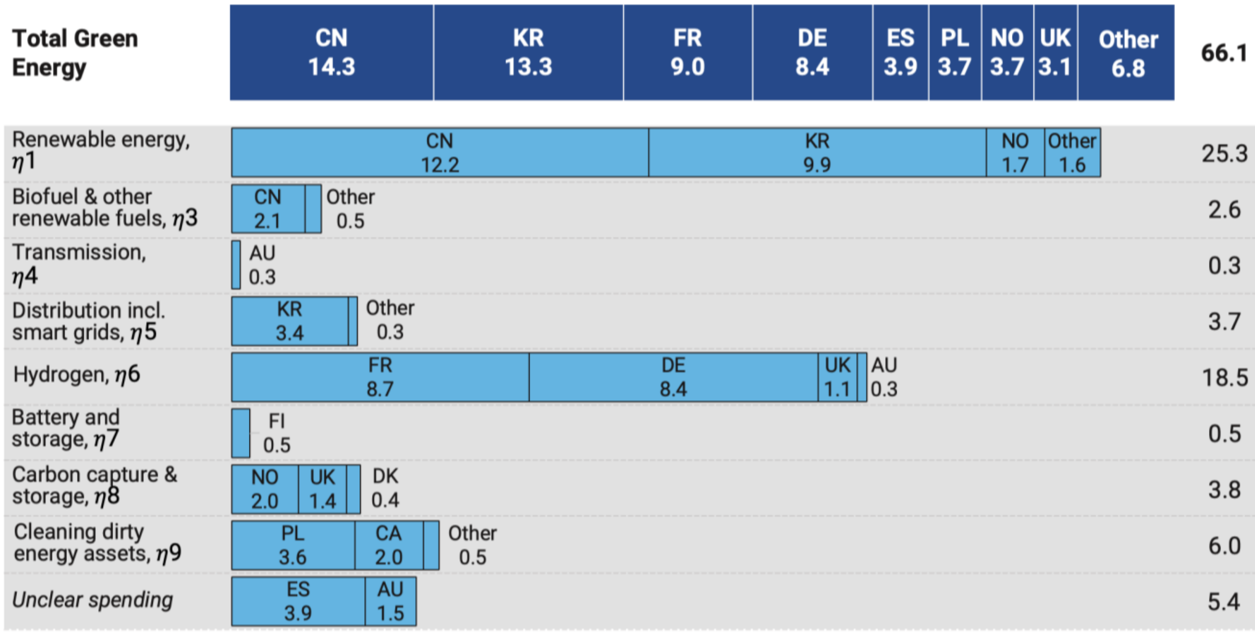

Figure 10. Total green energy spending by country and sub-archetype. For each sub-archetype, the largest contributors are listed by name, with smaller spenders categorised as 'other'. Countries - AU: Australia, CA: Canada, CN: China, DE: Germany, DK: Denmark, ES: Spain, FI: Finland, FR: France, KR: South Korea, PL: Poland, NO: Norway, UK: United Kingdom. Values are in USDbn. Source: Global Recovery Observatory.

In addition to these green investments, several dirty energy investments were also announced in 2020. Among others, China and India announced significant investments aimed at expanding coal mining domestically, while several countries including the US, Canada, Mexico, and Australia made investments supporting oil and gas.

Alongside the potential negative GHG consequences of these policy decisions, the negative health consequences for proximate communities and workers can be significant. Additionally, compared to like-for-like green investments, these policies are likely to have poor economic returns in the medium- to long-term as fossil fuel assets become stranded and fossil industries fade.

2.3 Emerging policy opportunities

2.3.1 Spain and energy transition investments

As a part of their Recovery, Transformation and Resilience Plan 'España Puede' the government of Spain has earmarked over USD7.2bn to a 'just and inclusive energy transition' (Government of Spain, 2020). Renewable energy generation in Spain has risen over the last two decades (IEA, 2020a) and this policy is expected to hasten that trend. The package is slated to include direct investments in renewables, promotion of renewables in productive sectors, upgrades to transmission and distribution networks, investments in storage technologies, and investments in green hydrogen. Notably, the plan emphasises a green transition which promotes job creation and provides targeted support to sectors and communities whose livelihoods may be affected by the transition. The majority of the funding for España Puede was allocated to Spain through various European Union funds including the REACT-EU fund and the 'Next Generation EU' fund.

2.3.2 Germany and green hydrogen investment

Green hydrogen has gained new attention over the last decade as a key component to the decarbonisation of the energy sector. As an energy-dense, lightweight fuel, green hydrogen, provides a pathway for GHG emissions reductions in some of the most difficult to abate sectors, such as industrial processes and heavy transport (IEA, 2019b). Green ammonia is a related and perhaps even higher potential energy carrier. Several countries are beginning to invest more heavily in green hydrogen, with Germany emerging as one of the global leaders in this effort over COVID-19 (O'Callaghan and Tritsch, 2020). In June 2020, Germany announced their National Hydrogen Strategy (BMWi Germany, 2020) as part of a broader COVID stimulus package. The package consists of (i) USD2.4bn for establishing German leadership in hydrogen trade and a European Hydrogen society, and (ii) USD8.3bn for domestic investments in hydrogen production, as well as hydrogen in the industrial sector, transport, and heat market. Priorities of the second pool include the construction of demonstration plants, support for offshore wind and other renewables that are crucial to produce green hydrogen, and a network of hydrogen refueling stations for heavy transport. These measures are likely to contribute significantly to Germany's economic recovery through job creation, as well as securing a sustainable green energy future for the country.

2.3.3 South Korea, renewable energy, and the green new deal

Amid the 2008 global financial crisis, South Korea committed to a "low-carbon, green growth" model of economic development (Government of the Republic of Korea, 2008), leading to one of the largest green fiscal recovery programs at the time, although outcomes may not have been as strong as hoped (see Jung, 2015; Mundaca and Damen, 2015). In 2020, South Korea again launched one of the strongest global green recovery programs, allocating USD53.6bn to green investments, largely through the 그린뉴딜 (Green New Deal). The program aims to reduce GHGs by 16.2 million tonnes, relying on green industry innovation, the construction of 'green infrastructure', and green energy (Lee et al., 2020; Hwang et al., 2020).

The green energy component of the program includes investment in renewable energy production (wind and solar), hydrogen investment, and, in distinction to other nations, smart grid investment (Government of the Republic of Korea, 2020). Building on the Smart Grid National Roadmap, in South Korea smart grids could support higher renewable energy penetration, bring more efficient electricity distribution by enabling demand response capabilities, and in this way use electric vehicles to bolster a smart city ecosystem (see Government of the Republic of Korea, 2012). South Korea's green energy spending plan is also notable for its explicit target to "support a fair transition" and thereby cushion displaced workers (Lee and Woo, 2020).

2.3.4 Opportunities to watch

There have been significant shifts in the renewable energy landscape since the 2008 global financial crisis (GFC), with the costs of renewable energy production (particularly solar and onshore wind) decreasing by 82% and 40% respectively in the last decade (IRENA, 2020). While private investors have dedicated substantial capital to profit from these shifts, opportunities continue to abound, particularly in EMDEs where risk premiums are higher but demand for energy will continue to expand for decades to come. Erdiwansyah et al. (2019) highlight the propensity for increased cooperation to unlock particularly strong opportunities in Southeast Asian countries.

Expanded transmission capacity, smart grids, and storage are all key enablers of high renewable energy penetration, and therefore a necessary component of decarbonisation efforts. Each of these can present valuable opportunities for economic stimulus, with 'shovel-ready' programs available in many countries already. The need for enhanced transmission infrastructure appears particularly strong in countries such as Australia, Brazil, India, and the United States; geographically large nations where renewable energy production is on the rise (BNAmericas, 2020; Mercom India, 2019).

Green hydrogen has already seen significant stimulus investment from countries like France and Germany. As a key facilitator of decarbonisation, particularly in hard-to-abate sectors, a range of other countries are also likely to benefit from further green hydrogen investment, as well as green ammonia investment. Current opportunities exist in both R&D and infrastructure investment. A large fraction of hydrogen production today derives from natural gas resources (IEA, 2019b), but falling costs in renewable energy generation and electrolysis mean that green hydrogen is already nearing cost competitiveness in some applications like heavy duty transport (IRENA, 2019).

The countries most likely to benefit from green hydrogen investment may include those with strong renewable energy resource endowments, related industrial capabilities/expertise, and/or high existing renewable energy penetration. The attractiveness of green hydrogen investment is not necessarily limited to advanced economies. The technology is already seeing significant investment in China (Yue & Wang, 2020) and may have long-term (post-pandemic) appeal for EMDEs as a means for increasing energy security and resilience to oil price volatility (World Bank, 2020d)

3. GREEN TRANSPORT

3.1 Benefits: jobs, air pollution, social impact, and more

Transport infrastructure featured heavily in stimulus packages during the GFC (Mallett, 2020). These investments were, and continue to be, lauded for their job creation potential and propensity to boost economic productivity. In the present economic crisis, there is an opportunity to use green transport investments to boost the economy while making progress towards energy efficiency and emissions reductions goals.

The transport sector contributes substantially to air pollution (EPA, 2015) and produces 23% of global energy-related CO2 emissions (IEA, 2020f). Managing emissions in the sector will be an essential component to both deep decarbonisation efforts in line with the Paris Agreement (Dominković et al., 2018) and efforts to improve health outcomes. In this section, electric vehicles (EVs), public transport, as well as cycling and walking infrastructure are explored, though certainly other less developed green transport opportunities are emerging, particularly in heavy transport and aviation.

EV investment has become a somewhat popular choice when it comes to green transport stimulus investment, likely driven by the scope for positive economic, environmental, and social impact. Increased adoption of electric vehicles is heavily associated with reduced GHG emissions, particularly in countries that have high renewable energy penetration (Ke et al., 2017). There are also significant air pollution reduction benefits associated with replacing internal combustion engine vehicles with EVs, improving overall quality of life and health outcomes in regions with high EV adoption rates (Buekers et al., 2014).

Incentive measures can boost electric vehicle purchases in some cases (Langbroek et al., 2016; Sierzchula et al., 2014), though there have been instances where EV exchange programs have been economically ineffective, primarily resulting in intertemporal substitution of purchases (Gayer & Parker, 2013; C. D. Wei & Li, 2014). With careful targeting and in combination with expansions in charging infrastructure, EV incentives have the potential to create many high-quality jobs over a short period of time (Unsworth et al., 2020) and expand access to green transport beyond the very wealthy. This is particularly true for targeted subsidies.

Public transport investments may also yield large social returns. GHG emissions and air pollution reductions can be significant when public transportation displaces automobile transport (Basagaña et al., 2018). Electric and hydrogen-based public transport solutions may also yield significant energy efficiency benefits (Borén, 2020). As in the example of green energy spending, reductions in air pollution can significantly improve health outcomes, particularly in urban centres (Pascal et al., 2013). There is also evidence to suggest that public transport is associated with higher safety relative to individual automobile travel (Litman, 2014), though particular care must be taken to ensure that public transport addresses safety issues specific to women and gender minorities (ITDP, 2018).

Furthermore, walking and cycling infrastructure investments have the potential to create more jobs in their construction phase than traditional transport investments (Garrett-Peltier, 2011), as well as reducing GHG and pollutant emissions and improving both mental and physical health outcomes (Pucher et al., 2010). Unlike many electric car investments, both public transport and local cycleway/walkway investments are naturally progressive in that they support low-income individuals who are more likely to require cheaper and safer forms of transportation (Hernandez et al., 2020). Considering these social and environmental impacts, green transport investment could support strong progress to the 2030 Sustainable Development Goals (SDGs); most notably goals 3, 11, and 13, but also goals 5, 8, 9, and 10 (UN, 2015).

3.2 Announced investment: 86bn in green transport

The Global Recovery Observatory presents two archetypes and seven sub-archetypes related to green building upgrades and energy efficiency spending.[11] They are:

T: Electric vehicle incentives

T1: Electric vehicle transfer programs

T2: Electric vehicle subsidies

δ: Clean transport infrastructure investment

δ1: New public transport systems or line expansions

δ2: Existing public transport capacity expansions

δ3: Electric vehicle charging infrastructure

δ5: Cycling and walking infrastructure

δ6: Efficiency initiatives to improve dirty transport

Figure 11 illustrates the breakdown of announced green transport spending in 2020 by sub-archetype and country.

USD86.1bn in green transport spending was announced as part of COVID-19 recovery programs in 2020, with significant spending across all listed sub-archetypes. The largest fraction of this spending was directed towards investments in EV subsidies (USD21.5bn), with significant investments in existing public transport capacity expansions (USD20.5bn) and EV transfer programs (USD11.0bn). Smaller measures were announced in EV charging infrastructure (USD7.9bn) and cycling and walking infrastructure (USD4.3bn).

[11] Archetype δ: Clean transport infrastructure investment, contains another sub-archetype: public transport digitalisation. This is not listed here as no policies in this area were announced in 2020.

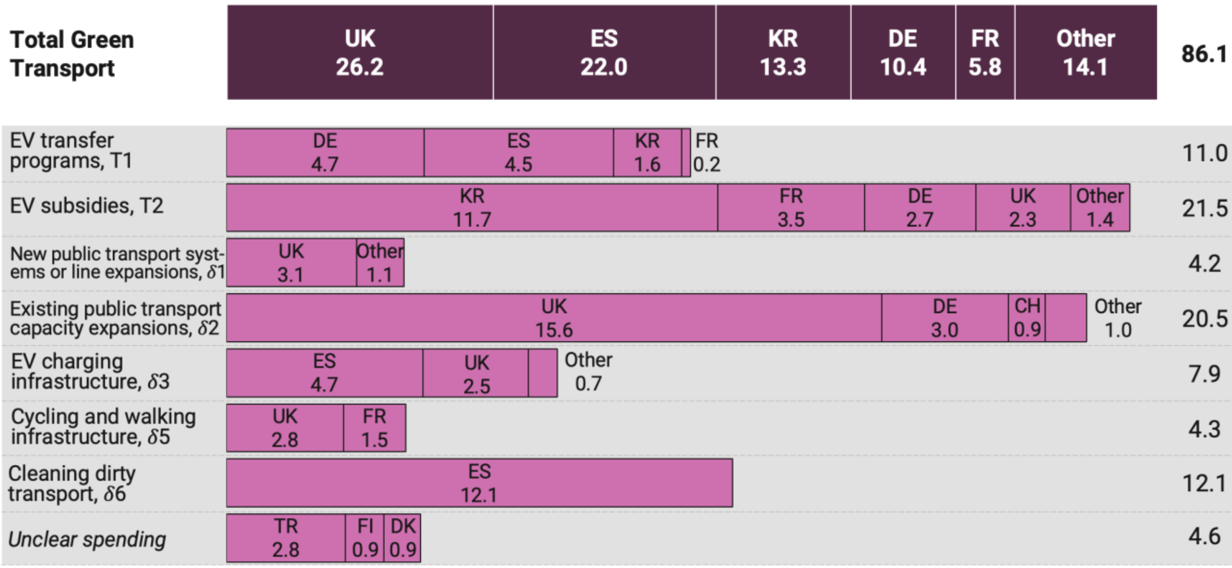

Figure 11. Total green transport spending by country and sub-archetype. For each sub-archetype, the largest contributors are listed by name, with smaller spenders categorised as 'other'. Countries - CH: Switzerland, DE: Germany, DK: Denmark, ES: Spain, FI: Finland, FR: France, KR: South Korea, TR: Turkey, UK: United Kingdom. Values are in USDbn. Source: Global Recovery Observatory.

Alongside the policies displayed in figure 11, many dirty transport policies were also announced in 2020. These include incentive measures (grants or tax cuts) for consumers to purchase new internal combustion engine (ICE) vehicles, as in Italy and South Korea. Incentivising the purchase of ICE vehicles while EV penetration rises is counterproductive to the low-carbon transition of the transport sector.

3.3 Emerging policy opportunities

3.3.1 Electric vehicles in Poland

Although the Polish government has historically been reluctant to engage with strong emissions reductions narratives (Ancygier, 2013), shifting economic conditions for renewable energy and green transport have perhaps spurred the beginnings of a sea change in Polish policy. The government announced a USD2.1bn green investment stimulus package in June of 2020 containing, among many other measures, several policies designed to promote EV production and uptake (Government of Poland, 2020). Poland is a major producer of passenger vehicles in Europe, but as of 2019, only 0.5% of Polish-produced vehicles were fully electric, compared to 12% of Swedish vehicles, 4.2% of Chinese, and 4.0% of German (ICCT, 2019; Wappelhorst & Pniewska, 2020). The government's policies, although at times unclear and possibly repeating pre-COVID announcements, aim to increase the cost competitiveness of EVs and to ultimately position Poland as a leader in the EV market through both production and consumption incentives.

The stimulus policies include EV subsidies aimed at local governments, entrepreneurs, and individuals, as well as support for new electric public transport, taxis, and school buses. The policies also include production support for EV manufacturing and for charging stations. Total EV-related spending from the package is expected to be PLN668mn (USD178mn) (Government of Poland, 2020). These policies could be effective both in providing economic stimulus through job creation and strengthening Poland's EV production and adoption into the future (Wappelhorst & Pniewska, 2020), though there is disagreement among economists regarding the efficacy of EV subsidies, transfer programs and other kinds of incentives, especially in non-stimulus contexts (Holland et al., 2015; Irvine, 2017; Muehlegger & Rapson, 2018).

Given high air pollution in Poland (World Bank, 2019), these policies may also result in significant improvements in air quality and therefore health outcomes, if they are coupled with strong renewable energy policy. Despite these efforts, uptake of the EV programs has so far trailed expectations (Wappelhorst & Pniewska, 2020), indicating that more generous measures, or perhaps better targeted measures, may be required for the policies to have their desired effects.

3.3.2 What's next? Remaining high potential opportunities

With green transport technology developing rapidly in the last decade, governments may be able to effectively support the transition away from fossil-fuel based transportation through strategic investments in EVs and green transport infrastructure. Globally, COVID-19 mobility restrictions have had a large impact on transport practices, particularly in large urban centres. The long-term impact of the pandemic on public transport demand is unclear, but it is likely that densification of public transport services will be needed to aid a responsible return to normal use (Tirachini & Cats, 2020). Densely populated urban centres with extreme transport congestion, like major cities in India, Mexico, and Colombia, require particular attention (INRIX, 2019). If a city already has a public transport system, or is even partway through construction, fiscal stimulus could be used to increase the scale of the initiative and/or electrify the system. These investments could create many jobs quickly, while bringing high economic multipliers (APTA, 2020).

Gender-responsive transport policies will also be necessary to address the disproportionate impact of restricted transit on women and gender minorities (Caselli et al., 2020). New public transport investments, as well as program expansions, can bring a host of other long-term positive social and economic benefits ranging from improved access to job opportunities, better public health outcomes, and higher reported life satisfaction driven by improved perceptions of accessibility (Saif et al., 2019).

Investment in the automotive industry is expected to feature heavily in fiscal stimulus packages moving forwards, and whilst EV programs are likely to benefit from industry-wide support, additional measures targeting EVs are likely necessary to keep nations on track with emissions reductions goals (IEA, 2020c). Countries that may benefit significantly from public support of EV sales include those with large existing automotive industries like India and Japan, and these policies are expected to be most effective when coupled with the phasing out of oil price supports and investment in physical infrastructure such as charging stations (IEA, 2020c).

4. GREEN BUILDING UPGRADES & ENERGY EFFICIENCY

4.1 Benefits: rapid jobs, bill reductions, and more

Energy efficiency improvements are vital to global decarbonisation and can directly support the green energy transition by reducing the magnitude of required capacity investment (IEA, 2020b). Carbon emissions from building operations were linked to 28% of 2019 global energy-related emissions, yet investment in building efficiency improvements was decreasing before the pandemic (UNEP, 2020b). Governments have several tools available to support green buildings; in this report we focus on energy efficiency retrofits as well as rooftop solar installation. Investment in each of these can contribute to a fast economic recovery while also resulting in emission reductions. The Observatory indicates that many such programs are already in the global pipeline.

The GHG emissions impacts of energy efficiency policies are substantial and well-documented (IEA, 2019a). Additionally, these programs can be among the most effective policy tools available for stimulating domestic economies as they create more jobs than other investments, can do so locally and quickly, and can deliver a high long-run economic multiplier (E2, 2019; IEA, 2020d; Jacobs, 2012; Roland-Holst, 2008). Well-designed building energy efficiency programs can also secure significant other environmental and social co-benefits. By reducing overall energy demand, these policies directly prompt a reduction in energy use for an equivalent outcome. In non-renewable energy systems, this decreases the burning of fossil fuels and energy sector air pollution (Kerr et al., 2017; Zhang et al., 2014). However, the perception of lower energy costs could also stimulate new energy demand. Housing retrofits have also been shown to be effective in reducing energy costs for occupants and reducing fuel poverty (Webber et al., 2015), which is a vital component of the 2030 Agenda. As energy expenditures are likely to be proportionally higher for low-income households (Ofgem, 2018), they are also likely to benefit from well-targeted energy efficiency policies.

Careful targeting to low-income consumers who would not otherwise make energy efficiency investments is also crucial for maximising the economic stimulus benefits of these policies (Allcott & Greenstone, 2012), as the marginal propensity to consume is often highest for the lowest income earners (Carroll et al., 2017). Benefits are also likely to be maximised if programs are designed with consideration for and direct involvement of individuals that are diverse across age, gender, income level, and physical ability (Asian Development Bank, 2013). These policies have the potential to contribute meaningfully to the 2030 Sustainable Development Goals, most notably goals 9, 11, and 13, but also goals 7, 8, and 10 (UN, 2015).

4.2 Announced investment: 35bn in efficiency measures

The Global Recovery Observatory presents one archetype and two sub-archetypes on this topic. They are:

- **λ: Buildings upgrades and energy efficiency infrastructure investment**
- λ1: Green retrofitting programs (including daylighting, electricity and electrification, insulation)
- λ2: Rooftop solar support

Figure 12 illustrates the breakdown of announced energy efficiency spending in 2020 by sub-archetype and country.

The total energy efficiency spending announced as part of COVID-19 recovery announcements in 2020 was **USD35.2bn**. The majority of this spending was in green retrofitting programs (USD30.6bn), with large policies announced by France and the United Kingdom. Spending on rooftop solar was significantly less (USD4.7bn), though there may be some rooftop solar initiatives included as small contributing components in the green retrofitting policies.

In addition to the spending in figure 12, several other building-related policies were announced in 2020 without any green conditions. The most prominent examples of these were investments in new housing developments without green construction incentives or standards, both in private residence construction and social housing. Countries that announced such policies include the United Kingdom, Argentina, Australia, and Chile. Many of these policies aim to provide affordable housing for low-income communities, bringing significant social dividends. Such policies could be further enhanced using mandates to require design in line with green building standards.

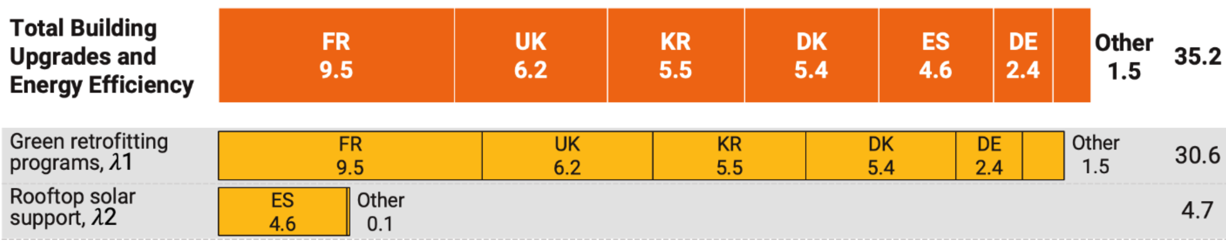

Figure 12. Total green building upgrades and energy efficiency spending by country and sub-archetype. For each sub-archetype, the largest contributors are listed by name, with smaller spenders categorised as 'other'. Countries - DE: Germany, DK: Denmark, ES: Spain, FR: France, KR: South Korea, UK: United Kingdom. Source: Global Recovery Observatory.

4.3 Emerging policy opportunities

4.3.1 France and building energy efficiency upgrades

In September 2020, France announced a USD120bn major stimulus package, "France Relance" (Government of France, 2020a), of which USD48bn is to be provided through grants from the European Commission (Government of France, 2020b). One of the largest green components of France Relance is a sweeping investment in energy efficiency retrofits for buildings, with an allocation of more than USD8.4bn.

The measures cover a wide range of energy retrofit initiatives, including insulation, heating, ventilation and energy audit work for households, landlords, condominiums, social housing and public buildings, educational institutions, Small- and Medium-sized Enterprises (primarily through a tax credit), and many more. The broad scope of these energy efficiency retrofits surpasses many similar policies implemented in previous financial crises and brings the potential to create many jobs in the short-term while, in the long-term, reducing energy expenditures for vulnerable renters and individuals in public housing, who are often left out of energy efficiency initiatives restricted to homeowners.

4.3.2 The United Kingdom's Green Homes Grant Scheme

The UK announced a large set of new stimulus measures in July 2020 including a ~USD2.8bn Green Homes Grant scheme (HM Treasury, 2020a), expanded by USD420mn in November 2020, to last to March 2022 (HM Treasury, 2020b). However, the program has faced considerable challenges in implementation and, despite public outcry, in February 2021 USD1.4bn in unspent funds were cut from the program.[12] The initiative uses a voucher system to incentivise homeowners and landlords to invest in low-carbon heating, insulation, efficient windows, and efficient doors. Vouchers cover two thirds of the cost of efficiency upgrades up to USD6,650 for most homeowners. For low-income households, the program covers 100% of the cost up to USD13,300 (UK Government, 2020a).

These targeted measures could bring wide-ranging co-benefits, including health benefits, particularly for vulnerable individuals. Analyses of energy efficiency retrofits in the UK have previously found that they can be effective in reducing energy demand and energy costs for consumers (Hamilton et al., 2016). Additionally, energy efficiency measures have an additive effect in that combining multiple measures can act to compound energy demand reductions (Hamilton et al., 2016). In this context, the UK Prime Minister's *Ten Point Plan for a Green Industrial Revolution* explains that green homes and public buildings are a long-term priority for the nation (UK Government, 2020b).

However, the net impact of this policy on jobs, the domestic economy, and GHG emissions remains unclear. A delay between policy announcement in July 2020 and program launch on September 30 2020, may have simply postponed otherwise planned spending for medium- and high-income households, decreasing demand for retrofits in the months June to September and precipitating excess demand in the following months (Britchfield, 2020).

[12] *These funds, originally earmarked for the period September 2020 - March 2021, were not rolled over into the March 2021 - March 2022 extension.*

Without a multi-year extension, the program risks a net result that does little more than shift demand in the short-term, with unclear impacts on GHG emissions nor on creating jobs and stimulating the domestic economy. This would hold particularly true if uptake for low-income households was below that of other households.

4.3.3 What's next? Remaining high potential opportunities

Opportunities in energy efficiency retrofits tend to be most attractive in advanced economies with high established housing stock. In EMDEs, opportunities in new energy efficient housing are likely to be more attractive than retrofits given the added benefit of sheltering the vulnerable. Nations with extreme climates are likely to find upgrades in heating efficiency and insulation particularly attractive for improving energy efficiency. In these contexts, energy consumption and therefore energy spending is often particularly high (World Bank, 2014), contributing both to higher GHG emissions and to higher rates of energy poverty, with significant flow-on health consequences (Jessel et al., 2019). Finally, countries that have pre-existing energy efficiency and building upgrade programs may also see higher impacts by directing stimulus there. The use of pre-existing structures may reduce the time and resources required to launch a widespread spending program. The United States is a key example of a country that is likely to benefit from stimulus investments in energy efficiency retrofitting programs. With one of the highest per-capita energy consumption rates in the world (World Bank, 2014), the US stands to gain by reducing costs for low- and middle-income individuals and reducing GHG emissions through energy efficiency programs.

Investment in energy efficiency retrofits through the extended Weatherization Assistance Program played a stimulatory role during the GFC recovery, and programs have continued throughout the country. For the US, expansion of existing programs, rather than investment in new programs, may reduce implementation costs and maximise the chances of success. Expanded programs could catalyse swift job creation in construction and in manufacturing (E2, 2020). Careful targeting is required to ensure that economic returns are maximised (Allcott & Greenstone, 2012) and that marginalised populations, who bore a disproportionate health and economic burden during the pandemic, can reap the highest benefits.

5. NATURAL CAPITAL

5.1 Benefits: low-training jobs, low imports, sustainable ecosystems and more

Over the course of human history, the natural environment has been a constant foundation of human prosperity. Governments have exhibited interest in spending to expand or protect natural capital as a means of simultaneously supporting economic recovery and environmental sustainability. As natural capital spending encompasses a broad range of policies, the impacts of these policies on social, environmental, and economic metrics are not uniform. The policies considered in this report include support for forestry, waterways, public parks, and general conservation initiatives.

On the economic front, there is evidence to suggest that protecting natural capital can bring both short-run recovery benefits and long-run growth opportunities. In the short-run, spending on ecosystem regeneration initiatives and reforestation can create relatively low-skilled jobs quickly (Edwards et al., 2013). Since a high proportion of spending on natural capital investments is directed to labour and sourcing of natural resources, risks of offshoring government spending to imports are low and the economic multiplier high (Nair & Rutt, 2009).

Speaking to the long-term, the degradation of soil quality, waterways, and biodiversity act as significant handbrakes against growth in sectors ranging from agriculture to tourism to water (Darmendrail et al., 2004) in addition to disrupting critical food supply chains (Altieri, 2009). Protection of natural resources acts to support the long-term economic strength of these sectors. The positive social impacts of natural capital spending can also be numerous. Expansions of green spaces can have local cooling effects (Willis & Petrokofsky, 2017) and play a significant role in improving air quality in areas immediately proximate, thus improving health outcomes for communities in those regions.

There is also significant evidence to suggest that increased public access to green spaces can improve mental health and overall quality of life (Mensah et al., 2016; Stigsdotter et al., 2010). Furthermore, natural capital investment can support poverty reduction. It can increase access to safe water supplies and more resilient agricultural land, reduce mortality related to environmental toxicity, and increase food security (Adams et al., 2004; Zhen et al., 2014).

Gender-inclusive policy design for natural capital programs, particularly in relation to job allocation and land rights, may help to bridge existing economic inequalities, in addition to considerations for indigenous populations. Supporting natural capital can also build resilience against future pandemics and natural disasters (IPBES, 2019; Kousky, 2010; UNEP & ILRI, 2020).

Finally, carefully designed natural capital investments have the potential to benefit biodiversity, reduce pollution, and enhance ecosystem sustainability. To ensure sustainable outcomes, policies must directly prioritise biodiversity and be designed with strong requirements for community-oriented implementation that reflect cultural and ecological rights (Seddon et al., forthcoming 2021). Failure to prioritise biodiversity, particularly in the instance of monoculture-type afforestation, can devastate local ecosystems (Xiao et al., 2020).

Sustainable investment in nature-based solutions (NbS) directly supports the 2030 Agenda (specifically through goals 5, 6, 8, 13, 14, and 15) and can enhance progress to emissions reduction targets through carbon sequestration in line with the Paris Agreement. NbS investments are not, however, a panacea, and do not eliminate the need for broad decarbonisation of the economy (IPBES, 2019).

5.2 Announced investment: 56bn in natural capital

The Global Recovery Observatory presents one archetype and four sub-archetypes related to natural capital spending. They are:

- μ: **Natural infrastructure and green spaces investment**
- $\mu1$: Public parks and green spaces investment
- $\mu2$: Tree planting and biodiversity protection
- $\mu3$: Ecological conservation initiatives
- $\mu4$: Waterway protection and enhancement

Figure 13 illustrates the breakdown of announced natural capital spending in 2020 by sub-archetype and country.

USD56.3bn in natural capital spending was announced as part of COVID-19 recovery plans in 2020. Over two fifths of this investment (USD19.2bn) was directed towards public parks and green spaces investment, with spending dominated by a US policy for the restoration of national parks, and a Chinese policy aimed at air, water, and soil pollution prevention. Significant investment was also directed to tree planting and biodiversity protection initiatives (USD13.1bn), as well as ecological conservation initiatives (USD5.3bn). Waterway enhancement has also seen significant Chinese investment (USD18.7bn).

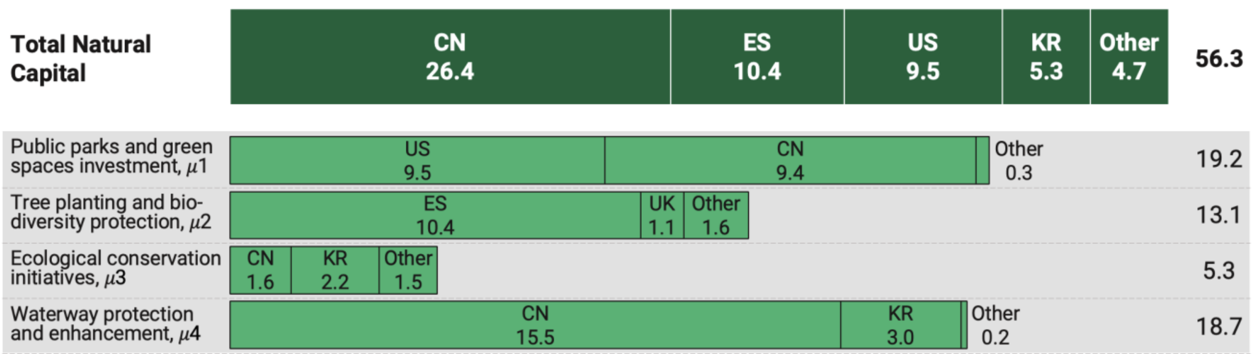

Figure 13. Total natural capital spending by country and sub-archetype. For each sub-archetype, the largest contributors are listed by name, with smaller spenders categorised as 'other'. Countries - CN: China, ES: Spain, KR: South Korea, UK: United Kingdom, US: United States. Values are in USDbn. Source: Global Recovery Observatory.

5.3 Emerging policy opportunities

5.3.1 Pakistan and job creation through reforestation

As part of a green stimulus package announced in June 2020, the Pakistani government allocated USD90mn to an afforestation program that hires workers to plant saplings throughout the country. With extensive job losses plaguing the nation, this program was developed to sequester carbon, protect the natural environment, and provide work for daily-wage workers facing unemployment due to the pandemic.

The tree planting initiative looks to prioritise work for women and other vulnerable groups and is expected to generate tens of thousands of jobs if implemented successfully. Particularly in lower-income countries with largely unskilled labour forces such as Pakistan, tree planting initiatives have the potential to meet many of the social, environmental, and economic goals associated with recovery.

However, this process is not without its challenges. Though the program is expected to provide work for many thousands of individuals, the current daily payment rate is significantly below Pakistan's minimum wage for unskilled workers. Concerns have also been raised regarding the siting of the afforestation programs negatively impacting rural communities or disregarding land rights (Ashraf, 2019). Additionally, insufficient biodiversity in the use of monoculture-type afforestation presents significant ecological risks (Altieri, 2009; Cannell, 1999). In this way, the project may fail to satisfy several of the principles identified for successful NbS investment in Seddon et al. (2021).

Some efforts have been made to address these important issues, and in the event that they can be effectively managed, programs such as Pakistan's have the potential for high returns along social, economic, and environmental dimensions.

5.3.2 Natural capital investment in advanced economies

The natural capital projects that are feasible for nations vary widely by the country's geography and income status. Several advanced economies have announced natural capital projects as part of their recovery strategies. Examples include the United Kingdom's Green Recovery Challenge Fund and an Australian policy supporting coastal ecosystems.

The UK's Fund involves around USD54.9mn for the planting of 800,000 trees in rural and urban settings, with benefits for several demographic groups (UK Government, 2020c). Tree planting is set to occur at healthcare facilities to contribute to ecotherapy sessions, at natural heritage sites, and in cities. These projects have potential to create jobs swiftly, improve air quality and health outcomes, and if biodiversity is sufficiently considered, create resilient new ecosystems.

In Australia, the federal government included USD47.2mn in environmental measures in its COVID-19 Relief and Recovery Fund (Australian Government, 2020). This spending included measures to rebuild shellfish reefs subject to overfishing and measures for the conservation of the Great Barrier Reef. The programs aim to accelerate projects already in advanced stages of planning, reducing administrative barriers for quick implementation and a swift boost for local jobs.

5.3.3 What's next? Remaining high potential opportunities

The benefits of natural capital investment are broad and expected to vary widely by the country in which they are implemented. One of the key benefits of natural capital investment is its ability to reduce the risk of, and increase community resilience to, natural disasters including fire, floods, and storms. For this reason, nations with volatile climates (or those whose climates are projected to become increasingly volatile as the impacts of anthropogenic climate change worsen) are particularly likely to benefit significantly from these policies. These include countries such as India, Bangladesh, China, Vietnam, Pakistan, and Indonesia which are particularly susceptible to floods (Winsemius & Ward, 2015) and the US, Australia, and Brazil who have experienced devastating wildfires in the last decade.

In addition to the benefits of natural capital investment in protecting against natural disasters, investment here can also benefit tourism. Tourism frequently leads to serious environmental degradation, and a key component of making the industry sustainable is investing in and restoring related natural resources (Blangy & Mehta, 2006).

The tourism industry has been particularly badly impacted by the pandemic (UNWTO, 2020), so investments in this area through supporting natural capital may have significant economic benefits for countries that rely on tourism such as the Philippines, Thailand, Vietnam, and Mexico (OECD, 2020b).

EMDEs are another group that may see particularly high benefits from natural capital investment. Many natural capital project types, including reforestation and afforestation, do not require highly skilled labour and could be effective in providing incomes to some of the most vulnerable communities in these countries. The economies of EMDEs are also more likely to rely heavily on nature-based sectors such as agriculture, so natural capital investments which aid those sectors have the potential to both boost jobs in the short-term and safeguard nature-dependent industries in the long term (Cook & Taylor, 2020). The benefits related to limiting natural disaster impact are also likely to be greater for many EMDEs, who have on average three times more deaths due to natural disasters than higher income nations (CRED, 2015) and whose economies rely in large part on climatic stability (Coulibaly et al., 2020).

6. GREEN RESEARCH AND DEVELOPMENT

6.1 Benefits: seeding new industries, smoothing recovery, and more

Reaching net zero emissions will be difficult without significant technological innovation. For hard to abate sectors like aviation, plastics, and agriculture, we simply do not yet know how to eliminate emissions without significant lifestyle changes. Even for sectors that can be decarbonised with existing technologies, costs are often too high for significant GHG emissions reductions. Efforts to reduce GHG emissions in these cases can be economically irrational without pricing the global warming externality. Barring drastic new pricing mechanisms and lifestyle changes, full decarbonisation aligned with Paris targets will be impossible without significant technological advancement.

Examples of green R&D spending opportunities include renewable energy technologies, technologies for decarbonising hard-to-abate sectors, and carbon sequestration. To accurately describe their economic returns, in the Observatory large demonstrator projects are included in their related investment categories, rather than in the R&D category. These projects can sometimes create jobs and use materials in a manner more closely aligned with infrastructure development than other R&D processes.

When it comes to green R&D as a fiscal stimulus tool, the picture is somewhat more complicated than in the policies mentioned in previous chapters. Though there is strong evidence that green R&D can deliver very large long-term benefits and catalyse new industries and jobs in later years, the policy is not particularly well-suited to inducing immediate economic growth or jobs, which is naturally a priority for governments as they consider their investment options. This is in large part due to time lags between R&D investment and realised output (Jaekyung Yang et al., 2011; Wang et al., 2016), and that short-term employment benefits are primarily directed at highly skilled workers in high-tech industries (Piva & Vivarelli, 2017). As such, in some cases fewer jobs are created by these policies per dollar in comparison to, for instance, green infrastructure investment.

However, there is a role for longer-acting stimulus in any economic recovery package. Longer acting measures can combine with shorter acting measures to ensure that economic growth curves are smooth, rather than stepped. Smoothed growth may help accelerate investment to create new long-term demand and industrial capability, rather than only shifting future demand backwards. Green R&D policies could be a vital component of meeting the 2030 Sustainable Development Goals, particularly goals 7, 9, 11, 12, and 13 (UN, 2015).

6.2 Announced investment: 29bn in green R&D

The Global Recovery Observatory presents one archetype and four sub-archetypes related to green R&D spending. They are:

ψ : **Research and development investment**
ψ1: Energy sector R&D programs
ψ2: Agriculture R&D programs
ψ3: Industrial R&D programs
ψ4: Other sectoral R&D programs

Figure 14 illustrates the breakdown of announced green R&D spending in 2020 by sub-archetype and country.

USD28.9bn in green R&D was announced as part of COVID-19 recovery spending in 2020. The largest component of this investment (USD9.7bn) was devoted to green energy R&D. 'Other sectoral R&D' (i.e., that which was not specifically energy, agriculture, or industrial programs), largely from the 'France Relance' recovery package, accounts for USD7.0bn. Investment was also announced in industrial R&D (USD5.5bn), but no investment was recorded for agricultural R&D.

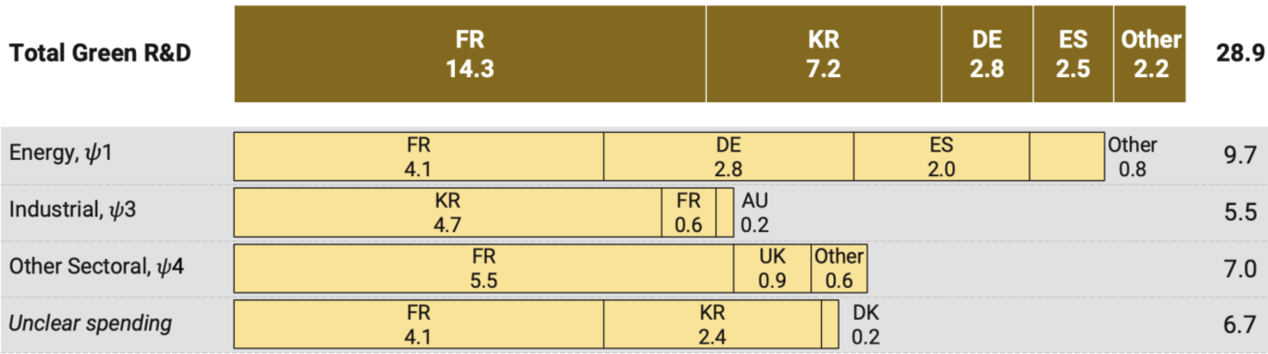

Figure 14. Total green R&D spending by country and sub-archetype. For each sub-archetype, the largest contributors are listed by name, with smaller spenders categorised as 'other'. Countries - AU: Australia, DE: Germany, DK: Denmark, ES: Spain, FR: France, KR: South Korea. Source: Global Recovery Observatory.

6.3 Emerging policy opportunities

6.3.1 Green R&D examples

As the urgent demands of addressing the COVID-19 crisis remain significant in many countries, it is unsurprising that announced spending on green R&D policies has been small in relation to other categories of spending. In spending to date, there are a variety of examples that could provide a framework for further investment in other nations.

As part of 'France Relance', the French government has earmarked a total of USD14.3bn for green R&D measures. This investment covers a variety of sectors and includes funding for research into low-carbon energies, circular economy, sustainable transport and mobility, a responsible agriculture and sovereignty of food supply, and urbanisation, all included as 'Other sectoral R&D' in Figure 14 (Government of France, 2020a).

The German government has also made significant investments in renewable energy research with a focus on hydrogen (Government of Germany, 2020), while South Korea's green R&D spending has so far focused on industrial decarbonisation and green manufacturing (Government of the Republic of Korea, 2020), an area which does not often receive research funding commensurate with its importance given the magnitude of industrial emissions and the difficulty of decarbonising industrial processes (Esparza, 2020). Norway has announced investments in a variety of green technologies, including renewable energy, hydrogen, green shipping, and emission reduction technologies for the petroleum industry (Government of Norway, 2020).

6.3.2 What's next? Remaining high potential opportunities

Though spending on green R&D is a crucial component to the deep decarbonisation of global economies, tracking the precise economic, social and environmental outcomes is a difficult process (IEA, 2020e). However, as a general principle in the context of fiscal stimulus, countries are likely to get the most out of green R&D investments if they are targeted to build on areas of existing advantage. This advantage may come in natural resource endowment(s), intangible assets like patents, established expertise in adjacent or otherwise related technology types, and/or existing prominent skill sets in the labour force.

As the processes involved in R&D often require highly skilled workers, making use of an existing transferable skills base is important for fast implementation, although, the primary benefits of any R&D program are not usually realised until many years after the research is carried out. Targeting diversity and inclusivity in green R&D recruitment can improve team creativity and increase the returns of investment in subjects including science, technology, engineering, and mathematics (UNESCO, 2016). Many hard-to-abate sectors, like agriculture, have seen little R&D investment and would benefit significantly from a federal push. By taking early action, governments may be able to establish a first-mover advantage. However, success depends on country-specific characteristics, some of which can be directly influenced (Cleff & Rennings, 2012), but may be difficult to fully change (Kuik et al., 2019).

Sequestration technologies are another high priority R&D investment opportunity given that emissions scenarios often rely on sequestration to model long-term sustainable future emissions scenarios (Rogelj et al., 2018), but almost all non-NbS sequestration technologies remain in early stages of development (IEA, 2020e).

Through a combination of direct federal R&D programs and measures to incentivise private investment in green R&D, nations have the potential to safeguard their green energy futures while strengthening domestic economic priorities and overall economic performance in the long-term (Lee & Min, 2015).

CONCLUSION

To the question, **"Are we building back better?",** the resounding answer is: **not yet.**

Despite positive fiscal steps towards a sustainable COVID-19 recovery from a few leading nations, the world has so far fallen short of matching widespread aspirations to "build back better" with action. However, given the continuing nature of the pandemic and associated economic handbrake, opportunities to spend wisely on recovery are not yet over. As the pandemic progresses into its latter stages, policymakers will naturally turn their attention from rescue spending measures towards recovery measures.

Recovery measures that focus on equitably raising prosperity can help governments catalyse new economic growth, innovation, and jobs to meet short-term needs and establish long-term strength. By urgently prioritising long-term economic, social, and environmental objectives, nations can demonstrate their ability to build forward better.

In 2020, COVID-induced spending announcements totaled USD14.6tn (up to USD17tn, including European Commission announcements that have not yet been used by a specific member state). Of this, USD368bn was green, and USD341bn was both green and oriented to economic recovery. These figures reflect up to 2.5% of total spending and 18.0% of recovery spending respectively.[13] While total 2020 green COVID spending was substantial, it was driven by a handful of ambitious nations, with the European Commission accounting for at least half of all GHG-positive spending.

Overall, global green recovery spending has been incommensurate with the scale of the planetary crises of climate change, nature loss, and pollution.

Five key questions at the core of 'building back better' highlight the need for urgent government action to align with a sustainable recovery vision:

What is at stake as countries commit unprecedented resources to COVID-19 recovery?

Recovery policies implemented today will set economic, social, and environmental trajectories for years, if not decades, to come. These investments will determine whether and how communities rebound from the COVID-19 economic damage, potentially saving lives and businesses today while influencing which industries and technology types emerge as future growth drivers.

Crucially, actions now could influence whether economies continue to be reliant on unsustainable fossil-heavy growth, or instead decouple growth from GHG emissions to avoid the worst of the climate crisis and bring significant air pollution, natural capital, health, and other co-benefits. For most nations, under the Paris Agreement, support of a high-emissions economic status quo now could mean insufficient time to revert to a suitably green growth pathway later. By contrast, decoupling global emissions from growth could give a fighting chance to meet a 2°C or 1.5°C future.

[13] Including the European Commission, green stimulus announcements totaled up to USD723bn, of which USD696bn was oriented to economic recovery. These figures reflect up to 4.2% of total spending and 23.4% of recovery spending. Incorporation of European Commission figures may involve some double counting as many member states are not fully transparent in reporting on policy funding.

What spending pathways could enhance both economic recovery and environmental sustainability?

Following the seminal work of Hepburn et al. (2020), and supported by Global Recovery Observatory policy archetype assessments, some high potential green spend areas include green energy, green transport, energy efficiency and building retrofits, natural capital investment, and green R&D, as covered in this report. Policies in each of these areas have already seen significant recovery investment. They have the potential to simultaneously facilitate swift economic recovery, secure long-term social returns, and make progress against numerous environmental objectives. For emerging markets and developing economies, debt forgiveness and generous foreign aid programs are needed to make these spending pathways a reality and to ensure that decades of progress in addressing poverty are not unwound.

What is the role of recovery spending in addressing inequalities exacerbated by COVID-19?

The brunt of the health and economic impacts of COVID-19 have been borne by those already disadvantaged due to their income status, gender or race, among other factors. Carefully targeted recovery policies could help catalyse efforts to build back better in these communities in the short-term, while raising resilience to future crises. Green spending policies often bring positive health outcomes through air pollution reduction and can reduce energy prices for targeted groups; in both cases, the positive impacts are most keenly felt by vulnerable populations. The pandemic has brought significant setbacks in progress towards international agreements, particularly the 2030 Agenda. Spending directed towards the Sustainable Development Goals could stem recent reversals in progress. As learned through the COVID-19 pandemic, inequalities are only further exacerbated without timely action (Klenert et al., 2020).

What kind of recovery investments are countries currently making to tackle climate change, nature loss, and pollution?

Afforestation programs, green energy investment, and electric vehicle incentives are just a few of several ambitious green recovery policies that were announced in 2020. Though there have been instances of strong recovery policies that address these environmental crises, current spending globally has been restricted to a few nations and is substantially less than what is required. Approximately 16.0% of recovery spending may bring positive air pollution impacts, but 16.4% may act to increase net air pollution. Regarding natural capital impact, only 3% of recovery spending is deemed positive and up to 17% may negatively impact natural capital, mainly through expanded road transportation and defense services.

What more needs to be done to ensure a sustainable and equitable recovery?

Even as nations continue to deal with the health consequences of the pandemic, policy makers must urgently seed and support teams to develop and begin implementing sustainable and equitable recovery policy. Learning from past and present fiscal policy actions, well-designed and targeted policy takes time and iteration; planning processes that begin early are more likely to deliver effectively targeted and impactful spending. However, these measures alone will not be enough to address the full scale of the environmental crises. Insufficient human capital investment in 2020 should be countered by prioritisation of ambitious green skills programs, including green retraining initiatives in 2021 and beyond. Additionally, a sustainable future requires appropriate pricing of the pollutive externalities of production, fiscal actions to address a growing debt crisis in emerging market and developing economies, and long-term commitments to address structural issues and deep-rooted market failures (Barbier, 2020). Alongside their focus on domestic prosperity, wealthier economies and their citizens must not let the gap between advanced and developing economies grow following from the pandemic.

Generous grants and concessional finance from international partners, including multilateral organisations, could help emerging and developing nations hasten their recovery, avoid significant additional loss of human lives, and align their growth trajectories to accelerated sustainable development pathways (O'Callaghan et al., 2021a; O'Callaghan et al., 2021b).

Trillions in still to be announced fiscal spending provide the greatest opportunity in decades to reorient for the future; citizens, businesses, policy makers, and politicians must hold each other to account to ensure that the opportunity is not wasted. This report demonstrates the vital opportunity and urgent need for governments to transparently align spending with existing pledges to build back better and prioritise the future prosperity of their constituents. And prosperity is driven not only by innovation, good jobs and growth, but also a stable climate and healthy ecosystems and landscapes.

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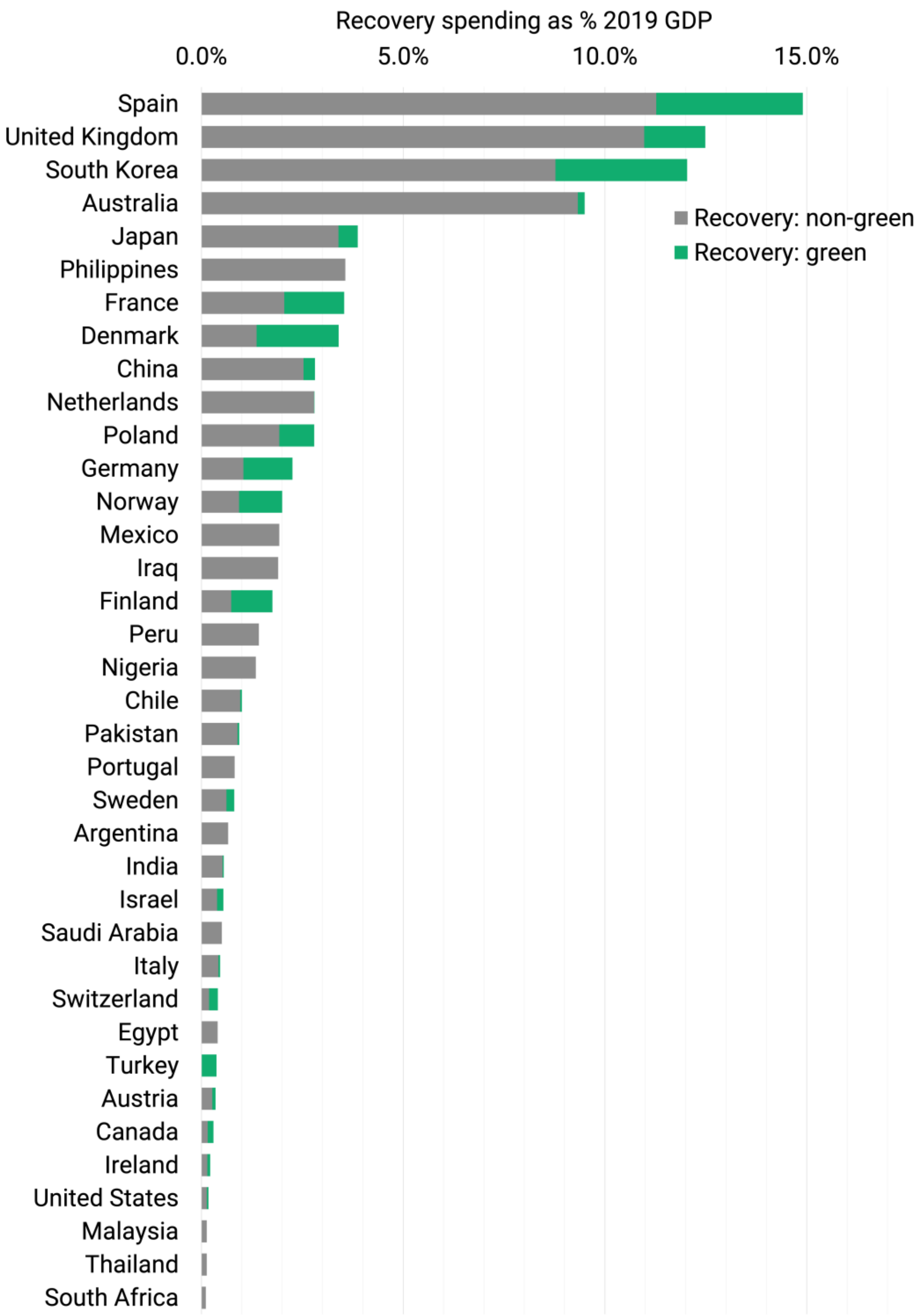
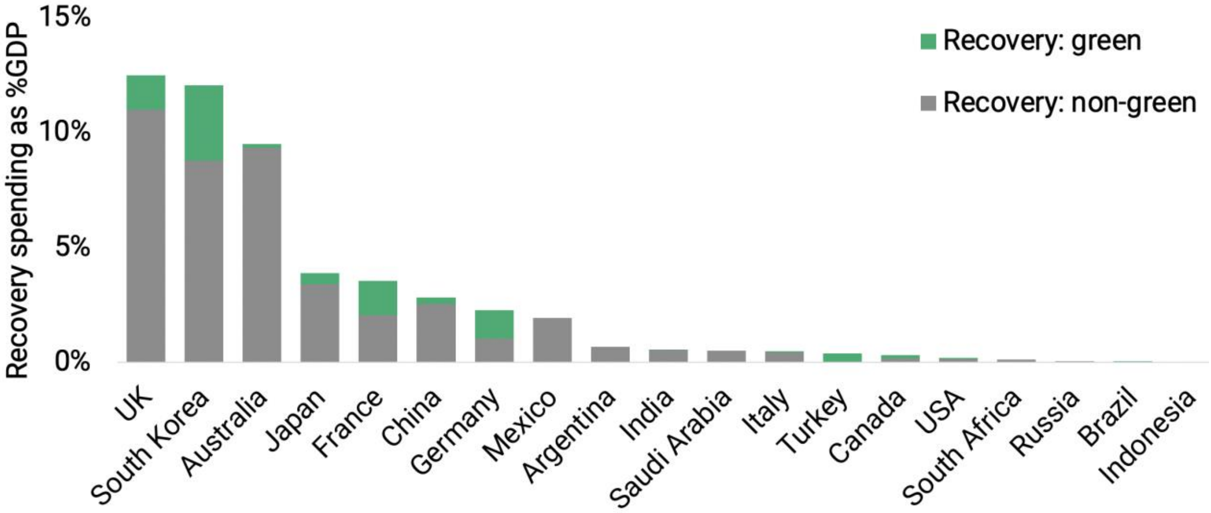
Appendix A: Global recovery spending

Announced recovery spending from countries in the Global Recovery Observatory. At the time of writing, Czech Republic, Belgium, Russia, Colombia, Singapore, Brazil, Bangladesh, Indonesia, Romania, Taiwan PRC, Iran, UAE, and Vietnam have announced less than 0.1% of GDP in recovery spending.



The figure below indicates a wide spread in recovery spending profiles of G20 economies, with few contributing significantly to green priorities. In 2020, some G20 nations, including France, Germany, and South Korea remained resolute in their focus on accelerating a sustainable climate transition, and this is reflected in the relatively high percentage of green recovery spending announced by each.



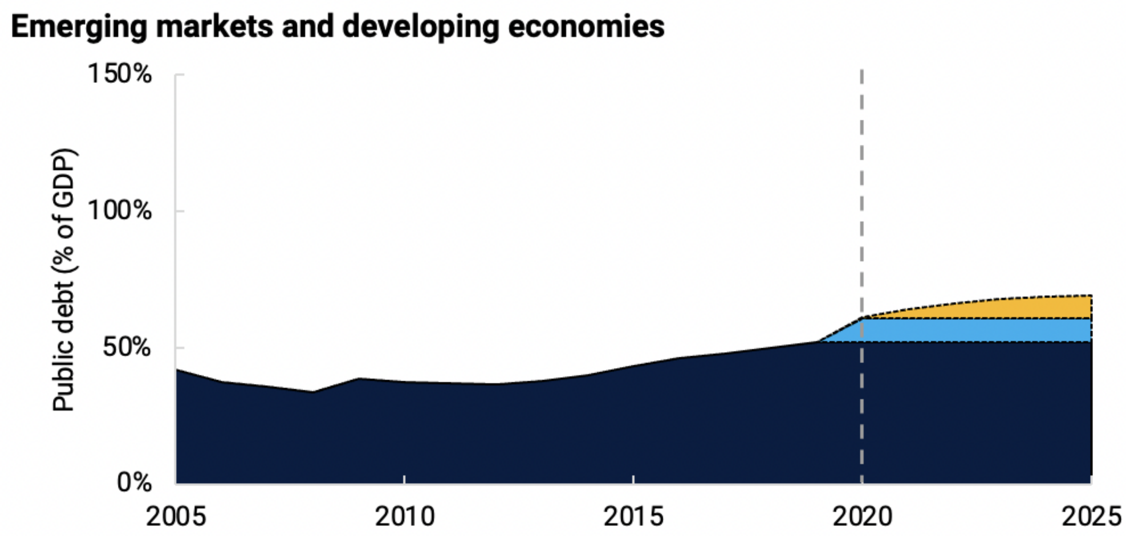
Green, neutral, and dirty recovery spending announced by the G20 countries, as a percentage of 2019 GDP. Other countries in Appendix A. Sources: Global Recovery Observatory; GDP data from World Bank, (2020b).

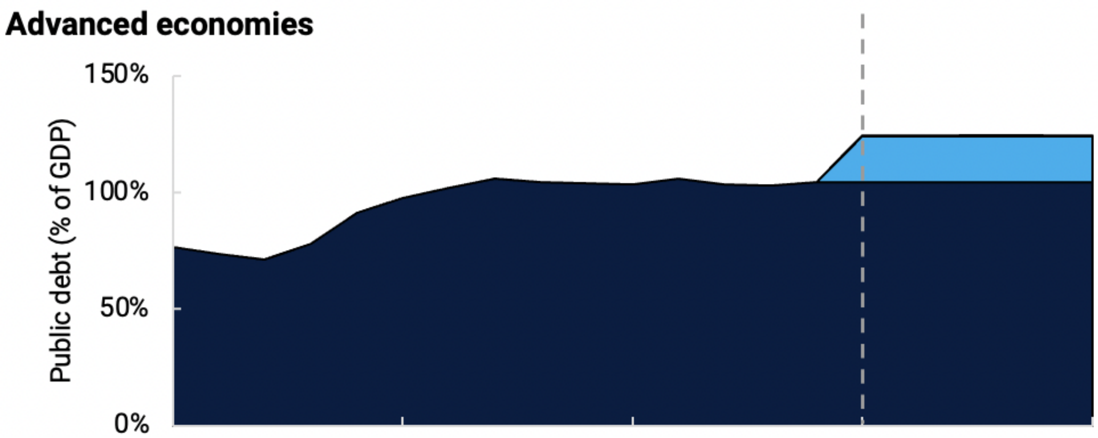
Appendix B: Country Information

Code	Country	Development status	Code	Country	Development status
AR	Argentina	EMDE	**MX**	Mexico	EMDE
AU	Australia	AE	**NL**	Netherlands	AE
AT	Austria	AE	**NG**	Nigeria	EMDE
BD	Bangladesh	EMDE	**NO**	Norway	AE
BE	Belgium	AE	**PK**	Pakistan	EMDE
BR	Brazil	EMDE	**PE**	Peru	EMDE
CA	Canada	AE	**PH**	Philippines	EMDE
CL	Chile	EMDE	**PL**	Poland	EMDE
CN	China	EMDE	**PT**	Portugal	AE
CO	Colombia	EMDE	**RO**	Romania	EMDE
CZ	Czech Republic	AE	**RU**	Russia	EMDE
DK	Denmark	AE	**SA**	Saudi Arabia	EMDE
EG	Egypt	EMDE	**SG**	Singapore	AE
FI	Finland	AE	**ZA**	South Africa	EMDE
FR	France	AE	**KR**	South Korea	AE
DE	Germany	AE	**ES**	Spain	AE
IN	India	EMDE	**SE**	Sweden	AE
ID	Indonesia	EMDE	**CH**	Switzerland	AE
IR	Iran	EMDE	**TW**	Taiwan, PRC	AE
IQ	Iraq	EMDE	**TH**	Thailand	EMDE
IE	Ireland	AE	**TR**	Turkey	EMDE
IL	Israel	AE	**AE**	UAE	EMDE
IT	Italy	AE	**UK**	United Kingdom	AE
JP	Japan	AE	**US**	United States	AE
MY	Malaysia	EMDE	**VN**	Vietnam	EMDE

Appendix C: COVID-19 impacts on public debt

Increased public debt spurred by the COVID-19 pandemic. IMF projections consider both expenditure and taxation forecasts. Sources: Global Recovery Observatory; IMF 2020b. While announced COVID-19 spending in the Observatory appears to match IMF debt projections very closely, this new spending is not equivalent to new debt as (i) many announcements include medium-term funding commitments beyond 2020 and (ii) not all new spending is debt-financed.





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Global Recovery Observatory

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