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Building Back Better: A Sustainable, Resilient Recovery after COVID-19

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For the economic recovery from the COVID-19 crisis to be durable and resilient, a return to ‘business as usual’ and environmentally destructive investment patterns and activities must be avoided. Unchecked, global environmental emergencies such as climate change and biodiversity loss could cause social and economic damages far larger than those caused by COVID-19. To avoid this, economic recovery packages should be designed to “build back better”. This means doing more than getting economies and livelihoods quickly back on their feet. Recovery policies also need to trigger investment and behavioural changes that will reduce the likelihood of future shocks and increase society’s resilience to them when they do occur. Central to this approach is a focus on well-being and inclusiveness. Other key dimensions for assessing whether recovery packages can “build back better” include alignment with long-term emission reduction goals, factoring in resilience to climate impacts, slowing biodiversity loss and increasing circularity of supply chains. In practice, well-designed recovery policies can cover several of these dimensions at once, such as catalysing the shift towards accessibility-based mobility systems, and investing in low-carbon and decentralised electricity systems.

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1. Governments' first priorities in tackling the COVID-19 pandemic have been to overcome the health emergency and to implement rapid economic rescue measures, the latter mostly aimed at providing essential liquidity and protecting livelihoods in the face of abrupt losses of income. As the health crisis gradually abates in some countries, attention is now turning to preparing stimulus measures for triggering economic recovery. This policy brief examines how these stimulus packages can create a recovery that "builds back better", i.e. not only getting economies and livelihoods back on their feet quickly, but also safeguarding prosperity for the longer term. This means triggering investments and societal changes that will both reduce the likelihood of future shocks and improve our resilience to those shocks when they do occur, whether from disease or environmental degradation. At the heart of this approach is the transition to more inclusive, more resilient societies with net-zero GHG emissions and much reduced impacts on nature. Other OECD policy briefs examine the role of environmental health in strengthening resilience to pandemics (OECD, 2020^[1]) and COVID-19 and the low-carbon transition (OECD, forthcoming).

A more resilient economy depends on a shift to sustainable practices

2. **In addition to the immediate human suffering caused by the disease itself and the loss of livelihoods for millions, the COVID-19 pandemic has also highlighted several key vulnerabilities of our societies and economic system.** Global interconnectedness has helped to create huge economic and social benefits for decades, albeit unequally, but also facilitated the rapid spread of the pandemic. More broadly, the speed and depth of the economic crisis have shown that a core principle of the global economy – prioritising short-term economic growth and efficiency over long-term resilience – can have huge societal costs. The precariousness of long and complex global value chains has been revealed, with many countries struggling to acquire medical and other strategic supplies. Social inequalities have been exposed and rapidly exacerbated by the massive but uneven loss of employment, with the equivalent of more than 300 million jobs potentially at risk (ILO, 2020^[2]). Although this is not the first economic crisis to expose these frailties, the depth and breadth of the current circumstances have brought the issue of resilience and preparedness high in the public consciousness.

3. **The exposed vulnerabilities are particularly sobering when seen in the light of an even bigger future threat to the global economy: environmental degradation driven by our current economic system.** The world's environmental emergencies are as pressing as ever, even if they may seem distant during such a very human crisis. The impacts of climate change, air pollution, biodiversity loss and poor ocean health already cause immense suffering globally and harbour further systemic vulnerabilities for the global economy that could ultimately eclipse the current crisis. Physical and economic impacts from climate change are already being felt, and some regions have experienced extreme weather events at the same time as tackling COVID-19, such as super-cyclone Amphan in Bangladesh and Typhoon Vongfong in the Philippines (UN, 2020^[3]). Without structural changes to our economies, continued accumulation of greenhouse gases (GHGs) in the atmosphere will lead to potentially catastrophic further impacts. While the economic shut-down has led to some widely-reported environmental improvements, such as reduced emissions of GHGs and air pollutants and less water pollution, these in themselves will have almost no long-term impact (Le Quéré et al., 2020^[4]). If economic activity resumes as before, they are likely to be temporary and quickly erased. Indeed, GHG emissions rebounded and resumed growth in the aftermath of the recent economic crises (OECD, 2020 forthcoming).

4. **These interlinked environmental crises may also heighten the likelihood and likely impact of future infectious diseases.** The economic pressures driving biodiversity loss and the destruction of ocean health can have cascading impacts on societies, and may increase the risk of future zoonotic viruses (those which jump from animals to humans) due to the expansion of human activities leading to

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deforestation, combined with the increased demand for and trafficking of wildlife (Jones et al., 2013^[5]). Declines in local environmental quality, including air and water pollution, can influence the vulnerability of societies both to disease and to the effects of a less stable climate, with impacts likely to affect poorer communities more (OECD, 2020^[1]).

5. **Returning to “business as usual” will not deliver a sustained long-term economic recovery that also improves well-being and reduces inequality.** With massive stimulus packages starting to be unveiled around the world, governments, businesses and societies as a whole have both a responsibility and self-interest to not only look for near-term measures to shore-up livelihoods and employment, but also to take a step back and reflect on the political and economic driving forces leading to the current crisis.

6. **Despite encouraging signs from governments, businesses and citizens, recovery plans have so far mostly fallen short.** Many governments have recognised the need and opportunity of a sustainable recovery. For example, in April 2020, the G20 Finance Ministers agreed to “commit to support an environmentally sustainable and inclusive recovery” (G20, 2020^[6]). Encouragingly, an international poll covering developed and developing countries also suggests that a majority of citizens see a focus on environmental issues as a continued priority as we emerge from the COVID-19 crisis (IPSOS MORI, 2020^[7]). The fragilities exposed by the pandemic may act to underline the reasons that environmental issues were becoming top political priorities around the world before COVID-19 struck. In 2019, millions of people, spearheaded by youth, protested in the streets for climate action, leading to several governments officially declaring a “climate emergency”. Biodiversity loss and the ongoing mass species extinction were also gaining headlines around the world, and the visible crisis engulfing the world’s oceans had become a front-line political issue in several countries. As recently as January 2020, climate change and biodiversity loss topped the World Economic Forum’s list of global risks (World Economic Forum, 2020^[8]). The social and economic case for a sustainable, resilient recovery is very clear. Despite this, economic recovery measures proposed so far have mostly scored poorly on environmental metrics, with unsustainable support outstripping sustainable measures in many countries (Vivid Economics, 2020^[9]). While there is significant support for “green” technologies and industries, in particular in European countries, in many cases this is outweighed by ongoing support for “brown” activities that may lock-in emissions intensive pathways.

“Building Back Better”: key dimensions for a resilient economic recovery

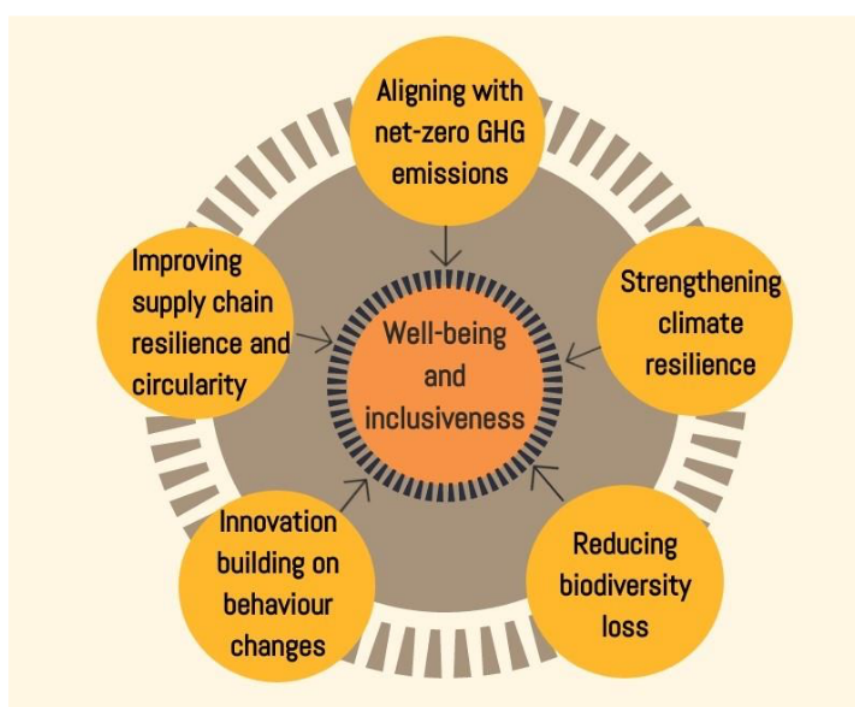
7. **The term “Building Back Better” has been increasingly and widely used in the context of the economic recovery from COVID-19** (WRI, 2020^[10]) (We Mean Business Coalition, 2020^[11]). The notion originated in the context of recovery and reconstruction from physical disasters¹, with an emphasis on making preventative investments that improve resilience to, and so reduce the costs of, future disasters. The challenge of re-igniting the global economy in the aftermath of the economic crisis triggered by COVID-19 is of course different. There has been no physical disaster, and the focus is global. Yet the economic crisis is so severe, the risks from returning to previous patterns so high, and the opportunity to embrace a more sustainable recovery so clear, that the term is relevant in this context. Even at the global level, there is still an emphasis on prevention, as the investments and behavioural changes made will pay dividends

¹ Coined in 2006 in the aftermath of the 2004 Asian tsunami, by 2015 the term “Building Back Better” was in widespread use by the Disaster Risk Reduction (DRR) community and was incorporated into the priorities of the Sendai Framework for Disaster Risk Reduction (United Nations Office for Disaster Risk Reduction, 2015^[40]). It generally refers to the recovery, rehabilitation and reconstruction phase after a disaster to increase the resilience of communities through the restoration of physical infrastructure and societal systems. In that context, there is evidence that disasters did pave the way for regulatory and policy changes to enhance resilience and invest in prevention (OECD, 2014^[39]). The emphasis is not only on preventative measures to reduce cost of recover, but also on incorporating social and environmental improvements for increasing well-being of impacted societies.

in the future through reduced exposure and increased resilience to costly future disruptions – whether due to climate change, disease, or a confluence of these or other factors.

8. To “build back better”, recovery measures can be assessed across a number of key dimensions (Figure 1). Common to all these dimensions is the need for urgent decisions taken today to incorporate a longer-term perspective. For example, assessing measures against these dimensions can expose where competing potential targets for stimulus spending may offer similar near-term benefits in terms of job creation, but very different long-term outcomes for sustainability and resilience (for example, whether or not the stimulus leads to investment in long-lived high-emitting infrastructure that may lock-in GHG emissions far into the future).

Figure 1. Key dimensions for Building Back Better



9. A central dimension of building back better is the need for a people-centred recovery that focuses on well-being, improves inclusiveness and reduces inequality. To improve public support, recovery policies need to be measured on more than just economic growth and total job creation. Emphasising other elements that improve well-being, such as income, job quality, housing and health is important to achieve this (OECD, 2020_[12]). More specifically, where stimulus packages target environmental objectives, a focus on people’s well-being is also crucial to cement the social and political acceptance of environmental measures (OECD, 2019_[13]). Even before the crisis, the impact of environmental policies on inequalities among and within countries, and between genders, was a mounting key concern in several regions, and this is even more critical in the current context. Means for ensuring that environmental measures are socially inclusive include making taxes and subsidies progressive (supporting the most vulnerable) and preparing the workforce for the green transition, for example by adapting and adopting “Just Transition” principles refocused for an era of economic crisis and recovery (OECD, 2017_[14]).

10. The relative importance of the other dimensions will likely vary across different country contexts, according to their development priorities, infrastructure needs and social circumstances, in particular for developing countries. These dimensions include:

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- **Aligning recovery measures with long-term objectives for reducing GHG emissions.** Avoiding the worst impacts of climate change is key to future resilience and stability. A careful assessment of the influence of stimulus packages on future GHG emissions trajectories is crucial, including in the context of moving towards net-zero emissions. This relates both to near-term emissions of economic activities receiving liquidity support, as well as long-term structural implications of potential lock-in through infrastructure investment decisions facilitated by recovery packages. The long-lived nature of infrastructure investments likely to be made through stimulus packages means that decisions made now will have implications for decades to come, and could determine whether the world can achieve its goals of averting the worst impacts of climate change.
- **Strengthening resilience to the impacts of climate change.** Resilience to climate change is one specific aspect of improving the overall resilience of economies and societies. In particular, infrastructure networks will face increasing pressures from the impacts of climate change, but also play an important role in building society's resilience to those impacts. Infrastructure investment is likely to be a key component of recovery measures in many countries – in part because of job creation potential – and it is important to ensure that infrastructure investments are climate resilient and do not increase exposure and vulnerability. This will reduce direct economic damages from climate related disasters and minimise the indirect costs created by the cascading impacts caused by the disruption of both critical services and economic activities. New infrastructure investments, including in low-carbon developments, need to build in resilience against future climate impacts, by assessing climate risks across the lifetime of the project. Retrofitting existing infrastructure is more costly, both organisationally and in terms of physical investment (OECD, 2018^[15]).
- **Integrating more ambitious policies to halt and reverse biodiversity loss and restore ecosystem services, including through nature-based solutions.** Biodiversity and ecosystem services are fundamental to economic activities and human health; deforestation and other land use change have been linked to the spread of diseases. Investment in natural infrastructure such as reforestation and wetland and mangrove restoration are not only a cost effective and sustainable way to improving resilience to climate impacts, but offer employment opportunities similar to man-made infrastructure investments. Investments targeted through stimulus packages need to better assess and value biodiversity and ecosystem services, and integrate these values into decision-making. In addition, government support that is potentially harmful to biodiversity must be identified and reformed. Additionally, valuing natural capital is integral to improving a range of environmental health dimensions that are important for societal resilience to pandemics and other shocks (such as cleaner air and water (these issues are covered in detail in another policy brief (OECD, 2020^[11])).
- **Fostering innovation that builds on enduring behaviour changes.** Continued technological and process innovation will be critical to achieving climate and other sustainability goals. Governments play a key role in fostering an innovation ecosystem, well beyond funding basic research and development (OECD/The World Bank/UN Environment, 2018^[16]). However, the COVID-19 pandemic will affect cultural norms and behaviour in ways that are not yet known. To be effective at creating jobs and improving resilience, stimulus packages need to take into account potential behaviour changes that could affect the saliency of different policy measures, including for innovation. For example, tackling reluctance to take public transport by encouraging measures to reduce crowding, improve hygiene and to encourage “active” transport modes; introducing measures that better support remote working (including well-being aspects) in order to reduce demand for transport such as encouraging remote working and events.
- **Improving resilience of supply chains, including through increased adherence to circular economy principles:** the COVID-19 pandemic and containment measures have raised new questions about the systemic resilience of complex global production methods and value chains, triggering renewed interest in more diversified and more localised production and shorter supply chains in certain sectors. The environmental implications of such a shift are far from clear, but there is a role for policy, including through stimulus packages to ensure that local supply chains do

genuinely improve resilience and reduce environmental impacts, including by improving resource efficiency and increasing circularity of supply chains.

11. **Fortunately, designing stimulus measures in this way does not mean starting with a blank slate.** International agreements already exist across many of these dimensions, such as the Paris Agreement on climate change, the Aichi Biodiversity Targets, and the Sendai Framework for disaster risk reduction. The UN Sustainable Development Goals also provide an overarching compass for ensuring that social development and well-being is fully integrated with environmental objectives. In terms of policy measures, many of the needed actions to build back better and improve resilience through stimulus packages can build on existing knowledge of policy design implementation. For example, although GHG emissions were growing until 2019, the experience from more than two decades of designing and implementing climate responses and assessing their effectiveness remains relevant. Similar policy knowledge exists for halting and reversing biodiversity loss, and improving circularity of material use, among others. Additionally, there are some key lessons from environmental measures integrated into stimulus measures following the global financial crisis in 2008-09 (Agrawala, Dussaux and Monti, 2020_[17]).²

“Building Back Better” in practice

12. This section provides some key examples of opportunities for “building back better” across sectors, highlighting where public stimulus spending could be oriented to align across several of the above dimensions simultaneously. These examples are clearly not exhaustive, but are highlighted here because of their relevance for where stimulus investments can catalyse important systemic change in economic sectors while also meeting the urgent need for creating employment, or otherwise trigger changes necessary to support longer-term resilience outcomes. While these examples cover a wide range of specific policy areas, some overarching policy guidance is provided in Box 1.

Enhancing biodiversity while ensuring a resilient supply of food

13. Biodiversity and natural infrastructure such as forest, wetland and mangrove ecosystems, are essential inputs for many economic activities, and are central to hundreds of millions of livelihoods. Natural ecosystems are also essential pillars of resilience. Yet most of this natural capital is undervalued in the economy, or valued only as a harvestable commodity and not for the vital ecosystem services provided. The unpriced natural capital consumed by primary production (agriculture, forestry, fisheries and mining) and some primary processing sectors (including cement, steel, pulp and paper) was valued at USD 7.3 trillion in 2013 (Natural Capital Coalition, 2016_[18]). However, despite the introduction of some policies to value biodiversity, in particular through payments for ecosystem services, most existing approaches to measure and value natural capital loss remain limited (OECD, 2019_[19]). Through recovery packages, governments may have leverage to increase private finance for nature-based solutions and to enlarge the commitment of businesses and investors to measure biodiversity impacts, dependencies, risks and opportunities, e.g. through conditions for financial support in recovery packages to agriculture and other sectors with close links to biodiversity (OECD, 2019_[19]).

² The stimulus measures enacted following the global financial crisis of 2008-09 included many examples of governments seeking to integrate aspects of sustainability, with varying degrees of success both economically and environmentally (Agrawala, Dussaux and Monti, 2020_[17]). The similarities between COVID-19 and that crisis are however limited. The nature of the economic and social crisis currently engulfing the world is fundamentally different, borne out of a deep and wide drop in demand right across the real economy, rather than emanating from the financial sector. Importantly, the environmental outlook is also different than it was in 2008. More than a decade later, the need to act on climate change and biodiversity is much more urgent and more broadly accepted by the public. In addition ten years of technological development have seen vast cost reductions in key technologies.

What policy can do

While the multiple dimensions of “building back better” span many specific policy areas, some key recommendations for governments to consider are:

- **Screen all elements of stimulus packages for their longer terms implications** across the key dimensions outlined above, prioritising actions that:
 - Combine benefits for jobs and reducing inequality with implications for longer-term resilience, including by avoiding locking-in emissions intensive infrastructure and systems.
 - Can be implemented quickly, including “shovel-ready” targets for public investment and existing policy frameworks that can be rapidly scaled up
 - Favour cross-sectoral, cross-government approaches that take a long-term, systemic view rather than single technological outcomes
- **Build pipelines of “shovel-ready” sustainable infrastructure projects:** take co-ordinated cross-ministry action to build pipelines of sustainable projects that can be implemented quickly, while avoiding favouring established emissions-intensive activities just because they are fast
- **Maintain (and increase) ambition of long-term environmental objectives (including net-zero GHG emissions) and ensure that policies and investments triggered through stimulus packages are aligned with those outcomes,** for example:
 - Avoid relaxing existing environmental regulations to provide near-term relief, as the costs of longer-term vulnerability will often outweigh short-term economic relief
 - Make subsidies and other government support for specific industries conditional on both environmental improvements (including GHG emissions) and better overall resilience (including for the workforce)
 - Make energy pricing coherent as part of fiscal reorganisation post-crisis, including phasing out fossil-fuel subsidies and building carbon pricing that includes social protections (e.g. using carbon pricing revenue to mitigate distributional implications for households, as well as to finance support for structural adjustment of workers and communities).
- **Actively support development of green finance flows to improve resilience, encouraging longer-term horizon for financial decisions:**
 - Measure the consistency of investments and financing with climate change mitigation and resilience, building on existing private and public sector initiatives (Jachnik, Mirabile and Dobrinevski, 2019^[20])
 - Promote robust and transparent definitions and standards for green finance in order to guide financial allocations and investment (including taxonomy approaches);
 - Increase potential for public finance to catalyse private investment by further empowering public finance institutions: e.g. by increasing lending authority and ability to co-invest.
 - Increase and improve capacities to assess, manage and publicly disclose climate change-related financial risks, building on existing frameworks and approaches (e.g. TCFD, NGFS).
- **Design public procurement processes that value both resilience and low-carbon as well as promoting innovation:** for example ranking bids based costs over the asset lifetime under different climate impact scenarios, and accounting for life-cycle GHG emissions.
- **Provide specific support for reskilling and training** for industries affected by the immediate crisis and longer-term decarbonisation, along with supportive policies such as reforming housing policies to encourage mobility.

14. The food sector is fundamentally important for the conservation and sustainable use of natural capital, and ultimately dependent on it. Secure food supply is essential for well-being and economic stability – indeed even to sustain life – meaning that the availability and affordability of food are likely to be key government priorities coming out of the crisis (OECD, 2020^[21]).

15. The agriculture sector faces growing threats including from climate change and infectious diseases of plants and livestock. It is also a major driver of environmental degradation. Land-use change, including for agriculture, is responsible for a large part of deforestation. Furthermore, excessive fertilizer use has important implications for freshwater and ocean ecosystems due to nutrient run-off. Increased ecosystem pressures due to agriculture could also have implications for potential creation of new human diseases. Agricultural expansion into zones close to wilderness areas increases pressures on biodiversity, and agricultural intensification, for example with denser livestock populations, can increase the chance of zoonotic transfer of viruses across species (Jones et al., 2013^[5]).

16. Agriculture already receives substantial government support globally. In 53 countries analysed by the OECD, farmers received around USD 528 million in support in 2019 (OECD, 2019^[22]). In addition to securing jobs and preventing near-term supply disruption, recovery measures should aim to reshape policies in the sector to promote environmental sustainability and resilience, and innovation for improved productivity. In the context of the COVID crisis, there is potential to focus on reform of the most harmful and distortive measures, including but not limited to the reinforcement of coupled supports (i.e. those proportional to production or livestock), as well as the relaxation of environmental regulation. Such measures could otherwise contribute to locking-in unsustainable practices and delay the transition of food systems towards sustainable practices. Investments and training aimed at triggering farmers' transition to more sustainable agricultural practices would benefit the environment, climate, as well as farmers' livelihoods.

17. More generally, patterns of consumer food choices can be important levers for ambitious climate mitigation as well as for improving health and well-being through balanced diets. Where access to sufficient protein is not an issue, policies to promote lower-emission food choices may also help, such as encouraging more plant-based food choices or shifting to sourcing from lower-emission livestock systems. Measures that could contribute to such objectives include public communication campaigns or education. It is also crucial that governments address the issue of food security for vulnerable populations. Food stamps and increased subsidies may also be an option to help vulnerable populations, as long as physical access to healthy food and diets is ensured.

Investing for low-carbon, resilient electricity systems

18. Economic stimulus packages can help accelerate the shift towards a zero-carbon, climate-resilient electricity system while creating jobs. While large-scale renewables remain important in this regard, distributed renewables, demand-side energy efficiency and improving the flexibility of the power system are also important opportunities.

19. Energy-related stimulus measures need to consider the changed context of the global energy system, with a historic reduction in energy demand expected in 2020, contributing to extremely low and volatile fossil fuel prices (IEA, 2020^[23]). Enduring low oil and gas prices reduce incentives for energy efficiency and renewables, as well as leading to reduced investment in fossil fuel industries. Energy investment is expected to decline sharply in 2020, even for renewables (IEA, 2020^[24]). In this context, using stimulus spending to invest in and mobilise finance for 'shovel-ready' utility-scale renewables (e.g. wind and solar photovoltaic) remain key levers for a sustainable economic recovery. But this is only part of the story. Stimulus packages can additionally seek to drive investment in other measures that accelerate decarbonisation while also improving resilience of the electricity system, both to climate impacts and demand shocks such as that triggered by the current crisis. Examples include energy efficiency, distributed energy resources and improving the flexibility of the power system. In developing countries, measures that

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increase electricity access, including through off-grid or mini-grid renewable systems, can have many benefits for employment, well-being, health and societal resilience ((IEA, 2017^[25]).

20. Energy efficiency is a clear candidate for a green recovery package but it is essential to achieve climate goals and is often generally labour-intensive. More than 3.3 million people are employed in energy efficiency in the US and EU alone, most of them in small and medium sized enterprises (IEA, 2020^[26]). Prioritising energy conservation and distributed energy resources also improves the resilience of the power system while delivering on a number of well-being benefits (enhanced affordability, lower environmental footprint, lower investment needs in network infrastructure). Beyond power, an important target for energy efficiency is the building sector (covered below). Energy efficiency across the economy can also mean a switch to electricity for energy uses previously directly using fossil fuels, such as electrification in industry, roll-out of electric vehicles and electric heat pumps as part of building energy efficiency measures (IEA, 2018^[27]). While this electrification trend can have substantial benefits for reduced air pollution at the point of use, the implications for GHG emissions depend on the decarbonisation of the underlying electricity system, as well as its ability to handle the increased demand pattern.

21. Challenges to scaling up energy conservation and distributed energy resources during the recovery include the relatively small scale of these projects and potential liquidity constraints for both households and firms. Governments could leverage on existing programmes, create 'project pipelines' of shovel-ready projects, and identify partners (e.g. utilities, municipalities, housing associations) and channels (e.g. energy efficiency obligations, on-bill financing) that help scale up the programmes in the short-term without creating a boom and bust cycle (IEA, 2020^[26]). These measures can be accompanied by investments in training to reduce skill shortages in the power and energy sector, including for energy system engineers and building retrofit specialists.

22. Another important target for stimulus packages is public investment in flexibility of power systems. This can include electricity storage (notably lithium ion batteries, also essential for electric transport), smart grids (e.g. rollout of smart meters) that are crucial for demand response, facilitating the integration of variable renewable energy sources and improving interconnection of grids. The lock-down measures imposed during the COVID-19 crisis have shone a spotlight on the importance of grid system flexibility, because falling demand has raised the share of renewables due to their priority dispatch and low-running costs. Finally, innovation in the energy sector is essential for technologies that will be essential for reaching net-zero emissions over the longer-term, including carbon capture and storage.

Energy efficient housing as part of compact, resilient and sustainable cities:

23. The confinement of hundreds of millions of people to their homes due to COVID-19 has highlighted major failures in the housing sector and illuminating social inequalities related to the quality and comfort of dwellings and building services such as sanitation. Situations where poor quality housing increases inequality by posing major threats for security and health have become ever more visible, including through indoor air-pollution, as well through increased living costs due to poor energy efficiency.

24. Cities, and the building sector more broadly, are key targets for energy efficiency improvements. Buildings account for nearly 30% of global CO₂ emissions, both through direct burning of fossil fuels for heating and indirectly through their electricity consumption (IEA, 2019^[28]). To achieve the goals of the Paris Agreement, there is a strong need both for retrofit of existing building stock and for new builds to meet stringent energy-efficiency standards. Despite the clear benefits of investing in building efficiency, the barriers are well-known, including the need for upfront capital, behavioural inertia and split incentives between landlords and tenants. In emerging economies, the investment gap for green buildings is estimated at USD 1 trillion annually according to the IFC. While country contexts vary for both types of investments, policy gaps (e.g. the need for building standards and incentives for energy efficiency), and the need for robust and scalable business and financing models, are typically key factors standing in the way of accelerated investment. Stimulus packages could therefore be critical to invest in the massive

retrofits needed to reduce GHG emissions from the building stock at the same time as improving living conditions and creating jobs. Measures include direct grants, tax breaks for efficiency investments and potentially scrappage schemes for inefficient household appliances. Good experience with such measures was gained from stimulus measures following the 2008 financial crisis (Agrawala, Dussaux and Monti, 2020^[17]). Policy incentives for residential energy efficiency also present clear opportunities for attracting private sector investment ((I4CE, 2020^[29]).

25. More broadly, economic recovery measures need to consider better coordination between housing policies and wider urban planning. In many countries urban planning has led to sprawling cities, with structurally higher GHG emissions and air pollution than dense cities, for several reasons including increased reliance on private cars. The COVID-19 pandemic could exacerbate this trend through an increase in demand for less dense neighbourhoods. For example, city dwellers may seek single-family homes in less dense neighbourhoods, due to a perception of higher infection risk in more dense housing. This could run counter to efforts to curb GHG emissions and could create a tension between balancing future resilience with mitigation. Transforming cities into liveable places where people want to live and stay can help offset this trend and contribute to both decarbonisation, resilience and lower inequality. Measures could include integrating programmes to retrofit buildings as part of wider sustainable development plans for neighbourhoods. In addition, creating the conditions for the uptake of eco-districts, both as part of urban revitalization and new developments, can help to make cities attractive places to live, as well as improving resilience to climate change impacts such as more intense heatwaves. Finally, promoting mixed land-uses and enhancing walking and cycling accessibility are key, providing redundancy in transport options that is a pillar of improved resilience, discussed further below.

Catalysing the shift towards accessibility-based mobility systems

26. For passenger transport, stimulus packages should aim to combine support for a transition to less polluting cars with investments that initiate a shift towards accessibility-based mobility. The automotive sector is a major global employer, accounting for around 14 million jobs globally, and has been severely affected by the COVID-19 crisis (ILO, 2020^[30]). As governments consider longer-term support for ailing car manufacturers, they can ensure that such support is contingent on environmental improvements including accelerating the shift to electric cars as well as more efficient, cleaner ICE vehicles. However, recovery measures should also embrace a shift towards mobility systems designed around accessibility (the ease of reaching jobs, services, leisure activities, etc.), rather than only emphasising an accelerated uptake of private electric vehicles. The latter would lock-in private vehicle ownership and low-occupancy vehicle use. This would limit the overall emissions reduction potential of the transport sector, and also implies a less resilient system due to overreliance on one transport mode. A mobility system based heavily on private vehicles is also badly equipped to achieve other social and economic goals (e.g. reduced inequality, better health and less congestion).

27. Investing in public transport remains essential both for mobility and for jobs: almost as many people work in public transport as in the car industry (13 million) (UITP, 2017^[31]). However, governments need to recognise new challenges for public transport, such as people being reluctant to take mass transit for sanitary reasons (ITF, 2020^[32]). As well as urgent hygiene and social distancing measures, over the longer term financial support and infrastructure spending could be targeted to enhance capacity, reduce crowding and rebuild the appeal of public transport, especially as capacity is likely to be strained while social distancing measures remain in place (Liebreich, 2020^[33]). Already some cities have benefited from traffic

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drops during the contingency phase to speed up public transport projects, such as the Bus Rapid Transit extension in Reno, and the metro construction in Los Angeles.³

28. Governments could also envisage cooperation with both public transport providers and businesses in two ways. Firstly, to support the shift towards public transport pricing schemes that make more efficient use of transport capacity (e.g. peak/off-peak pricing) and secondly, to encourage more flexible working schedules and remote working where possible. In parallel, investment in electric vehicle charging infrastructure is a key opportunity for recovery packages, both for private vehicles and electrified public transport such as buses. Charging plans need to take into account the opportunity cost for other modes as well as public space used.

29. As economic activity resumes, there is an opportunity to reallocate road space and encourage active transport, as a means to create jobs, reduce emissions, improve resilience and even boost public health. At least 150 cities around the world have already taken emergency action to create temporary cycle lanes and other space for active transport that allows for social distancing rules (ITF, 2020). To make these temporary changes permanent, stimulus measures could support redesigning road space away from cars to more sustainable modes (with a holistic view to enhance accessibility and promote safety) and adequately price it, building on evidence from the air quality and road safety improvements due to COVID-19 lockdown measures. Active transport modes and micro-mobility (e.g. electric scooters, bike sharing schemes) will be key to prevent a big shift from public transport to the car; supporting them with both investment and road reallocation is also important. R&D support could focus therefore in innovations around electric micro-mobility rather than exclusively on electric cars. Reconfiguration of road-space should also consider the need to better accommodate freight movement (particularly of last-mile travel inside dense city areas) and ensure transition to cleaner fleets; especially as urban freight volumes could increase with higher demand of e-commerce post-COVID. Pursuing an accessibility-based model, encouraging active and public transport modes, will also set a better context for advancing and increasing effectiveness of phasing out fossil fuel subsidies (where these are still in place) and implementing ambitious carbon prices (OECD, 2019^[13]).

Improving resilience of supply chains while accelerating the shift towards circular economy principles

30. The COVID-19 crisis has shone a spotlight on the resilience of global value chains, which have become increasingly complex and globalised in recent decades. If firms seek to improve resilience by shortening supply chains or making them more local, it will be important to ensure that such changes do not inadvertently increase emissions or other environmental impacts. Additionally, economic recovery policies may provide an opportunity to improve resource efficiency overall, including through exploiting job creation possibilities related to the circular economy.

31. Producing and shipping raw materials and manufactured goods along global supply chains is a key pillar of global economic activity but also a major source of environmental pollution. Materials management already accounts for nearly two-thirds of global GHG emissions, and is projected to increase by two-thirds by 2060 under current trends (OECD, 2019^[34]). Despite widespread policy efforts to encourage greater recycling and circularity of both production and consumption, the rate of recycled materials globally remains low.

32. The pursuit of efficiency and minimised costs in recent decades has led to highly complex supply chains, often with global reach and concentration in Asia (particularly in the People's Republic of China). This contributed to emissions reductions in developed countries, as some emissions were effectively "off-

³ In Los Angeles, the COVID-19 crisis has helped L.A. Metro (the transport authority) to overcome original opposition from residents, as speeding construction during this time will minimise construction impacts for local business when activities are renewed (Bliss, 2020).

shored” to countries higher up the value chains, because emissions are usually measured based on where goods are produced rather than where they are consumed. The resulting complex supply chains may in some cases be more exposed to risk of disruption, in part due to an emphasis on leanness and efficiency at the expense of redundancy and resilience. Another factor is the geographic concentration of upstream actors, meaning for example that disruption of a single supplier can ripple across multiple supply chains. The sheer complexity of supply chains also plays a role, as companies lack awareness of all the suppliers and secondary suppliers in their supply chains, making proper evaluation of risk challenging (Choi, Rogers and Vakil, 2020^[35]). However, if firms seek to improve resilience by shortening supply chains or building in redundancy, it will nevertheless be important to ensure that these changes do not lead to increases in emissions or environmental impacts. For example, within the OECD area there is evidence that off-shoring led to overall reduction in emissions, due to relocation to regions with less GHG-intensive production (Garsous, 2019^[36]).

33. The recovery measures proposed by governments also present an opportunity to seek greater circularity in supply chains, which can act both to improve resource efficiency and resilience for businesses (by building greater resilience to supplier risks) and society (by reducing environmental risks). In circular value chains, waste is minimised and end-of-life products are recovered for reuse, remanufacture, and recycling. This is achieved through improved product design (e.g., for disassembly, remanufacturing and recycling) and increased efficiency in the use of material resources, which generates a number of benefits. The availability of recycled materials and products for reuse and remanufacture leads to new sources of supply and supports the diversification of supply chains. Circular value chains also help to advance climate mitigation via reduced primary material production and opportunities to shift consumption towards product-service and other circular business models). Governments can catalyse the uptake of circular value chains via green public procurement (e.g., the Netherlands’ Most Economically Advantageous Tender procedure), removing trade barriers on scrap, landfill fees, Extended Producer Responsibility, and capacity building amongst firms (OECD, 2019^[37]); (Yamaguchi, 2018^[38]).

34. An increased use of digital technologies for supply chain management can also improve resilience and reduce the likelihood of disruptions, by providing data to identify and evaluate a number of resource efficiency risks and opportunities. On one hand, digitalisation lays the foundation for disclosure of climate-related risks by companies for example through the recommendations of the Task Force on Climate-related Financial Disclosure (TCFD). The recovery from COVID-19 opens an opportunity for governments to require both clear actions towards alignment with environmental policy objectives, as well as disclosure of climate-related risks as conditions for financial support through recovery policies. However, this would need to be applied cautiously in order to avoid hindering activity through administrative burdens, so may be best applied to larger firms. On the other hand, automation and digitalisation of industrial processes often enhances the efficiency of production – including by heavy industry – thereby reducing emissions. Governments can catalyse this shift by attaching conditions on stimulus packages to increase the uptake of these technologies, as well as through targeted innovation policies. However, as job creation is often at the heart of stimulus measures, the implications of automation for the work force would need careful consideration and active labour market management.

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