FELICITY
Accelerating investments for low carbon cities

GREEN RECOVERY FOR CITIES AND SUSTAINABLE INFRASTRUCTURE

Recommendations for investing in low carbon and resilient infrastructure in cities to cope with the socio-economic impacts of the COVID-19 pandemic and prevent future crises.

CONTENTS

KEY MESSAGES

- **Cities are at the forefront of the climate crisis**: Today they account for an estimated 75% of the world's CO_2 emissions - with rising trends. By 2050, two out of every three people will live in cities and will have to cope with the impacts of climate change. By then, an expected 570 cities and over 800 million people will be at risk of flooding from rising seas and storm surges.
- **The trillion dollars invested in the COVID-19 recovery provide a clear opportunity to start building future-proof cities**: As a significant amount spent through stimulus packages focuses on infrastructure, longer term goals on climate, biodiversity, water and waste management and resource efficiency should be considered.
- **Investing in low carbon and resilient infrastructure has co-benefits in employment, well-being and environmental health:** Cleaner mobility, renewable energy and energy efficiency have a higher job creation potential than investing in fossil fuels activities.

FELICITY in a nutshell

"Financing Energy for Low-carbon Investment-Cities Advisory Facility" is an initiative of GIZ and the European Investment Bank (EIB), commissioned by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), to **support low-carbon infrastructure projects in cities** that significantly contribute to sustainable development and climate change mitigation.
As a **project preparation facility**, FELICITY offers **technical assistance to cities** in designing and structuring their infrastructure investment projects. FELICITY prioritizes the interest of cities and incoporates the perspective of international financiers.

1 CHALLENGES FOR CITIES DUE TO THE COVID-19 PANDEMINC

Cities, particularly fast-growing cities and megacities with dense populations, are disproportionately affected by the COVID-19 pandemic. About 95% of reported cases come from urban areas[1]. Physical distancing is near to impossible on public transportation and on streets which are normally used by pedestrians, cars, and both formal and informal street vendors. At the same time, people living in dense areas could, in principle, benefit from better access to health care facilities, which could allow for lower death rates[2]. But poor urban planning, overpopulation, weak waste management services and traffic congestion, which hinder access to health facilities, can further exacerbate social inequality. **Urban and infrastructure planning is therefore crucial in determining the extent in which cities can cope with the COVID-19 pandemic as well as future crises.**

Furthermore, many inhabitants in developing and emerging economies live in informal settlements and work in the informal sector without a regular or secure income. **In urban areas, the informal economy not only carries a high risk of infection for workers, but workplaces are often directly affected by social distancing measures**; these include waste recyclers, street vendors and food servers, construction workers, transport workers and domestic workers[3]. In the first months of the crisis, informal workers worldwide lost on average up to 60 per cent of their earnings. In Africa and Latin America, this figure was almost 80 %[4]. This increases their vulnerability to economic and/or social shocks as they are unable to rely on benefits such as social safety nets, health insurance or unemployment insurances.[5]

For many cities, therefore, the pandemic not only represents a health crisis, but **threatens to develop into a crisis of urban access, equality, urban finance, security, unemployment, public services, infrastructure and transport**, disproportionately affecting the most vulnerable in society.[6] In order to absorb the medium- and long-term effects of the crisis on the environment, society, the economy and on finance, Green Recovery packages will be required. Greening the economic recovery is especially crucial as the greenhouse gas emissions have risen rapidly over the last decade, despite a fall during the pandemic as growth in energy use from fossil fuels outpaced the rise of low-carbon sources and activities.[7] [8] Hence, the alternative course of simply reviving the existing "brown" economy will exacerbate irreversible climate change and other environmental risks.[9]

"Building back better" means also addressing future threat to our global economy: environmental degradation. **Cities are at the forefront of the climate crisis**. Today they account for about 75% of the world's CO_2 emissions – with rising trends. By 2050, two out of every three people will live in cities and will have to cope with the impacts of climate change[10]. By then, an expected 570 cities and over 800 million people will be at risk of flooding from rising seas and storm surges and 1.6 billion city dwellers will suffer from extreme heat, being exposed to temperatures of over 35°C[11]. A study published in the journal Nature Climate Change calculates that with the current measures planned for a Green Recovery could reduce global warming by 0.3°C by 2050.[12] **As a significant amount spent through stimulus packages focuses on infrastructure, this provides an opportunity to better align infrastructure plans with longer-term goals on climate, biodiversity, water and waste management and resource efficiency**.

Hence, such measures are crucial to build prosperous and resilient cities capable of protecting their inhabitants from future health and environmental crises.

However, the enormous unforeseen public spending required will significantly increase the debt of cities in the Global South as well as those in donor countries. COVID-19 has registered adverse impacts in cities in multiple ways. Estimates by the World Bank and UN organizations forecasted that local governments could lose an average of 15 to 25 % of their revenues in 2021 due to declines in tourism revenues, exports and remittances as well as contraction of economic activities.[13] Estimates suggest that in Africa, local governments could experience a drop in local finances of 30-60 % on average, depending on the severity of the crisis. For instance, in South Africa, the cities of Johannesburg and Lagos are expected to experience negative growth, which will reduce municipal revenues, in turn leading to less financial resources to deliver urban services[14]. Urban infrastructure projects in developing countries are therefore even more dependent on external funding. Multilateral, national and private financial institutions have a central role to play in mobilizing the necessary capital (see Section 4 on Financing). **It is crucial that such investments are low-carbon and resilient to avoid carbon lock ins and further environmental depletion**.

2 CHANCES AND CO-BENEFITS

Municipalities are at the forefront of addressing the challenges posed by COVID-19 and ensuring that economic recovery measures are designed in a sustainable and resilient way. After all, they play a key role in civic engagement, the provision of public services and the management of public space.[15] While short-term measures must focus on the health sector and on social systems, medium to long term recovery measures should use the opportunities for sustainable modernisation measures in order to reduce the risk of a renewed crisis. **Urban areas should be reconfigured to better cope with future crises and provide access to basic services for their populations.** This can be done for instance through improved public transport or resilient waste and sanitation systems.

Economic stimulus packages for sustainable and climate friendly infrastructure in cities offer three opportunities for cities (triple dividend). Firstly, to channel comprehensive investments in technologies with long term impacts, and secondly, to generate additional benefits for a sustainable transformation and contribute to international climate and development goals. Thirdly, such measures will help addressing the existing infrastructure gap that could amount to more than $90 trillion until 2030 in transport (public transport, charging infrastructure, cycling infrastructure), energy supply, buildings, as well as flood and heat resilience.[16]

Additionally, investments in climate friendly urban infrastructure holds three potential co-benefits for city dwellers:

1) **Employment:** creation of numerous jobs, particularly for low-skilled workers (e.g. renovation & housing construction, greening). The Coalition for Urban Transitions estimates that investments in the areas of energy-efficiency buildings, low-carbon transport systems, renewables-based energy systems, and the preservation of natural

capital can support the equivalent of at least 87 million jobs by 2030 (mostly from building efficiency improvements) and an additional 45 million jobs in 2050 (mostly transport sector).[17]

2) **Well-being:** investments in green infrastructure projects can improve the overall quality of life of the population. More green spaces can provide for recreation, improved mobility means shorter commutes, saving time and stress. Sustainable energy supply and efficiency measures can also contribute to lower energy costs for consumers in the medium term.

3) **Environmental health:** Air pollution is the single greatest environmental health risk worldwide, it can lead to high blood pressure, diabetes and other respiratory diseases.[18] According to the European Public Health Alliance, citizens living in polluted cities face higher risks from COVID-19. Several studies have demonstrated that an increase in particular matter is associated with an increase in COVID-19 mortality rates, depending on the regions, and there is growing evidence that airborne transmission of COVID-19 is exacerbated by air pollution[19]. Low-carbon urban projects contribute to an improvement in urban air quality, which not only reduces the vulnerability of communities to pandemics, but also improves overall societal well-being and resilience.[20]

Major urban infrastructure investments have some of the highest potential to unleash new economic activity and set cities on a path of prosperity and sustainable long-term development. **Yet, there is a significant missed opportunity in the existing stimulus packages presented by national governments**. So far, only a fraction has been directed to "green" measures, running the risk of carbon lock-ins and delaying the construction of sustainable (urban) futures. The Green Stimulus Index (GSI) developed by Vivid Economics show that in 2020 **only 7% of the total stimulus packages by major economies assessed has gone to sectors that are relevant for cities**, such as energy, transport and waste. **Only 16% of the stimulus package going to these sectors is green.** [21] The report shows that several countries have already announced measures that will even have negative environmental impacts, such as China, India, Mexico, Indonesia and Brazil, or reinforce trends in carbon intensive sectors, such as in South Africa and Russia.

3 SELECTION OF APPROPRIATE MEASURES

When putting together recovery packages under a Green Recovery, city governments will need to consider various factors. This includes immediate needs, local institutional capacities, market conditions, financial leeway and past infrastructure investments. Other important factors when assessing specific measures and investments include the potential for job creation, the lead time prior to project initiation, the ability to mobilise further private capital and the long-term impact on the carbon balance.[22]

Existing Nationally Determined Contributions (NDCs) and their planned updates provide a good basis for selecting appropriate measures for sustainable economic recovery. For cities this means that the measures are already integrated into national targets and are ideally coherent with national policies. The COVID-19 pandemic may change some of the assumptions underlying the NDCs - such as the availability of domestic budgetary resources, the scope for borrowing or

access to international climate finance, or economic growth. Nevertheless, in most countries the NDCs provide a clear roadmap for the gradual decarbonisation of the economies. According to World Bank estimates, the NDCs could be transformed into a pipeline of rapidly implementable activities with relatively little effort. [23]

However, this would require coordination between the various relevant ministries and government levels in a country as well as with international institutions. Those responsible for the NDCs are currently being transferred from their posts to response and recovery efforts, yet they can assume a coordinating function. They already have the knowledge of the NDCs and the necessary cross-sectoral network. In addition, engineers, legal or contractual experts and other technical support would also be needed for project preparation. However, costs for sustainable infrastructure development quickly exceed the available budget funds. Hence, the World Bank emphasises the importance of grant support, especially in the project preparation phase. The focus here should be on developing feasible projects from the NDC Commitments with a recovery relevance.[24]

In the following, four key areas of investment are analysed in greater detail: **renewable energies and energy efficiency; transport and mobility; water, wastewater and waste management and nature-based solutions.** These areas **should be prioritised for investments** by national governments, national and regional development banks (NDBs) and multilateral development banks (MDBs). The measures proposed in each of the sectors have been selected because of their high potential in job creation and carbon reduction, their ease of implementation and their wider social, economic and health co-benefits.[25] Such measures have also gathered a broad consensus amongst both the scientists and policymakers.[26]

3.1 Renewable Energy & Energy Efficiency

Energy efficiency is one of the most important levers for policymakers to help reduce carbon emission reduction across the economy[27]. According to an analysis by the New Economic Foundation (which refers to the UK, but can be generalised in its basic aspects), retrofitting homes with new insulation is a particularly suitable measure for a Green Recovery. It is labour-intensive, it delivers economic stimulus, has a short lead time and can be carried out extensively in both rural and urban areas -or targeted where it is most needed [28]. In the building industry, an investment of US$1 million in energy efficiency, such as green construction and retrofits, can create as much as seven times as many jobs than the same investment in fossil fuels[29]. Furthermore, **buildings offer the greatest and lowest-cost potential for emission reductions with about 60% of cities overall carbon abatement potential**[30]. The work can be carried out at least partially by workers with little training. Depending on the labour market, retrofitting measures may require additional spending on retraining and training of workers. Particularly public buildings are suitable candidates for retrofitting measures, for example in schools, hospitals or administrative buildings, as energy costs are reduced over the long term. Energy efficiency programmes for new buildings or renovations in the residential or commercial sector that use public resources can also stimulate private investment, for example through subsidies, grants or subsidised loans[31].

Investments in renewable energy technologies (solar, wind, batteries etc.) and the modernisation of electricity networks are crucial in this regard. **Decarbonisation of energy, primarily electricity, amounts for half of the total mitigation potential in cities**[32]. Compared to

insulation measures, such investments entail longer lead times. However, the planning phases of these projects demand significant expenditure and investment. In some cases, project preparation and planning as well as consultations take a larger share of the budget and project time[33]. **The energy transition to renewables could increase jobs in the sector by four times by 2050, reaching 42 million jobs globally and increase global GDP by US$98 million by 2050[34]**. The potential for job creation is higher for renewable energy than for fossil fuels: per US $1 million in spending, renewable energy could create from 3 to 9 times more jobs [35]. Such investment is particularly attractive since cost of renewable energies has fallen significantly in recent years, in many cases even below the cost of conventional energies, despite the current slump in oil prices[36].

3.2 Transport and Mobility

Urban air pollution has decreased worldwide during COVID-19 because of the slowdown of the economic activity and traffic volume. Yet, these positive effects will probably be only short-term as economic activity and traffic picks up again as restrictions are lifted. Furthermore, whilst transport systems in most cities were able to cope with the immediate challenges of the pandemic, unequal access to public transport, limited spaces for pedestrians and cyclists and often long commuting distances for – often underpaid – frontline workers have intensified socioeconomic inequalities during the crisis[37]. Green stimulus measures should therefore encourage the promotion of low-carbon urban public transport solutions. In addition to creating jobs and having a positive impact on the climate, they also hold the potential of creating a lasting effect by improving human health and improving urban mobility. The OECD regards investments in low-carbon and resilient transport-related infrastructure as key for stimulus packages as these will have major implications for future environmental outcomes[38].

The expansion of bicycle lanes and footpaths, local public transport, modular transport services and an improved charging infrastructure for e-mobility are suitable recovery measures in the area of transport and mobility. As co-benefits, these measures can reduce emissions, while simultaneously generate numerous jobs. An analysis of the WRI's 2009 "American Recovery and Reinvestment Act" shows that green stimulus measures in the US have in some cases surpassed traditional infrastructure investments**[39].**

The COVID-19 pandemic increases the risk that the use of private vehicles in transport will become more attractive again. The increase in use and dependence on private vehicles and the resulting inequalities must be avoided. In many cities, privately operated informal transport services are the only way for the most marginalized citizens to move around a city. Provisional cycle lanes and bicycle-sharing fleet services are already being rolled-out to provide citizens with immediate and safe mobility alternatives during the pandemic (see chapter 7). Affordable access to public transport and "active transport" (pedestrian and cycling schemes) are thus essential to avoid an increase in the use and dependency of private vehicles.

3.3 Water, Wastewater and Waste Management

Due to the COVID-19 pandemic, many cities are struggling with waste management. On the one hand, operations have been reduced in many places and available resources have been redistributed, while on the other the volume of waste generated by medical products and take-away packaging has increased.[40]

The provision of clean water as well as adequate sanitary and hygiene conditions are indispensable in protecting human health during infectious disease outbreaks, including but not limited to COVID-19. Hygienic water, sanitation and waste management practices in communities, homes, schools, marketplaces and health care facilities help prevent human-to-human transmission of the COVID-19 virus and other infections[41]. It is crucial, especially in preparing for future pandemics, that cities invest in adequate infrastructure. At the same time, water, wastewater and waste management are significant sources of greenhouse gas emissions in urban areas. The expansion of more energy-efficient and climate-friendly solutions can therefore make an additional contribution to overall emissions reduction. Waste and resource interventions, such as reuse, repair, remanufacturing and recycling have the potential to reduce emissions associated with our materials use by a third[42]. Investment in waste management also has a crucial job creation potential, which is higher in recycling, reuse and recovery than in landfill and incineration[43].

3.4 Nature-Based Solutions

Investments in nature-based solutions are crucial to reverse biodiversity loss and restore ecosystem services, which are fundamental to economic activities and human health. They provide cost-effective approaches contributing to achieving a number of the Sustainable Development Goals (SDGs), particularly those relating to poverty, food and water security, human health and climate action[44]. Deforestation and other land use change have been linked to the spread of diseases. Hence Nature-Based solutions should be integral to future health crisis prevention efforts. The OECD finds that investments 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[45]. For instance, in the US, in every US$1 million invested in reforestation and sustainable forest management, nearly forty jobs can be supported, from growing saplings in nurseries, to operation of machinery, and workers to transport and plant new trees[46].

Furthermore, in cities, green urban spaces are valuable assets to citizens locked up because of COVID-19 lockdowns. With lower-income groups being particularly hard hit by the economic consequences of the pandemic, stimulus measures that focus on expanding a city's green assets are a win-win from a health and employment perspective and are likely to receive broad citizen support. For instance, tree planting provides enormous benefits to cities in curbing air pollution, reducing dangerous heat exposure, reducing carbon emissions whilst providing an opportunity for local job creation[47]. A US$6.9 billion capital investment in urban green infrastructure could deliver US$252 billion in physical health and well-being benefits to the most disadvantaged communities in the UK. This points to high multipliers in tandem with the enhancement of active travel, biodiversity, carbon capture and air quality which green infrastructure provides[48]. Yet, the cost of such green infrastructure investments will differ by country, especially since labour costs vary considerably and are lower in developing countries.

4 FINANCING

As a result of unforeseen public spending in response to COVID-19, the debt of cities will increase significantly. Consequently, cities are more dependent than ever on external funding for urban infrastructure projects. At the same time, cities often have a very limited capacity to borrow, especially in emerging and developing countries. On the one hand, they have only very narrow fiscal leeway and are therefore only able to repay loans to a limited extent. On the other hand, they are often severely restricted by law in their powers to take out loans[49]. In addition, risk premiums are rising, especially for emerging and developing countries.

Cities have struggled to efficiently respond to the socioeconomic shocks induced by the COVID-19 pandemic and cope with its consequences due to limited financial resources and a lack of coordination and integration across all government levels[50]. In these uncertain times, international finance institutions as well as multilateral and national development banks play a central role in deploying finance. They can scale programmes and mobilise private financing[51].

- **National development banks** (NDBs) are deeply rooted in their countries and can contribute to the definition and implementation of their governments' emergency and economic recovery programmes.
- **International financial institutions** (IFIs) can provide appropriate resources and support capacity building. IFIs such as the World Bank, the European Investment Bank and the International Monetary Fund are now focusing more on climate protection than they did during the 2008 financial crisis and much of the external financial and technical support they will offer will be driven by this objective.

Together, multilateral and national development banks can thus promote sustainable development in a cooperative and efficient manner. On the supply side, they should provide impulses throughout the course of a Green Recovery to promote sustainable, resilient and environmentally friendly "post-corona" economic structures. A coordinated strategy of financial institutions would be helpful here. To enable financial institutions to match their supply with the changing financial demands of cities, it is important to bring them into dialogue with city administrations.

To enhance the impact and effectiveness of investments from national governments, the Coalition for Urban Transitions recommends three cross-cutting reforms[52]:

- **Fiscal reforms that eliminate fossil fuel** subsidies and make it attractive for the private sector to invest in low-carbon infrastructure and services
- **Developing national strategies for cities**
- **Fiscal support for local governments** and reforming municipal financing system.

Finally, 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. The OECD finds that 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, for instance

through conditions for financial support in recovery packages to agriculture and other sectors with close links to biodiversity[53].

International cooperation can support to create financially viable project pipelines for COVID-19 relevant and sustainable infrastructure projects. Simultaneously, it would be reasonable to strengthen the capacities of cities to mobilise public and private financial resources. This will enable them to address COVID-19 related budget bottlenecks more easily.

5 SIGNIFICANCE OF SELECTED URBAN CLIMATE INITIATIVES

5.1 Cities Climate Finance Leadership Alliance

City networks and global alliances such as the Cities Climate Finance Leadership Alliance (CCFLA) take on a supportive role promoting exchanges, in particular with regard to the experiences and lessons learnt from the current but also past crises**.** The CCFLA is the only global coalition of leaders committed to deploying finance for city-level climate action at scale by 2030. CCFLA enables key stakeholders in cities climate finance to share knowledge, discuss findings and experiences on a global level and develop solutions together, also targeting the local level directly. The Alliance promotes coherent response and positioning of the various partner organisations.

In a statement released in May, the CCFLA has committed itself to working in three areas to support cities towards sustainable, inclusive and resilient green economic recovery:[54]

1. Increase cooperation among members to facilitate access to investment and job creation
2. Boost best practices sharing among members and cities to speed up a green economic recovery
3. Raise awareness of city finance needs and opportunities.

5.2 Leadership for Urban Climate Investment

The **Leadership for Urban Climate Investment (LUCI)** was developed under the leadership of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) for the UN Climate Action Summit in 2019[55]. It is now hosted by CCFLA. **It aims to strengthen collaboration and cooperation by bringing together different initiatives working at different stages of the entire project value chain - from project development, to financing, to implementation**. Together they overcome obstacles in the various phases of project development. In the context of COVID-19, bringing National Development Banks and other International Financing Institutions together with city networks and project promoters is essential to ease the access to finance for cities to develop their green infrastructure. They aim to strengthen 2000 cities in project preparation, develop 1000 financially viable projects and link them to finance, enable 100 urban projects to use new finance mechanisms and strengthen national framework conditions including the capacities of National Development Banks. **The objectives of LUCI have gained even more importance in the context of COVID-19.** LUCI will help to develop urban low-carbon and climate-resilient infrastructure, protecting population from the adverse effects of climate change and future pandemics. Given the significance of NDBs in

responding to the socio-economic crisis, strengthening their capacities in supporting cities is even more crucial.

5.3 City Climate Finance Gap Fund

The City Climate Finance Gap Fund is a key initiative under LUCI. It is the first global fund dedicated to support cities in the very early stages of project development[56]. The Gap Fund was initiated by the Global Covenant of Mayors (GCoM), and Germany (Environment Ministry, BMU). It was launched by German Environment Minister Svenja Schulze during the NYC Climate Week in September 2020. Through technical assistance and grant funding, the Gap Fund strengthens projects to the point where they are likely to receive further support from project preparation facilities and attract the interest of public and private financiers. The Gap Fund can help cities to plan proactively and invest in resilient urban and infrastructure planning. **It can contribute towards mobilizing public and private funds through the creation of project pipelines for COVID-19 relevant and sustainable infrastructure projects.**

5.4 Partnership for Collaborative Action

The **Partnership for Collaborative Climate Action** (PCCA) resulted from the International Conference on Climate Action (ICCA2019)[57]. Through the partnership, countries, regions and cities commit to enhanced climate action through better collaboration across all tiers of governments, across sectors and across borders. **The PCCA promotes intergovernmental policy dialogue to strengthen coherent national urban recovery plans. At the same time, it enables exchange and networking between national governments on COVID-19 measures.**

6 FELICITY'S SUPPORT TO GREEN INFRASTRUCTURE FOR A GREEN RECOVERY

FELICITY ("Financing for Energy and Low Carbon Investments – Cities Advisory Facility") supports the development of urban sustainable infrastructure projects in municipalities in Brazil, Mexico and Ecuador for a Green Recovery. In Ecuador, FELICITY aims to raise awareness among mayors on Green Recovery potentials. In addition, the National Development Bank of Ecuador (BDE) is supported in aligning its portfolio towards a Green Recovery. With the advice from FELICITY, long-term climate-friendly and employment-enhancing investment projects for improved **wastewater infrastructure** are identified. These have the potential to contribute to a national early warning system for COVID-19 (or other viruses).

In Mexico City, FELICITY supports the city to prepare investments for **energy efficiency in 50 buildings**, including public administration and hospitals. Such investments will significantly improve working conditions and reduce energy costs. Furthermore, a financing strategy is being developed to upscale additional buildings in the city.

Likewise, FELICITY supports efforts in the Brazilian municipality of Porto Alegre to cut energy costs by more than half. The city has conducted energy audits at 99 schools and prepared an investment project for the installation of **rooftop solar photovoltaic** (PV) systems and several building renovations measures to significantly increase energy efficiency levels. The project will halve the

schools' energy costs and generate billing credits for the municipalities as the electricity surplus would be sold back to the national grid. FELICITY supported with the investment preparation and mobilisation of financing. To scale up the project to other cities, FELICITY facilitated the training of more than 190 Brazilian cities to replicate the investment preparation using Porto Alegre as an example through a practical guide. The guide, developed with the Brazilian Ministry of Energy, contributes to standardising the development of such low-carbon investments in public buildings, especially for municipal schools and hospitals. The Guide's underlying instruments were applied in a serie of webinar sessions, from which nine large municipalities advanced with promising projects that shall drive the cities' Green Recovery strategies going forward. In the municipality of Maringá, FELICITY is supporting the investment preparation and mobilization of financing for energy efficiency in **street lighting**. The project includes approximately 500,000 LEDs, cutting energy costs by half.

Structuring and constructing new sustainable infrastructure can take a substantial amount of time to show effects in the real economy. However, investments in energy efficiency score high in all three dimensions relevant for a Green Recovery: short-term stimulus, medium-term growth benefits and long-term decarbonization. Building renovations are particularly labour intensive, require local skills and equipment and create high quality jobs.

7 EXAMPLES OF GREEN RECOVERY IN CITIES

7.1 Amsterdam's Doughnut Economy redesign post COVID-19

Amsterdam is to become the first city to apply the so-called "doughnut model" in redesigning its economy as a result of COVID-19. The model was developed by the British economist Kate Raworth of the Environmental Change Institute at the University of Oxford[58]. The model provides a compass for how societies and businesses can contribute towards a sustainable economy while respecting planetary and social boundaries. Amsterdam made a formal commitment on the 8th of April 2020 to use the donut as a tool for transformative action and as a starting point for future policy decisions - making it the first city in the world to make such a commitment[59].

Applying Raworth's initially global intended model to a city level could provide valuable insights into an alternative, holistic approach to recovery from the impacts of the COVID-19 pandemic at the sub-national level.

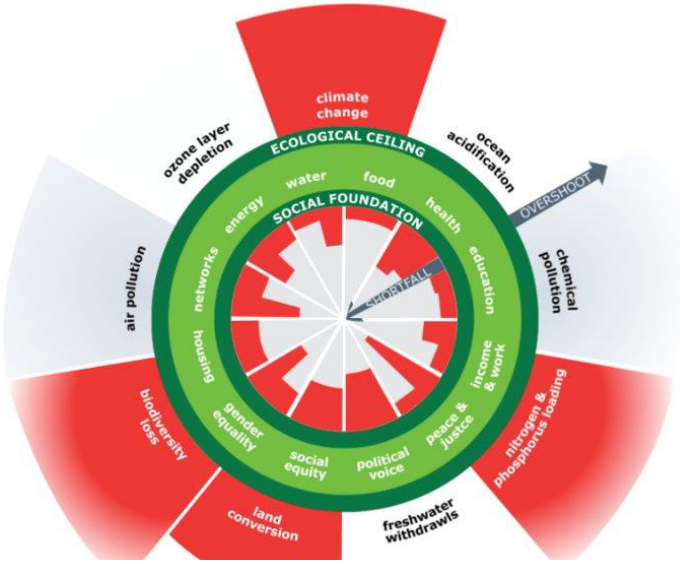

Fig. 2: The Doughnut of social and planetary boundaries (Raworth, 2020)

7.2 Cities are building bicycle lanes and footpaths

In direct response to the COVID-19 crisis, cities like Addis Abba, Kampala, Medellín, Bogotá, Milan, Seoul, Paris and London are introducing ambitious plans to redistribute road space. The measures will create more space for cycling and walking by taking away space for automobiles. In June, Ethiopia together with UN Environment and UN-Habitat, launched a National Non-Motorised Transport Strategy 2020-29, which outlines measures to improve mobility and facilitate inclusive urbanization[60]. In Bogotá, Colombia, a 25-kilometre cycle corridor is currently being temporarily established in response to the COVID-19 pandemic. Between 2021 and 2023, a permanent high-speed bicycle route will be built[61]. Colombia's second largest city of Medellín is preparing to revive its economy and cut carbon emissions by 20% by 2030 by expanding bike lanes by almost 50% within three years, and more than double the number of public transport lines, including overland trains, trams and cable car lines. The city aims to electrify all public transport by the end of the decade[62].

Milan is to introduce one of Europe's most ambitious schemes reallocating street space from cars to cycling and walking, where approximately 35 km of road space will by re-organised over the summer[63]. The northern Italian city and surrounding region of Lombardy are among the areas with the highest air pollution levels in Europe and have been affected particularly hard by the outbreak of COVID-19. In Paris, France, 50 km of new bicycle lanes are to be built as quickly as possible along the busy metro lines[64]. Meanwhile, the country will encourage people to cycle to keep pollution levels low once lockdown restrictions end through a US $22 Million scheme[65]. The Mayor of London, Sadiq Khan, has announced one of the world's largest car free initiatives. The aim is to re-design transport in cities in such a way that people can move around more easily whilst respecting social distancing rules, for instance on their way to work whilst also avoiding an increase in the use of private cars. Paths that are usually used by public transport will now be used by bicycles or pedestrians[66].

7.3 Pakistan's green stimulus scheme empowering most vulnerable

Pakistan offers women and labourers, who are out of work due to COVID-19, employment opportunities by planting trees. This measure is part of its already existing five-year tree-planting scheme. While most of the country was facing lockdown closures in April 2020, the scheme was granted an exemption and thus able to create over 60,000 jobs whilst planting billions of trees across the country. This does not only have huge mitigation benefits but also reduces risks from droughts, flooding, heat and other climate-related extreme events[67].

7.4 Seoul implements a "Green New Deal" for the city

In South Korea, the mayor of Seoul, Park Won-soon, wants to implement his own "Green New Deal" for the city in the period following the COVID-19 pandemic. The aim is to create jobs and reduce the city's carbon dioxide emissions. **The proposed deal has a strong focus on reducing greenhouse gases from buildings as they are the biggest source of carbon emissions for Seoul.** "Seoul will strictly limit all greenhouse gas emissions from buildings and expand the construction of zero energy houses. We will also renew the city with the citizens by renovating old buildings. By 2020, Seoul will greatly increase the generation capacity of solar power to 1 gigawatt and fuel cells to 300 megawatts," Park said[68].

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