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Shaping a Green and Resilient Recovery for the Republic of Kenya

How green investment and the circular economy could bring immediate COVID-19 recovery and long-term sustainable growth

Oxford University Economic Recovery Project, SSEE and Vivid Economics

in partnership with the United Nations Economic Commission for Africa

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Executive Summary

Following COVID-19, targeted green investment could help Kenya accelerate a strong and resilient pathway of economic development to 2030 and beyond. Supported by international partners, large-scale green recovery spending could immediately help the nations out of the COVID-19 downturn by creating jobs and catalysing economic gains.

At the same time, compared to traditional ‘dirty’ spending measures, green investments could unlock more development opportunities in the medium- to long-term while securing better environmental and social outcomes. Vivid Economics modelling suggests that green spending could deliver up to ~120% more jobs per dollar in the short term and ~200% greater Gross Value Added (GVA) in the long term, for select projects compared to traditional spending measures. These figures do not account for demand shifts towards green solutions and away from dirty products that we expect in coming decades.

Building on green aspirations contained in the Green Economy Strategy and Implementation Plan (GESIP), there is strong evidence to suggest that Kenya can use bold new green investment to enable rapid job creation, induce economic growth and improve social and environmental prosperity while fulfilling key sustainable development goals (SDGs). This could come in parallel to a shift towards a more resilient circular economy.

The Kenyan economy was hit hard in 2020, with GDP decreasing by 5.5% in quarter two; the first quarter of negative growth in 8 years.^{1,2} Hopes of a swift rebound were quickly dissipated by the onset of a second wave of the virus in December 2020, which induced deeper economic burdens. Pre-existing weaknesses along health and income levels continue to be particularly challenged by the pandemic. As world economies gear up to respond to the counterpart climate crisis, Kenya needs to continue to make progress against their own commitments while steadily driving forward plans for a greener future.

Vivid Economics modelling (figure 1) highlights the comparatively high job creation characteristics and gross value-added potential of green initiatives over traditional ‘dirty’ stimulus approaches in Kenya.

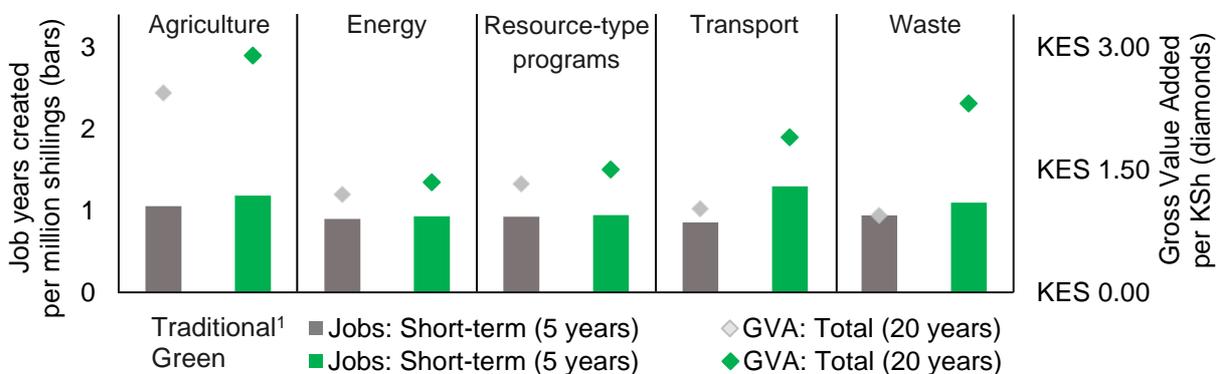


Figure 1. Job and Gross Value Added (GVA) impacts of green spending policies (average) compared to traditional spending measures in the Republic of Kenya. These are simple average figures; the full policy set is in Figure 4. Modelling output from Vivid Economics; see Technical Annex.

Notes: 1. Traditional investments include, sequentially, gravity irrigation systems, coal energy generation, support for mining, road construction, and water treatment facilities. 2. Green policies include agroforestry, irrigation systems, reforestation, a BRT, cycling infrastructure, waste recycling facilities, solar energy systems, among others (figure 4). 3. Modelling is based on current sector dynamics, rather than projected future dynamics. It is likely to overstate long-term GVA of traditional (fossil) investment and understate GVA of green investments. For fossil spending, stranded asset risk could reduce asset lifespans. For clean investment, cheaper energy is likely to unlock investment in electric transport, sustainable production, and other adjacent sectors.

This briefing proposes three green policy areas with particularly strong potential to deliver economic, environmental, and social benefits for Kenya:



Renewable energy: Kenya is abundant with renewable energy resources, but underdevelopment of transmission infrastructure has limited the scope of electricity provision. Investments in minigrids, especially for rural communities, can help address constrained transmission and increase rates of electrification, potentially bringing electricity to millions. Further, building on existing projects by expanding solar, wind, hydro, geothermal, and biomass energy generation is an important step to upgrading energy access across the country. Investments in renewable energy have valuable short-term economic characteristics; they can create jobs, deliver high economic multipliers, and stabilise energy prices, all while acting as a core enabler of CO₂ reduction efforts in other sectors. In support of targeted electricity generation, transmission and distribution, and microgrid investments, Kenya should tap into emerging research and development (R&D) opportunities and seek public-private partnerships (PPPs) to maximise the impact of public spending.



Natural Capital Investments: Nature-based solutions (NbS), including the restoration of habitats and agricultural interventions, can sustainably boost productivity, protect livelihoods, and enable urban greening. With the potential to be one-off investments, these initiatives can be implemented quickly and efficiently create low-skilled jobs. They are not given to investment leakage outside of the domestic economy, ensuring that the economic impacts of government spending is maximised. These opportunities can bring returns for the badly hit travel and tourism sector, improve Kenya's resilience, especially within agriculture, and act as climate adaptation safeguards.



Clean transport: Besides substantial climate benefits, investments in clean transport can deliver strong positive health and productivity benefits. Mobility in Kenya is limited by poor road infrastructure and a lack of public transport solutions. Poor road infrastructure not only leads to highly-pollutive traffic but also impacts the high number of non-motorised transport (NMT) users, that would benefit from more designated NMT transportation corridors (e.g., bike lanes) and safer traffic control systems. Further, an incentivised transition to electromobility, in both public transport and private ownership, would future proof the transportation sector while unlocking significant new economic potential. Building on a strong domestic technology scene, the government could incentivise the domestic design and manufacture of electric vehicle (EV) solutions, including electric tricycles (e-trikes), electric matatus, and electric buses.



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In support, investments targeting formalised job-creation, green retraining, and economic uplift can help address deep social welfare challenges in Kenya. Increased employment opportunities in the formal sector can alleviate poverty and address inequalities rife in Kenya. This would also decrease taxation avoidance.

In response to COVID-19, in 2020 Kenya spent ~USD10 per person, compared to an average in advanced economies of ~USD11,000 per person and ~USD640 in emerging market and developing economies (data covers 50 largest economies only). This disparity has been driven partly by limitations on fiscal space and limited international support.

International partners must support Kenya through critical resources to ensure that decades of development gains and momentum are not prematurely halted in the wake of the pandemic. Long-term external support could catalyse a quick rebound and longer-term green growth. Transparency, open forums of collaboration with local leaders, and strong governance mechanisms all play a key role in developing lasting local partnerships. By directing funding to green assistance, external organisations can help Kenya implement one of its best options for achieving strong economic development in line with SDGs and key climate commitments. In the long run, this could bring improved prosperity, greater disaster resilience, and truly sustainable growth.

1. The pandemic has intensified pre-existing weaknesses

1.1 Pre-pandemic Kenya

Kenya's economy is the largest of the East Africa Community (EAC), with its GDP accounting for over 40% of the region.³ Thanks to its comparatively more advanced human capital base, dynamic private sector, and role as a leader in R&D and innovation in the region, Kenya's economic growth averaged roughly 5.7% in 2019, placing it at the forefront of the fastest growing economies in Sub-Saharan Africa.^{4,5} Despite this, the nation continues to be challenged by widespread poverty and inequality, structural issues in health systems, informality and unemployment, and limited fiscal space which has left its government ill-equipped to deal with internal and external economic shocks.^{5, 6, 7}

Even before the COVID-19 pandemic, environmental challenges, likely worsened by climate change, had demonstrated the interconnection of environment and economy in Kenya. Shocks, including severe locust outbreaks and weather phenomena, reverberated across the agricultural sector, which remains the backbone of the economy, in the form of increased food insecurity and stunted growth.⁵

Kenya's economy has always depended heavily on environmental goods and services. To date, agriculture contributes approximately 33% of GDP, employing more than 40% of the total population and 70% of the rural population.⁸ Impending climate variability is accelerating the impact of existing vulnerabilities to environmental adversities and is likely to play a role in increasing the susceptibility of Kenyan supply chains. As one of the world's epicenters of biodiversity, Kenya will need to ensure environmentally sustainable approaches are a key part of their growth pathway. With a rapidly rising population and high dependence on natural resource-based incomes, the country is at risk of overshooting its ecological capacity and placing further pressure on already fragile ecosystems.⁹ The delivery of comprehensive economic plans to ensure long-term prosperity will ride on transparent collaboration between private and public sector funding, overcoming implementation inefficiencies and motivated, robust policy focus guided by existing strategies, including the Green Economy Strategy and Implementation Plan (GESIP).¹⁰

1.2 Impact of COVID-19 on Kenyan economy and society

COVID-19's impact on Kenya's healthcare system, livelihoods, and the economy has and been significant. Since Kenya's independence in the early 1960s, healthcare has been a privilege of the few who are able to afford the costs of private hospitals or treatment abroad.¹¹ The pandemic had exposed critical weaknesses in the country's health system, with issues ranging from corruption to inadequate access to resources and equipment, and from understaffing to unequal distribution of health facilities.^{12, 13} These challenges weaken efforts to achieve goal three of the SDGs: good health and wellbeing.

The strongest impact was felt in the second quarter of 2020, where Kenya's GDP decreased by 5.5% for the first time in 8 years.^{1,2} As of mid-March 2021, more than 110,000 COVID-19 cases have been reported in the nation, with roughly 2,000 deaths.¹⁴ It is likely that both figures are underestimates.

In response to the first wave of the virus in early 2020, the country entered a partial lockdown and imposed sweeping travel restrictions. School closures, restrictions on movement, bans on social gatherings and limitations on economic activities have exacerbated already existing food

and income security struggles. A national survey revealed that 22% of households, translating to roughly 10.7 million Kenyans, reported increased food insecurity during lockdown.¹⁵ Further, pre-COVID-19, informal workers formed 83.6% of Kenya's total workforce, where incomes are both erratic and unreliable and social safety nets are absent.^{16, 17} The World Bank estimates an additional two million people have fallen into poverty following the outset of the pandemic in Kenya.¹⁸ On a macroeconomic level, the mobility restrictions of the lockdowns undermined Kenya's export, tourism and remittance inflows.⁵ The second wave of the virus in December 2020 undoubtedly deepened the aforementioned struggles and more.

International aid plays a vital role in the country's response to the pandemic. Kenya has benefitted from concessional finance, provided by institutions such as the IMF and the World Bank, and will rely on external vaccine support from international partners like the EU through the COVAX Facility.^{19, 20, 21} Assuming effective crisis alleviation enabled by support from international partners, and no additional shocks, GDP may be able to rebound to pre-COVID levels by the end of 2021.²

1.3 Policy responses during the pandemic

Globally, the unprecedented economic challenges of COVID-19 are being countered by combined fiscal and monetary interventions. In most advanced economies, fiscal packages of unprecedented size have allowed governments to address short-term rescue needs; tackling the urgent health, social, and economic challenges faced by their populations. As societies have begun to emerge from the depths of the health crisis, fiscal spending has again been the favoured lever, this time to support long-term recovery by stimulating new jobs and enabling a return to pre-COVID-19 levels of economic growth.

The Oxford University Economic Recovery Project has developed the Global Recovery Observatory (GRO), in cooperation with the Green Fiscal Policy Network, to track all fiscal expenditure announced by over 70 countries in response to the pandemic. These policies are assessed under a lens of economic, environmental and social impact. In 2020, the Observatory tracked ~KES60bn (USD540mn) from the Kenyan government, of which KES33bn (USD300mn) is rescue-type spending and KES26bn (USD240mn) is recovery-type spending.²²

The bulk of announced spending in Kenya is contained in a KES38mn package released in May 2020.^{23, 24} Key responses have included limited direct cash transfers to the vulnerable, liquidity support measures for businesses and major industries and healthcare spending. Of this package, some measures, totaling over KES4bn, are explicitly green. These measures include funding for wildlife conservation, reforestation, and flood control. Kenya should be applauded for spending a higher proportion of recovery funds on green initiatives than most nations, and certainly many other nations in Africa. However, significant opportunities, in fact the vast majority, remain uncaptured.

So far, in response to the pandemic, Kenya has spent USD10 per person, 0.6% of GDP, compared to 22.5% of GDP on average in advanced economies (USD11,000 per person) and 10.6% in emerging market and developing economies (USD640 per person).

1.4 Green stimulus to catalyse future prosperity

Kenya has committed to a green transition, with the GESIP reflecting one of the country's most coordinated plans.¹⁰ To enable effective engagement with the GESIP in 2021, there must be a complete understanding from all agents that **a stronger recovery and a green recovery are not in conflict**. There is a growing body of evidence, including Hepburn et al. (2020), that suggests that green fiscal spending can deliver stronger economic returns than traditional spending alternatives.²⁵ Green policies can deliver large economic multipliers, relatively quick job creation, and shift emissions towards net-zero, resolving the two great crises - 'climate' and 'COVID-19' - economies face today.²⁵ Additionally, other studies reveal that inclusive, well-designed green spending can deliver substantial environmental and social co-benefits.^{26, 27, 28}

However, as concluded in a recent study by O'Callaghan & Murdock (2021), economies are not yet building back better from the pandemic.²⁹ Spending announced in 2020 paints a disappointing picture for overall efforts to build forward with green priorities (figure 2 and figure 3). Without this foundational common understanding, a more prosperous, resilient, and sustainable future will be held back.

For many low- and middle-income nations, including Kenya, debt constraints, low credit ratings and limited fiscal space have restricted their ability to fund sufficient levels of rescue- or recovery-spending. For Kenya, the long-run interest rate for new debt is around 12.5% p.a.; increased debt finance is expensive.³⁰ A failure to make necessary economic investments now not only act to magnify domestic poverty and inequalities but can put a wholly unnecessary upper bound on global growth and prosperity. It is hence imperative that international partners, including foreign governments and multilateral organisations like the IMF, World Bank, and AfDB, urgently direct significant concessional finance to help these nations. Concessional rates could be linked directly to climate-positive projects and policy priorities, as described below. International partners should also look to the comparatively high utility of grant programs, again with strict sustainability requirements. Some nations and development institutions have already contributed greatly to these causes; however, the need is orders of magnitude higher than current commitments.^{29, 31, 32} Generous support oriented to the long-term could significantly uplift the economic, social, and environmental future of the Kenyan population.

Parallel to this, Kenya must ensure that domestic institutions are capable of dispersing increased volumes of aid. Funding must flow equitably to the benefit of the wider Kenyan population, guided by diligent governance mechanisms, collaboration with localities, and full transparency. Targets can be guided using a priori policy assessment frameworks, such as that of the Global Recovery Observatory (GRO), and progress against these targets could be observed and published by impartial academics that provide insights on how to better plan and implement these projects.²² Development of long-term relationships between Kenya and its benefactors should be prioritised over short-term interventions as they are far more likely to build lasting domestic capacity and meaningfully accelerate sustainable development.

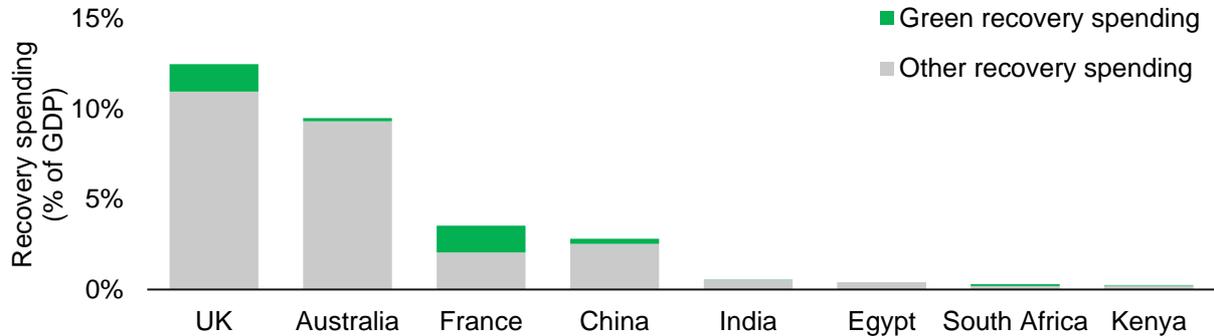


Figure 2. Composition of global recovery spending in 2020. Data from Global Recovery Observatory.

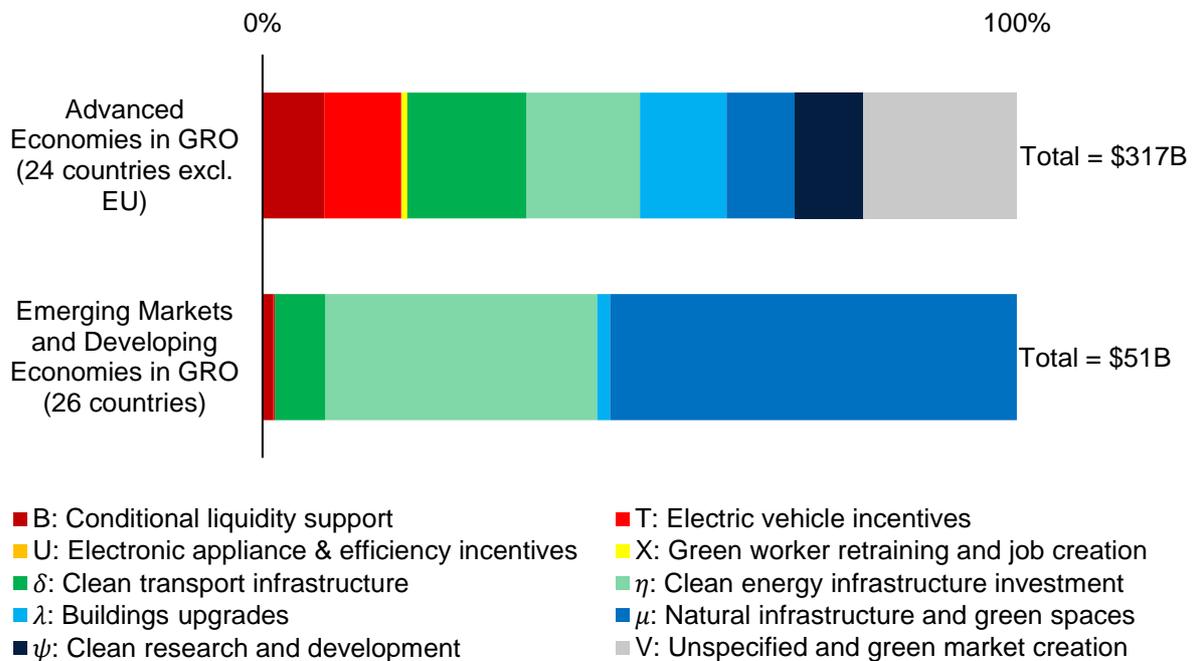


Figure 3. Distribution of green spending in 2020 as tracked by the Global Recovery Observatory.

2. Priority policy recommendations

Vivid Economics' modelling suggests that green investment initiatives could pave the way for a stronger economic recovery for Kenya through potent job creation and inducement of strong economic growth. At the same time, these initiatives could advance progress towards key climate commitments and the SDGs. Various green investment opportunities, accompanied by their potential job creation impacts in the short- and long-term, are illustrated in Figure 4. Gross value added (GVA) is also shown. Vivid's input-output analysis finds that all modelled policies support economic recovery through job creation opportunities, and that over the next five years, green policies deliver more jobs per dollar compared to traditional alternatives.

Since government spending in Kenya has been stretched between many competing priorities, including healthcare and poverty alleviation, the social co-benefits of green spending are particularly attractive. Transitioning from predominantly petroleum-based energy to clean, renewable energy can substantially improve air quality, alleviating the burden on healthcare providers, and save lives.^{33, 34, 35} Further, unlike fossil-fuel energy, clean energy combats climate variability and reduces disaster risk, which would have disproportionately impacted the poorest and most vulnerable communities.³⁶ There is potential to pair green investments with agricultural support initiatives to promote sustainable and efficient farming practices. With Kenya’s economy largely dependent on nature-based resources, these benefits are immeasurable. Additionally, strategically targeted green investments can help expand opportunities for the labour force, which is currently tied up in informal work characterised by irregular and volatile incomes, potentially reducing poverty and cutting inequality.^{37, 38}

Wider Vivid Economics modelling suggests three priority investment opportunities for Kenya, discussed below. In comparison to traditional stimulus investments, spending in these three areas is expected to deliver large long-run economic multipliers, enable sustainable development, and assist in the decarbonation of the economy to secure a range of supplementary social and environmental benefits for Kenya.

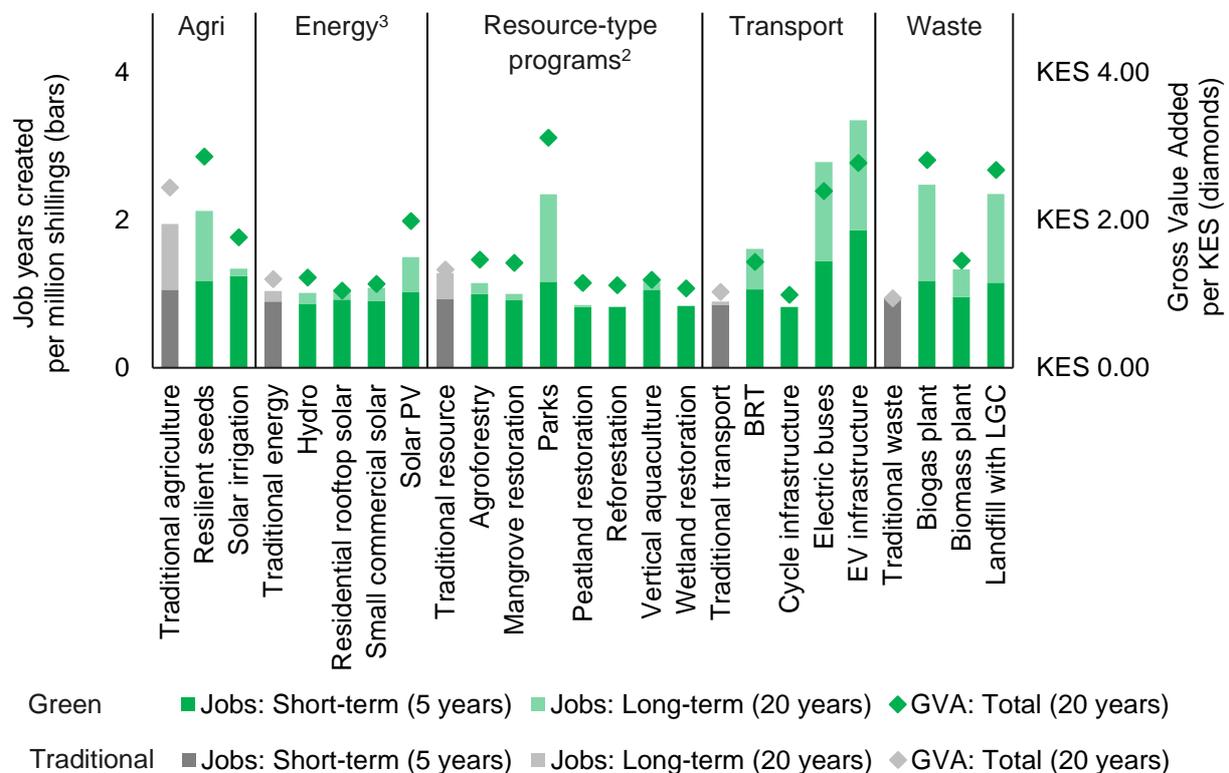


Figure 4. Job and Gross Value Added (GVA) impacts of green spending compared to traditional spending in the Republic of Kenya, all modelled policies. Modelling output from Vivid Economics; see Technical Annex.



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Note: Modelling is based on current sector dynamics and is therefore likely to significantly overstate the long-term GVA of traditional (fossil) investment and understate the GVA of green investment. For fossil investment, stranded asset risk could significantly reduce the asset lifespan, and for clean energy investment, cheaper access to energy is likely to unlock new investment in adjacent areas like electric transport, artificial proteins, and sustainable material production.

Traditional investments are intended as comparable dirtier approaches to invest in the economy, that may have been used in past recessions. These are defined as follows: agriculture includes a traditional gravity-based irrigation technique; energy includes ultra-supercritical coal energy generation without any carbon capture technology; resource-type programs include supporting a mining project and continued resource extraction; transport includes improvements to the road network, including laying new road and constructing accompanying road infrastructure, such as interchanges and bridges; and waste includes water treatment facilities, including the construction and operation of waste-water treatment facilities.

Alongside these core recovery policy proposals, we suggest close continued consideration of a circular economy regime. Shifting socioeconomic and political trends are expected to lift more of the population into the middle-class.¹⁰ Though this positively boosts individual prosperity, it also increases demand over finite resources. A circular economy in Kenya, which functions to design-out waste and pollution, is an important component of environmental protection, rehabilitation, and remediation that could sustain biodiversity, support resource regeneration, and enable lasting economic growth.^{33,39} Kenya has already demonstrated initiative through measures such as the Framework of Cooperation (FOC) and KAM's Kenya Plastics Action Plan, which engage a broad range of stakeholders. To complement existing plans, moving forward, Kenya must look to the growing manufacturing sector. There are notable opportunities to promote sustainable manufacturing, incorporate smart factory models, and tap into R&D and technological advancement possibilities.⁴⁰ Evolving a circular economy is a sure way of promoting economic growth while conserving the environment.

Apart from recovery spending, Kenya should continue to deepen efforts for financial inclusion. Already, the Kenyan government is exploring diversification of policy and financial instruments that support a green economy transition, including green bonds and eco-taxes.¹⁰ Moving forward, Kenya should capitalise on new facets of ethical investing to attract more funds for impact investment. Ethical investing through fixed income has recently been revolutionised with new financial securities such as rhino bonds across Kenya and South Africa, a blue bond in the Maldives, and green bonds in South Africa, Egypt, and Brazil.^{41, 42, 43, 44, 45, 46} These securities are issued specifically to finance the implementation of vital projects related to marine, wildlife, and environmental conservation, all playing a vital role in financing the green transition. Further, Kenya and its capital city Nairobi stands as the center of East African impact investing. Impact investors fill an important role to identify innovative solutions that address difficult sectors and circumstances that conventional investors may overlook or dismiss, providing much-needed capital to businesses that would otherwise struggle to access finance (37).⁴⁷ Enhancing Kenya's domestic capacity in this domain will enable greater access to international funding opportunities too, supported in trend by a rapidly growing international market for impact investment.

The three priority green investment opportunities for particular consideration in Kenya are:

2.1 Renewable energy investment

Renewable energy investment presents strong economic potential across geographies, but nowhere more so than in Africa. For many African nations, including Kenya, low rates of electrification lock-in low productivity and poverty, while hindering economic growth. New renewable energy generation, whether at utility scale or delivered via microgrids or minigrids, can bring electricity to those who have never had it before and therein unlock significant economic opportunities for individuals and businesses. Of course, the short-term job creation potential and contributions to economic growth are also significant, as they are in advanced economies too.

Kenya has already developed a national energy plan within Vision 2030 to set a path to meeting growing energy demand almost entirely from renewable energy sources.⁴⁸ The country has developed the Lake Turkana Wind Power project, producing 310MW of wind power, the Olkaria 5 Project, producing 140MW of geothermal power, and the Gorge Farm Energy Park in Naivasha, producing 2MW of electricity from biomass.^{49, 50, 51} As of January 2020, renewable energy forms 87% of Kenya's energy mix.⁵²

The green energy transition underway provides tremendous potential to generate large economic benefits, important social benefits, as well as vital environmental benefits. Modelling from Vivid Economics suggests that Kenyan investment in renewable energy can generate more jobs in the short-term than investment in traditional energy projects. Considering COVID-19, this short-term advantage is particularly relevant. The modelling suggests an identical trend for renewable energy investment in terms of Gross Value Added (GVA) in the short-term. Additionally, renewable energy investments are likely to improve public health through reduced air pollution, enhance social wellbeing through energy price stability, and significantly reduce GHG emissions.⁵³

However, despite the encouraging number of renewable energy projects completed or currently underway, suitable infrastructure for the transmission and distribution of electricity is lagging. Deficiencies in the national grid infrastructure can lead to frequent power outages as well as technical and non-technical losses.⁵⁴ Accelerated investment in grid infrastructure, supported by appropriate low-carbon dispatchable power (e.g., would enable high reliability and high rates of renewable energy penetration).

For those in rural areas who live off-grid, the lack of readily available, reliable, and affordable electricity can be a continuing constraint against development.⁵⁵ As of 2018, the rural electrification rate was only 6.7%.⁵⁴ To counter the challenges of inadequate transmission infrastructure, Kenya should both direct funding to improving national utility grid reliability and smart grid technologies, while also considering the large-scale rollout of microgrids and minigrids. These off-grid solutions provide a rapid decentralised solution to the rural transmission issue. Minigrids can bypass complex structural implementation issues that central utility grids are subject to, however they do face challenges in that they require careful design consideration and, depending on the size of the total package investment, a need to



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invest in supplementary training to assist the scarcity of skilled workers and experienced contractors to manage implementation, operation, and maintenance of minigrid systems.⁵⁶

Providing energy access to rural areas enhances lives and livelihoods, supporting the productive and income generating activities of local communities to stimulate growth, create jobs and reduce poverty.⁵⁷ Every 1MW of minigrids in a recent ‘Power For All’ study in Kenya translated into 180 jobs.⁵⁶ Furthermore, on a household level, being linked to a minigrid rather than the national grid saved rural households USD 43-100 per year.

As a growing R&D hub for Africa, Kenya should take further steps to support enterprises that use renewable energy for additional value additive activities. For instance, there is growing potential for renewable energy to play a role in agriculture and manufacturing.⁵⁸ The Kenya Electricity Generating Company (KenGen), Kenya’s largest electricity producer, has already established an energy R&D centre in Tana. KenGen’s laboratory will test new ideas for power generation and related industrial projects. To date, the company has received 251 innovation proposals, of which 143 have been approved.⁵⁹ Sharing knowledge and encouraging collaboration between domestic and international partners will expedite economic, social, and environmental benefits across the population.

The role of international sources of finance in supporting Kenya’s green energy transition is significant. International public sector capital allocators (i.e., governments and multilateral agencies) can help ensure that fiscal interventions are productive and meet long-term environmental, social, and economic objectives, while bringing progress to the SDGs.⁶⁰ Strong public incentives, transparent policy frameworks, and well-defined objectives are essential for catalysing both international and domestic involvement in renewable energy investment to meet financing requirements. Further, policymakers have a responsibility to ensure legislative and regulatory efforts are consistent with a just transition that addresses equity concerns for the labour market. Renewable energy investments can be supported by supplementary investments in human capital that include the youth and informal labour force. For instance, paired green skill development and green retraining programmes could be used to inclusively support human capital.

2.2 Natural capital investment

Kenya relies heavily on nature-based resources, including for the agricultural sector, contributing to roughly 33% of GDP and more than 40% of employment, as well as the travel and tourism sector, which contributes 8.8% of GDP¹ and 8.3% of employment.^{8, 61} Kenya’s travel and tourism sector has been one of the worst affected industries during the COVID-19 pandemic, with 45% of organisations losing over KES2.5 million because of booking cancellations in the first half of 2020.⁶² Investments in nature-based solutions have the potential to, in the short-run, reinvigorate, and in the long-run, bolster, this industry significantly. Designed well, natural capital investment can bring a multitude of simultaneous economic, social, and environmental benefits. For example, compared to traditional stimulus options, natural capital investments exhibit low leakage of funds outside the domestic economy as they are usually labour-intensive and materials can be locally sourced. Relatedly, natural capital investments can rapidly create jobs and safeguard communities against climate change.^{63, 64,}

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¹ Worth KES790 billion (~USD7.9 billion) when all direct, indirect, and induced effects are taken into consideration.

Policymakers must take particular care in the design of natural capital solutions by prioritising native biodiversity and local communities. Any intervention must be inclusive, appropriately dealing with job allocation, land rights and considerations for indigenous populations, by involving local communities at every stage of the policy design and investment cycle.⁶⁶ Absolute transparency and robust regulatory enforcement, then, are key to the responsible implementation of such projects.

Options for investment in Kenya include:

- **Agroforestry:** the introduction of trees into existing or potential pastureland to raise livestock or the creation of areas for foraging in a manipulated forest environment. Agroforestry and habitat restoration can decrease the likelihood and severity of droughts by improving soil water retention, slowing water loss, and regulating water flow. Agroforestry efforts can also improve shading, decreasing livestock loss due to heat stress.
- **Reforestation:** re-establishing natural forests, planting more native species, or increasing the density or extent of an existing forest. Well-managed, consultative, and participatory reforestation can enhance wildlife habitats, support biodiversity, protect water supplies, develop recreational opportunities, and work to address numerous issues associated with climate change, including through carbon sequestration.
- **Resilient Seeds and Irrigation:** Policies considered include investments in irrigation for agriculture, which better enable farmers to withstand droughts, and investment in drought-resistant seed programmes. Investments in resilience-focused project could lead to high economic returns, with between 1.7-2.8 KYS in revenue for every KYS spent. Furthermore, the economic impacts would increase farming revenues, enabling farmers to then reinvest into their practices, enhancing the impacts beyond those revealed through the modelling.
- **Urban parks:** Nearly 30% percent of Kenya's population is already living in urban areas, and with annual urban population growth of 4%, this number will keep rising rapidly. To ensure this process creates liveable cities, that are hubs of productivity and well-being, investment is needed in green spaces. Urban parks support recreation, health and wellbeing, translating into a healthier population, improved human capital, and lower pressures on health services. Investing in the creation of parks today would help unlock urbanisation as a driver of agglomeration economies and productivity gains, rather than a source of congestion and pollution. They can also make cities more attractive to tourists and business travelers, enhancing Nairobi's position as an international business centre.

2.3 Clean transport investment

There are several key policy adjustments that may help to sustainably transform transport systems in Kenya. To support the Share the Road Programme, which catalyses the creation of a network of footpaths, cycling lanes and more, Kenya could direct focus to robust road regulation and enforcement. To strengthen a green transition in public transport systems, Kenya could accelerate electromobility through suitable public incentives and PPPs.^{67, 68} Kenya can also look to raise the existing 20% allocation of the road construction budget to NMT investment to target increased rural connectivity. Other considerations include favouring the import of efficient used vehicles, including EVs, to combat undesirable outcomes from a growing trend in private ownership or initiatives like bike-sharing schemes.^{69, 70, 71} Similar

initiatives could be applied to electric matatus and e-trikes. For instance, there is already a Kenyan EV startup importing and testing used Nissan Leafs to promote EV adoption. The lower speeds, stop-and-go traffic, and shorter distances make this type of electric vehicle ideal for Kenyan roads.⁷⁰

In Kenya, NMT is the most common mode of transportation. In Nairobi, 45% of people walk for their daily trips and many others use NMT as a last-mile link to public transport.⁷² Despite this, a lack of proper infrastructure to support NMT has left pedestrians and cyclists at the peril of motorists. Kenya is characterised by roads that do not have walking or cycling lanes, and even when lanes exist, they are usually encroached on by motorists.^{69, 72} Kenya's Integrated National Transport Policy recognises the importance of NMT, which is at risk of decline; there is much to be done.^{73, 74}

To future proof the transportation sector, a transition to private and public electromobility should be incentivised through greater investment from the private sector, private targeted public investment, and/or PPPs. Increased electric vehicle usage brings a host of local benefits, ranging from lower commuting costs to decreased air pollution in the long run.^{75, 76} In particular, investing in e-public transport solutions, like electric buses, can help prevent congestion issues in anticipation of increasing urbanisation.^{77, 78}

Done well, clean transport investments have major economic, social, and environmental benefits. As part of a recent NMT cost-benefit analysis in Nairobi by the University of Cape Town, a move to a city-wide network of NMT infrastructure could potentially result in a reduction of over 2 million metric tonnes of CO₂ emissions in a fifteen-year period, save over 400 years of travel time, and prevent 8,000 premature deaths.⁷³ Better and cleaner transport connectivity, whether through non-motorised, public or private, is key to unlocking access to goods and services, building a more flexible workforce, and in turn, securing stronger economic development.

2.4 Other guidance

Kenya is a hub of technology and innovation in East Africa, and has a goal, set out in Kenya Vision 2030, to become an industrialized economy supported by science, technology, and innovation (STI). By boosting STI across the country through COVID-19 recovery, Kenya can accelerate its path to meeting its 'Big 4' agenda: 1) food security, 2) employment through manufacturing, 3) housing, and 4) universal health care.

The economic benefits of research and development (R&D) activities are significant and compound over the long term. Successful R&D can catalyse new industries and strong long-term job creation, bringing high return on public investment. In advanced economics, annual private rates of return to R&D investments are around 20-30%, with supporting mechanisms playing a major role in determining the size of impact.⁷⁹ Supporting mechanisms can include fiscal incentives, grants, and the supporting infrastructure of public research centres.⁸⁰

Innovation spending can create new jobs in the short term, as well as the long term. In developing market economies, investment in domestic innovation and appropriate incentives for entrepreneurship can help to reduce outward-bound skilled migration. Creating highly skilled local jobs can help to foster domestic ecosystems of innovation with overflows for lower-skilled workers too. Green innovation can deliver particularly strong returns, with many new

green industries to emerge over the coming decade. By acting early, Kenya could establish a position of leadership, both within Africa and globally.

Job creation is dependent on educational skills and institutional frameworks.⁸¹ Kenya's spending in R&D as a share of GDP is already higher than all other Sub-Saharan Africa countries,⁸² supported by Nairobi as the nation's innovation hub. The existing innovation and enterprise institutions of Nairobi provide a solid foundation for further investment in entrepreneurship incentives, skill development, and job creation.

In this vein, the fastest route to scaling up innovation is to use mechanisms that are already working within the Kenyan economy, while ensuring the necessary infrastructure and skills training is in place. For instance, the Kenya Climate Innovation Centre (KCIC) offers incubation, capacity building, and financing options to SMEs that are developing innovations to address climate change challenges.⁸³ They have already incubated 298 SMEs and mobilized USD 44,000,000 for climate change. The scaling up of such an existing centre, with already proven expertise in supporting SMEs, could be a fruitful way to disperse funds for innovation. At all stages, programs should prioritise an accelerated digital transformation, which underpins Kenya's innovation agenda.

3. Conclusion

For Kenya, Vivid Economics modelling suggests that in comparison to traditional spending alternatives, green investments can deliver significantly more jobs (up to ~120% more in the short term for select projects) and greater gross economic value (up to ~200% more in the long term for select projects), while exhibiting major social and environmental co-benefits.

Kenya should urgently invest in a sustainable economic recovery plan to support and productively augment the existing national green framework for growth and development. To maximise the efficacy of their economic recovery, Kenya should prioritise clean energy investment, natural capital solutions, and clean transport initiatives, among other green solutions. By spending green, Kenya could avoid the long-term dangers of spending on fossil-intensive programmes. Continued dirty spending directs scarce resources to assets that are at major risk of being stranded by growing trends in global energy use. Asset stranding can lead to "bad debt" and reductions in tax revenue, resulting in broader economic and social consequences. Contrary to this, green spending accommodates positive tax-side opportunities, with potential to instead increase tax revenues and accelerate the growth of emerging green industries.⁸⁴

With help from international partners, Kenya has made resolute headway to a greener future, but there remains much to be done. Continued support from foreign agents will be indispensable in maintaining momentum and achieving climate commitments. Inaction on the part of either international actors, or the national government, will make reaching the SDGs nigh on impossible and could have dire impacts on the long-term health, wellbeing, and economic opportunities of Kenyans for generations ahead. Increased grant and concessional finance with sustainable strings, as well as debt forgiveness measures, have a vital role to play in shaping Kenya's future. As a part of COVID-19 economic recovery, in Kenya there is a significant and economically rational opportunity for new long-term international support to target green spending projects and mitigate poverty, social inequalities, and climate change.



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ABOUT THE OXFORD UNIVERSITY ECONOMIC RECOVERY PROJECT

OUERP is the world’s hub for developing and communicating long-term economic perspectives on recessionary fiscal spending. The project develops leading original research, as well as core advisory services to governments and multilaterals, businesses, and non-profit institutions. Core initiatives include tracking of global COVID-19 government recovery spending, assessment of spending effectiveness, and development of core perspectives on how to incorporate long-term economic, social, and environmental objectives into immediate stimulus action.



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Vivid Economics is a leading strategic economics consultancy with global reach. We strive to create lasting value for our clients, both in government and the private sector, and society at large. We specialise in understanding the policy-commerce interface and resource- and environment-intensive sectors. The success we bring to our clients reflects a culture of strong partnerships, the application of ground-breaking analytics and modelling, and an understanding of strategic imperatives and political economy. From our beginnings in 2006, we have become well recognised and trusted in our field and known for our uncompromising quality.

Vivid has an extensive track record in analysing the economic, environmental, and social impacts of policies and public investments, including COVID-19 rescue and recovery packages:

- Our Green Recovery Roadmap work, including modelling the impacts of announced and alternate recovery measures on the economy and environment of ten countries worldwide, is funded by the ClimateWorks Foundation. We are also working with the Children's Investment Fund Foundation, to model further recovery policies.
- Our flagship 'Greenness of Stimulus Index' (funded by the MAVA foundation) assesses the effectiveness of COVID-19 stimulus efforts in ensuring an economic recovery that takes advantage of sustainable growth opportunities and is resilient to climate and biodiversity.
- We are experts in assessing the economic, environmental and social benefits of government interventions to be included in national strategies, working with Nigeria, Indonesia, Belize, Lebanon, Colombia, Jamaica and others to prioritise policies and investments for inclusion in their intervention plans.
- We are working with SystemIQ to develop an assessment of the economic and climate mitigation and adaptation impacts of global stimulus packages and assess the benefits of a greater emphasis on investment in nature-based solutions

For more information on Vivid Economics please visit <https://www.vivideconomics.com/>

Technical Annex from Vivid Economics

Authors: Julia Bird, Jonathan Aron, Malvina Bondy, Paul Roe, and Dan Aylward-Mills.

The objective of the modelling is to estimate the economic and environmental impacts of different stimulus policies. As Figure A.1 shows, there are four steps in the analysis:

- **Coordinate background policy analysis**
 - o The existing COVID-19 spending policies were mapped using Vivid Economics tracking and Oxford’s Global Recovery Observatory. Policies included rescue-type spending such as household and job support programmes, as well as non-targeted business support. To consider recovery-type investment policies, a set of reference investments across core sectors was established.
 - o Vivid Economics designed a series of indicative green recovery policies to form a potential green recovery package. This package is tailored to the national context, while drawing on international best practice for designing green stimulus policies.
- **Prepare model inputs.** Each intervention is translated into a ‘shock’ for use in the I3M model. As a Leontief multiplier input-output (I/O) model, model shocks are changes in sectoral final demand.
- **Conduct economic modelling.** The shocks are input to the model to estimate the direct and indirect economic impacts of the different stimulus scenarios. The direct economic impacts are those within the sector where demand has changed. For example, an increase in demand for solar power will directly increase jobs in the renewable energy sector, and indirectly bring upstream supply chain impacts.
- **Conduct emissions modelling.** The economic modelling outputs predicted the emissions impact of each shock. Using emissions factors, Vivid Economics calculates the total change in CO2 emissions to demonstrate the mitigation benefits of a green recovery.

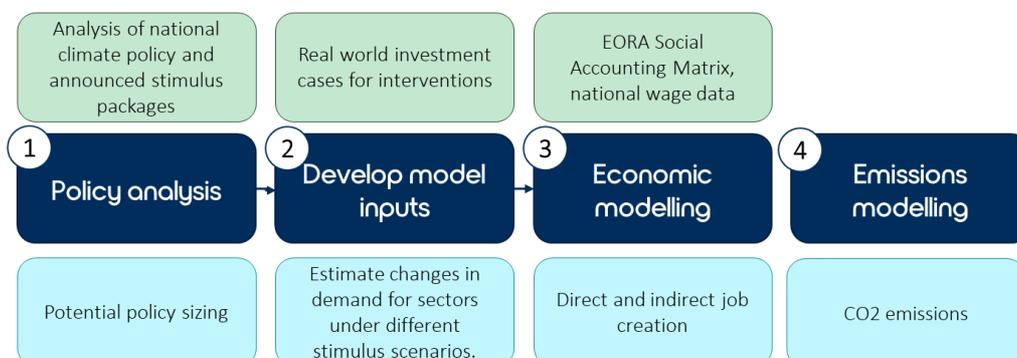


Figure A.1. Overview of modelling approach. Dark blue boxes summarise the steps in the analysis, green boxes indicate inputs at each stage, and light blue boxes indicate outputs.



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A.1.1 Economic modelling: How does the model estimate direct and indirect economic impacts?

The analysis leverages Vivid Economics' Intervention & Investment Impact Model (I3M) to estimate the direct and indirect economic impacts of different stimulus packages. The analysis feeds the investment and operational phase spending profiles into the I3M input-output model to obtain estimates of changes to sectors' gross value added and labour costs.

Vivid's I3M model has been applied to assess the impacts of investment in green solutions, as compared to 'reference stimulus' packages deployed by countries in response to the COVID-19 pandemic. The I3M model uses an input-output framework to estimate the short- and long-term impacts of investments and other interventions. To define the inputs to the I3M model, the interventions (both green solutions and reference) are characterised in terms of changes to the final demand for the output of specific sectors within the Eora26 classification scheme.² The I3M modelling framework estimates a 'per unit' impact of each intervention, which is then multiplied by the total amount of investment allocated to the intervention. This technical note details the methodology for modelling both the investment green solutions and the reference stimulus.

Input-output tables

I3M is an input-output modelling framework which can be calibrated to work with any input-output data source. This work was drawn from the Eora multi-region input-output table (MRIO). The MRIO is a square matrix that represents the intermediate transactions between all sectors in all countries. In addition, the final demand of households, government purchases, and other agents within each country for the output of all sectors is represented in the Final Demand block. Correspondingly, the primary inputs to sectoral production (labour, capital etc.) are represented in the Primary Inputs block. A simplified version of the table is represented in Figure A.2.

Impact modelling

I3M works by modelling the impacts of investments and other interventions as shocks to final demand in specific sectors. The flowchart in **Error! Reference source not found.** shows how the MRIO is used to calculate the matrix of Leontief multipliers. Multiplying a shock vector (a change in final demand for every sector) by the Leontief matrix produces the increase in sectoral output needed to satisfy the increase in final demand. Relationships between sectoral output and variables such as GVA, employment, and GHG emissions, determined from the Satellite accounts of the Eora database, are used to calculate the impacts

² <https://worldmrio.com/eora26/>. The modelling for the USA uses the IMPLAN data platform <https://implan.com/>

of the shock. The shock vector itself determines the ‘direct’ impacts, while the additional impacts on sectoral output are used to calculate the ‘indirect’ impacts.

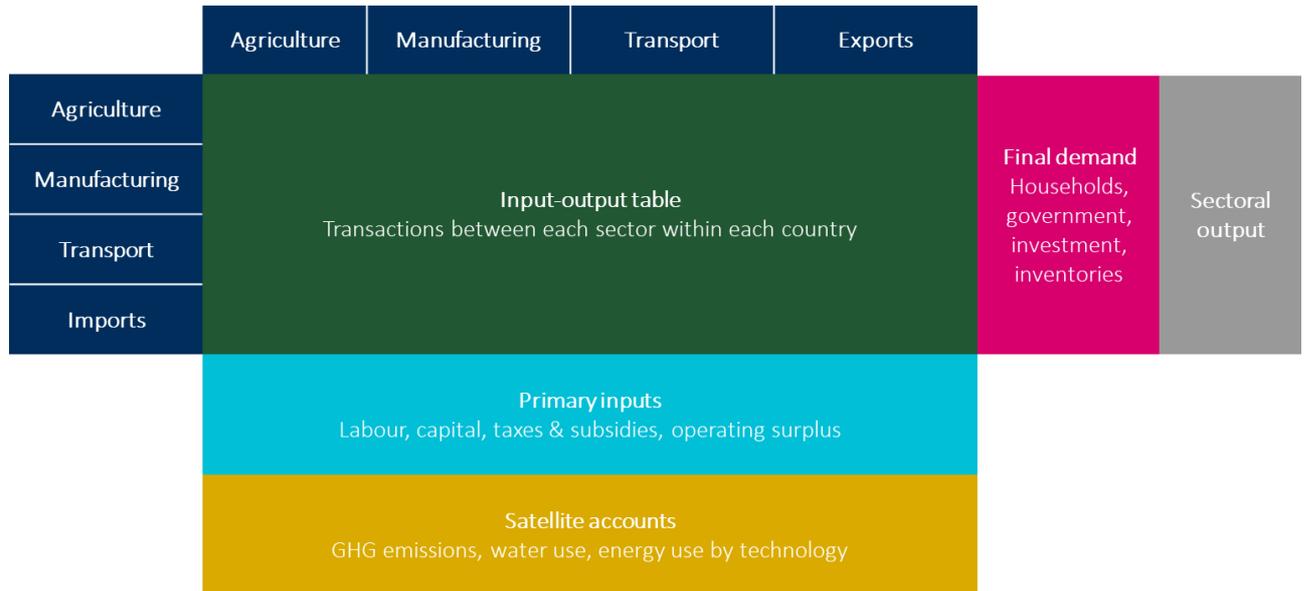


Figure A.2. Simplified representation of the Eora MRIO.

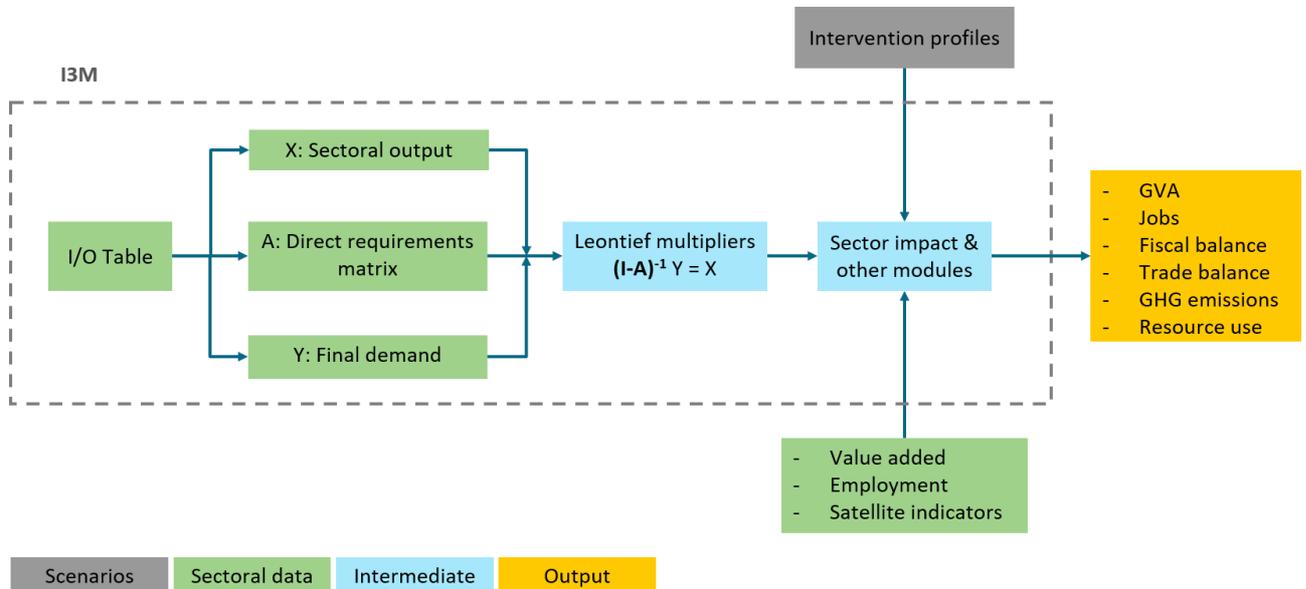


Figure A.3. Representation of the I3M system.

Since the I3M system is fundamentally linear, the per-USD benefits can be calculated before knowing the final allocation. This means that the steps were taken in the following order:

1. Determine the capital expenditure (CAPEX) and operational expenditure (OPEX) spending profiles associated with each stimulus policy.
2. Estimate the per-USD impacts on GDP within the country.
3. Determine the allocation of investment in green solutions for each intervention.
4. Multiply the allocation by the per-USD impacts for each intervention within the country.

Job Impacts

Labour is a key input to production. The economic shock, as modelled by I3M, leads to increased demand for inputs both from the impacted sector and from indirectly affected sectors. The increase in labour demand that results from this is expressed in monetary terms.

To translate the monetary value of increased labour demand into job years, the total labour spending increase, per year, is divided by the average existing wage in the economy.

'Short-term' vs. 'long-term'

The 'short-term' impacts of interventions are defined as those that result from the CAPEX associated with the intervention. The 'long-term' impacts result from the operation phase of the intervention, i.e., the OPEX. In this case, the long-term impacts are calculated on an annual basis.

Assumptions

There are four key assumptions in I3M:

- **Constant returns to scale as production is increased.** In other words, the empirical technology observed in the I/O table is assumed to be the same at any level of production.
- **Slack capacity.** There is enough underused capacity in the economy to scale up production without requiring additional investment. This is considered reasonably valid in the context of an economic downturn.

- **Fixed prices.** The model does not allow for price adjustments. This assumption is critical, as the model does not consider substitution effects between inputs, but rather assumes they will always be used in the same proportions. In the short run, this is a reasonable assumption, but in the longer run, prices will reflect the increase in demand through an upward movement.
- **No induced impacts.** The model excludes the mechanism by which increased household wealth prompts greater consumer spending.

A.1.2. Develop model inputs: How do stimulus packages become model inputs?

The analysis draws on real-world investment cases to translate the interventions into model inputs. Model inputs are the changes in expected demand for different sectors over time, which are captured in spending profiles for the 'investment' and 'operational' phases. The investment phase consists of capital expenditure, which are the costs of manufacturing, constructing, or installing the technologies, such as installing a wind farm or building a power plant. Recovery stimulus is assumed to directly translate to CAPEX rather than OPEX. The 'operational' phase consists of OPEX, including on inputs (such as fuel) and maintenance.

There are three key points to note about this phase of the work:

- The model is agnostic to the source of the expenditure and does not account for any multiplying effect government investment can have. The modelling compares the economic and environmental impacts of like-for-like investment. For instance:
 - o The model analyses the expected cost of expanding solar generation, which could be borne by state-owned enterprises or private sector firms.
 - o The model analyses the costs of implementing energy efficiency improvements in the building sector. This type of intervention is often part-funded by government through subsidies.
- Each of these interventions is treated in the same way: the total cost of the investment is modelled without regard to the source of the expenditure.
- The spending profiles are developed from real world investment cases from both national and international sources.