Global Recovery Observatory

Draft Methodology Document

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Oxford University Economic Recovery Project, Smith School of Enterprise and the Environment

in partnership with

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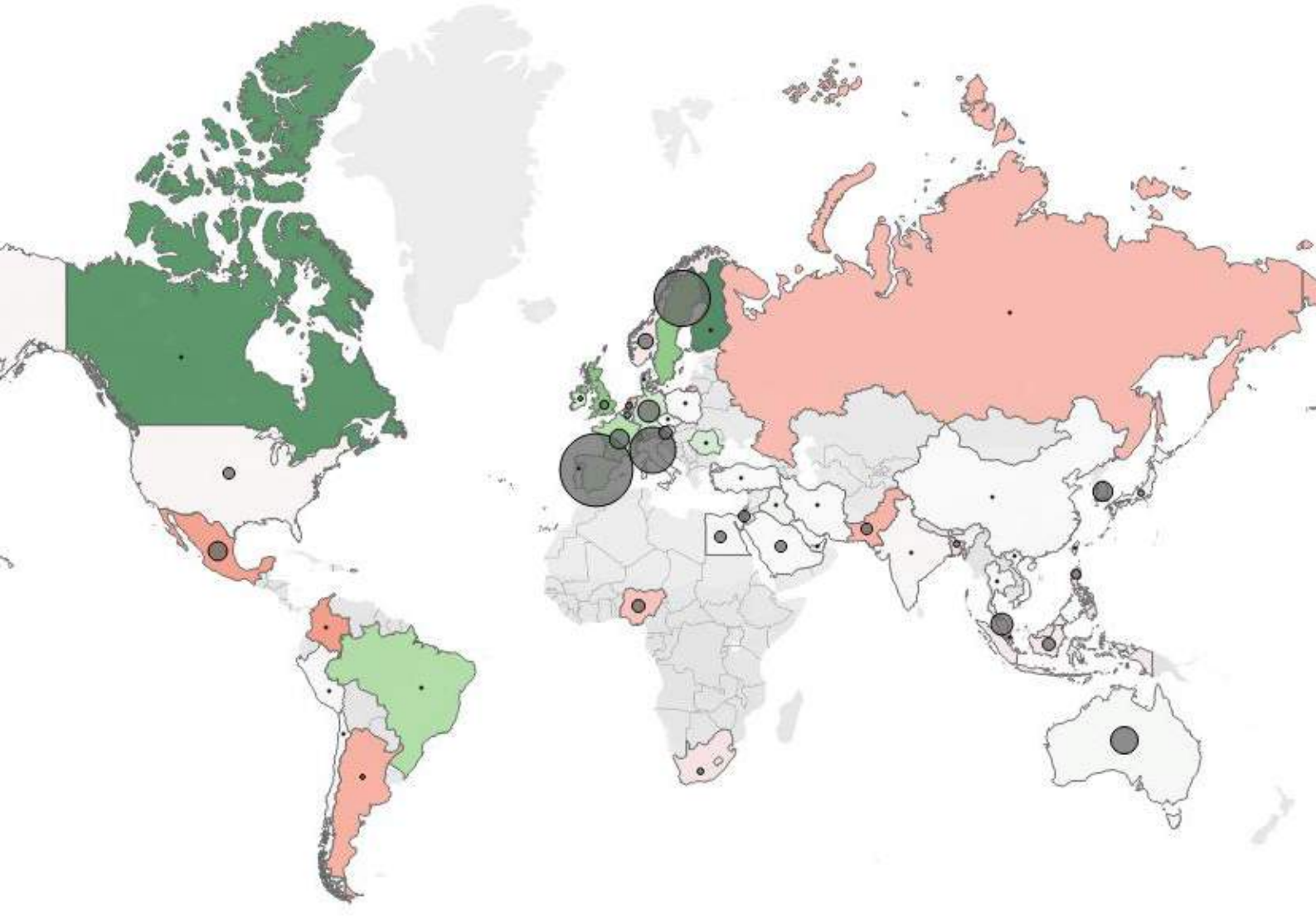

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ABOUT THE OXFORD UNIVERSITY ECONOMIC RECOVERY PROJECT

OUERP is the world's hub for developing and communicating long-term economic perspectives on recessionary fiscal policies. 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.

The Oxford University Economic Recovery Project is housed in the Smith School of Enterprise and the Environment. The project is generously supported by the Green Fiscal Policy Network (International Monetary Fund, United Nations Environment Program, and the German Corporation for International Cooperation), Children's Investment Fund Foundation, ClimateWorks Foundation, and University of Oxford Social Sciences Division.

NOTE TO READER

The *Global Recovery Observatory* is a project to bring transparency to government spending practices, designed and managed 'by the world and for the world'. We rely on the kind collaboration of users to identify errors and help improve policy impact assessments.

The current policy assessments, detailed on pages 19-65, are the result of six months of input from economic and environmental experts, as well as other contributors. There is, however, a long way to go.

If you have any suggestions or considerations for improving the Observatory methodology, and in particular, the policy assessments, please contact us using this form: https://recovery.smithschool.ox.ac.uk/methodology-improvements/ . These corrections should be supported, wherever possible, by findings of peer-reviewed literature.

1. METHODOLOGY IN BRIEF

The COVID-19 pandemic has ravaged economies globally (IMF, 2020b), (The World Bank, 2020). Governments have responded with a wide range of significant fiscal measures to stabilise their economies and safeguard the health of their populations. In such a crisis, it is vital that government interventions are carefully observed to ensure that they are meeting the public interest. To ensure accountability, spending practices must be made visible, analysed, and contrasted with other nations. Additionally, it is important that governments are adequately supported in making these decisions with an approach for assessing the economic, social, and environmental consequences of stimulus options.

With the dual motivation of ensuring government accountability and maximising stimulus impact, the Oxford University Economic Recovery Project has produced the Global Recovery Observatory, under the banner of the Smith School and supported by the United Nations Environment Program (UNEP), International Monetary Fund (IMF), and German Corporation for International Cooperation (GIZ) through the Green Fiscal Policy Network (GFPN). The Observatory tracks and assesses national fiscal crisis expenditure in the world's fifty largest economies, with a March 2021 expansion to include an additional 39 emerging market and developing economies. The Observatory is updated weekly and covers crisis expenditure during the COVID-19 pandemic (January 2020–present). Tracking is completed at the policy level and aggregated at a national and global.

The Observatory aims to provide transparency to government spending practices and is a tool for governments and researchers to assess spending. These assessments can then be used as input in their future stimulus decision making. The Observatory intends not only to support COVID-19 fiscal interventions, but to provide a rich database for informing research and response for future economic crises.

Policy items are assessed for potential environmental impact (greenhouse gas emissions, air pollution, natural capital), social impact (wealth inequality, quality of life, rural livelihood) and economic impact (multiplier, speed of implementation). These assessments consider the impact of policy versus a scenario in which no intervention is made. Economic impact assessments are a work in progress and excluded from the current Observatory iteration and methodology review. Compared to alternative subjective approaches, archetype-based assessment enables rigour, evaluation consistency, and transparency. Using this approach policy items are first mapped to 40 exhaustive and mutually exclusive archetypes, as well as 158 sub-archetypes. The granularity of the new Oxford taxonomy represents a substantial step-change in categorisation of fiscal policy initiatives. Archetypes were developed from first

principles and subsequently tested against a preliminary set of 2,000 observed policies. Acknowledging the global imperative for policy to combat climate change, archetypes are categorised to clearly distinguish between policies that support and harm that objective. This approach builds on a subset of archetypes employed in an April 2020 Smith School survey of over 230 leading economists (Hepburn et al., 2020).[1]

Archetypes are assigned environmental, social, and economic Likert assessments based on evidence in the academic literature, and supported by the input of leading economists (economic assessments are a work in progress and not included in this document). A five-point Likert scale is used to assess greenhouse gas (GHG) emissions, both short-term and long-term (high increase, increase, little net change, decrease, high decrease), while a three-point Likert scale is used for all other assessments (improve, little net change, regress). Sub-archetypes are used to account for assessment variation within broad archetype categories (e.g. tourism incentives, sub-archetype S1, may have larger GHG impacts through induced travel compared to other leisure industry incentives covered by archetype S). A full list of archetype definitions, as well as a list of sub-archetypes and illustrative examples, is included in Appendix A.

GHG assessments include a temporal component, where the net effect is assessed both in the short-term (while policies are being implemented) and long-term (following from policy implementation). This enables greater nuance for green assessments and ensures that non-uniform emission life cycles are considered. Whilst long-term emissions are clearly of greater environmental significance, short-term emissions are often politically relevant as governments strive to meet year-by-year emissions targets under international agreements. As an example of varied emissions profiles, it is important to recognise the short-term GHG impacts of clean energy infrastructure (e.g. through material use) and the long-term effects of reducing GHG emissions through the provision of clean energy. The Observatory enables the user to adjust the relative weights of short-term and long-term GHG emissions as they please.

Evaluations of other (non-GHG) metrics consider only overall first order impacts. Assessments of these impacts are again, based primarily on literature and consultation of leading experts at private, public, and research institutions.

[1] Due to methodological constraints associated with survey length, Hepburn et al. intentionally constrained their test set to only a portion of possible archetypes. Survey archetypes were selected based on relevance to live policy debate amongst other factors.

2. A TAXONOMY FOR FISCAL STIMULUS POLICY

In the post-Keynes era, countless policy approaches to economic stimulus have been tried, ranging in type, speed, sectoral focus, and mechanism for implementing (Khatiwada, 2009). The preponderance of different policy approaches has led to rudimentary attempts at policy classification. Some of these attempts have been sectoral, some based loosely on policy type (IMF, 2020a), and some including a targeted but limited set of policies based on immediate relevance to policy making (Hepburn et al., 2020). In almost all cases, efforts to categorise policy have been developed rapidly and for discrete purposes rather than in an attempt to create a universal taxonomy. As a result, all existing categorisation approaches seem to lack the level of sophistication and detail necessary to comprehensively record, assess, and compare government spending.

Without sufficiently granular groupings in a taxonomy, it is impossible to distinguish between target beneficiaries of different policies and between different economic mechanisms for stimulating growth. For instance a broad categorisation like “Clean energy support” would lump together policies as wide as tax breaks on new renewable assets, subsidies for new hydrogen R&D, and new public investment in transmission infrastructure to renewable energy hotspots. The economic, environmental, and social impacts of each policy type would vary significantly. To ignore this variation in assessing the impact of “Clean energy support” would significantly limit the credibility and usefulness of this exercise.

In this document we define a new taxonomy, derived to cover the full breadth of policy options with sufficient granularity to attempt a priori assessment of impact. At each level of the taxonomy, groupings were designed using a prototype classification model where a test set of 2,000 policies was used to iterate on and improve an initial classification. Groupings were kept mutually exclusive and, in an attempt to future-proof the taxonomy, groupings were designed to cover policy types that may not have been implemented during the COVID-19 pandemic, but are featured in the academic literature and have been observed in response to previous crises. Acknowledging the global imperative for policy to combat climate change, archetypes are categorised to clearly distinguish between policies that support and harm that objective.

The taxonomy covers three levels; typologies (5), archetypes (40), and sub-archetypes (158). Typologies also function to distinguish between rescue-type (short-term measures designed for emergency support to keep people and businesses alive) and recovery-type (long-term measures to boost economic growth) spending. Table 1 provides a list of the typologies and archetypes while Appendix A details sub-archetypes, providing definitions and examples for each.

Initial policy classification by archetype was undertaken on two distinct occasions by independent researchers. Through this process, only 178 out of 2,406 policies (7.4%) had an

unclear or contested classification at the sub archetype level, and 33 (1.4%) at the archetype level. These contested policies each received further research attention and all were subsequently classified by consensus. The same process has been applied to subsequent classification efforts.

Table 1. List of typologies and archetypes, organised alphabetically with greek letters following roman letters. Sub-archetypes and complete definitions are included in Appendix A.

Rescue: Temporary liquidity measures	T Electric vehicle incentives
A Liquidity support for subnational public entities	U Electronic appliance and efficiency incentives
B Liquidity support for large businesses	V Green market creation
C Liquidity support for start-ups and SMEs	W Other incentive measures
D Liquidity support for not for profit organisations	**Recovery: Investment measures**
E Temporary waiver of interest payments for businesses	X Worker retraining and job creation
Rescue: Temporary life and livelihood measures	Y Education investment (non-infrastructure)
F Direct provision of basic needs	Z Healthcare investment (non-infrastructure)
G Targeted welfare cash transfers	α Social and cultural investment (non-infrastructure)
H Job continuation support	β Communications infrastructure investment
I Temporary waiver of interest payments for individuals	γ Traditional transport infrastructure investment
J Healthcare services support	δ Clean transport infrastructure investment
K Emergency services (disaster management) support	ε Traditional energy infrastructure investment
Rescue: Temporary tax and payment relief measures	η Clean energy infrastructure investment
L Income tax cuts	θ Local (project-based) infrastructure investment
M VAT and other goods and services tax cuts	λ Buildings upgrades and energy efficiency infrastructure investment
N Business tax cuts	μ Natural infrastructure and green spaces investment
O Business tax deferrals	π Other large-scale infrastructure investments
P Reduced prices for centrally-controlled products and services	σ Armed forces investment
Q Other tax cuts and deferrals	τ Disaster preparedness and capacity building investment
Recovery: Incentive Measures	φ General research and development investment
R Targeted recovery cash transfers	ψ Clean research and development investment
S Tourism and leisure industry incentives	**Indiscriminate**

3. INHERENT DIFFICULTIES OF A PRIORI ASSESSMENT

Assessing fiscal spending a priori comes with a number of inherent unavoidable challenges. Though every effort has been made to minimize these drawbacks for the Observatory, they are present nonetheless. Above all, it is important to note that the purpose of these assessments is not to attempt to accurately predict future outcomes, but instead to provide a general guide for assessing policy before detailed ex post analysis can occur. In this way, a priori assessment should be interpreted as a coarse temporary placeholder for detailed ex-post assessment. Contributing to this are three major difficulties.

First, to enable complete transparency, policies are added to the Observatory as they are announced and our records take government guidance at face value. This includes how much is to be spent, and how it is to be spent. Hence, at the time of record, it is not possible to know whether or not the announced funds will be true to the amount that is spent. This is especially true given rapidly evolving economic situations. We refer to this as the spending-expenditure anomaly, where fiscal spending describes ratified plans, and expenditure describes actuals. Where data is available (e.g. the UK), we have attempted to record expenditure progress against spending.

Second, use of an archetype method requires that similar policies be grouped under broad categories so that meaningful analysis can be undertaken. Although a 158 sub-archetype approach allows for significant targeting, there will always be policy-level variation that cannot feasibly be addressed. Spending announcement dates are also included in the Observatory, which have important signalling value, but since it is not possible to know the precise timeline of the actual spending a priori, we recommend caution when using these dates to analyse the temporal component of country spending.

Third, assessment of impact at the archetype and sub-archetype level also has challenges. One clear point of difficulty is that the performance of a policy against social, environmental, and economic indicators will vary somewhat based on the economic, political, social, regulatory, legal, business, and environmental conditions in which they are implemented. These conditions are of course heterogeneous across nations, and while we have made some attempts to account for national variation (e.g. by using existing emissions intensity in assessing GHG impacts of liquidity measures), many conditions are unknowable and therefore cannot be included in our assessments. This is compounded by the rapidly evolving nature of the pandemic, which makes all a priori assessment uncertain. However, while assessment of exact quantitative impacts may be futile at the global level, understanding probable directional impacts is certainly helpful in keeping governments accountable. For

some archetypes, as will be discussed in section 4.1.2, the Observatory does incorporate country level variation, but for the most part, archetypes and sub-archetypes are given single scores across all countries. In using three-point Likert scales for almost all of these evaluations, the Observatory keeps score categories broad enough to minimize this uncertainty, though naturally this comes at the expense of granularity in policy evaluations.

A number of previous studies have similarly attempted to provide a priori fiscal policy assessments, particularly during the 2008 financial crisis. Perhaps most notably Edward Barbier's 2010 paper examining the green recovery policies of the G20 in relation to concerns about debt and global imbalance (Barbier, 2010). Barbier's work identifies 5 policy types that are classified as low carbon and uses these to split the fiscal spending of the G20 countries broadly into green and non-green spending, illustrating which countries lead the way in a green recovery. This approach has laid the foundation for a priori assessment of fiscal policies and has shaped our approach in this methodology.

4. ENVIRONMENTAL POTENTIAL IMPACT ASSESSMENT

We consider three environmental impact metrics for fiscal policy, namely: GHG emissions, air pollution, and natural capital. The environmental impact of policies are considered through a first-principles assessment guided by literature and supported by input of environmental experts and economists.

4.1 GHG emissions

4.1.1 Baseline

'GHG emissions' describes the atmospheric release of carbon dioxide (CO2), methane (CH4), and other gases that create a warming greenhouse effect. In this study, the baseline for assessing the GHG emissions impact of archetypes is the national rate of emissions with no intervention, as expected at the time of policy intervention.

Short-term and long-term GHG emissions impacts are assessed separately, on a five point Likert scale, with -2 reflecting a large increase in GHG emissions, -1 reflecting a moderate increase, 0 reflecting little or no change, +1 reflecting a moderate decrease and +2 reflecting a large decrease. In summation, **a negative score implies that the national rate of emissions is likely to increase in comparison to a scenario where the investment is not made**, **and a positive score implies that the national rate of emissions is likely to reduce compared to a scenario where the investment is not made**. This approach is

made clear with a series of highly simplified and completely illustrative examples below. Detailed perspectives with supporting literature are available in section 7.

Example scenarios (completely illustrative)

- **Scenario A: Investment to build a new coal-fired power plant (sub-archetype ε1).** In this scenario, without public funds, it is highly unlikely that a new coal plant is built.[2] Instead, if new power supply is required, it is likely that lower emission alternatives are built, perhaps by private operators, and perhaps at a later time than the coal plant. Hence, the no intervention baseline is some level of long-term emissions, $x_{A,0}$ *per year*, but no significant additional short-term emissions $y_{A,0}$. In the case that the coal plant is built with public funds, significant material use results in short-term emissions $y_{A,1}$, and the burning of coal increases emissions over the long-term to $x_{A,1}$ *per year* where $x_{A,1} > x_{A,0}$. Hence, the post-intervention emissions profile is significantly higher than the no intervention profile, and the archetype receives a score of -2 in both the short- and long-term.
- **Scenario B: Investment in new clean public transport (sub-archetype δ1).** In this scenario, without public funding support, it is highly unlikely that a new public transport asset is built in a given city.[3] Without intervention, existing transportation systems continue to function. Most often, existing systems are highly-dependent on internal combustion engine (ICE) automobiles, and impose a high CO_2 load. The no intervention baseline of transportation in the given city is then some level of long-term emissions, $x_{B,0}$ *per year*, with no significant additional short-term emissions $y_{B,0} = 0$. In the case that the new public transport asset is built, significant material use results in short-term emissions $y_{B,1}$, where $y_{B,1} > y_{B,0}$, but the replacement of automobile transport with more efficient public transport reduces net sector emissions over the long-term to $x_{B,1}$ *per year* where $x_{B,1} < x_{B,0}$. Hence, the post-intervention emissions profile is higher than the no intervention profile in the short-term but lower in the long-term. The archetype receives a score of -2 in the short-term and +2 in the long-term.
- **Scenario C: Direct liquidity support for an airline without green conditions (sub-archetype B3).** Without liquidity support, in the extreme case, a desperate airline unable to secure private investment is likely to scale down operations or otherwise face liquidation. In time, it is assumed that another airline, either a new operation or an emboldened competitor, grows to take its place and meet the demand

[2] Poor financial returns and high risk of asset stranding render coal power an unattractive investment.
[3] Public transport is almost always an impure public good and uncommonly provided by private investors without government support.

that it would have otherwise met. Without external encouragement to the contrary, it is likely that the replacement airline takes on a similar long-term emissions profile, $x_{C,0}$ *per year*, to that which the liquidated airline had pre-crisis, $x_{C,-1}$ *per year*, such that $x_{C,0} \approx x_{C,-1}$. However, because airlines are capital intensive operations, and liquidity is low in the sector in times of downturn, it is likely that there will be a period of unmet demand where short-term emissions, $y_{C,0}$ *per year,* are less than $x_{C,-1}$. With unconditional liquidity support, the airline is likely to continue operations post-crisis as they would have pre-crisis so that long-term emissions, $x_{C,1}$ *per year*, and short-term emissions, $y_{C,1}$ *per year*, are both roughly equivalent so that $y_{C,1} \approx x_{C,1} \approx x_{C,0} \approx x_{C,-1} > y_{c,0}$. Compared to the no intervention baseline, the unconditional liquidity support receives a score of -2 in the short-term but 0 in the long-term (i.e. neutral).

- **Scenario D: Direct liquidity support for an arts and culture not for profit (NFP) (sub-archetype D1).** Without liquidity support, a desperate NFP is likely to scale down operations or be liquidated. In time, it is assumed that another NFP takes its place. With liquidity support, the NFP continues operations largely as before. Since the emissions of the NFP are likely to be minimal with or without intervention, the policy is deemed to have little influence on the national rate of emissions in either the short- or long-term.

4.1.2 National deviation

Under the stated baseline, archetypes may have a different GHG impact in different nations, according to differences in emissions trajectory. In this way, it is conceivable that one policy may be more/less positive in one country versus another. This is particularly true for liquidity support of incumbent corporations, business tax deferrals, and business tax cuts. For high-emitters (versus low-emitters), economy-wide liquidity support is likely to more negatively impact future emissions versus a scenario without intervention. To account for these deviations between countries, "emissions intensity adjustment factors" are applied to sub-archetypes A1, A2, B13, C6, E6, N1, N2, N4, and O2, which collectively account for ~44% of spending (as of 16/11/2020).

The emissions intensity adjustment factor accounts for heterogeneity in the impact of broad-base support for incumbent corporations. The size of an economy is a factor in the magnitude of liquidity support provided to businesses operating in that economy. The adjustment factor considers national CO2 emissions as a proportion of GDP. The Observatory takes the GDP-weighted global mean of CO2 emissions per $ of GDP and then linearly assigns scores to individual nations based on deviation in emissions intensity from the global mean. Scores are distributed on a 0 to 1 scale according to deviation from the mean. A score of 1 represents the large economy with the highest emissions intensity and

therefore the highest positive deviation from the mean (South Africa has the biggest large nation deviation of +156%), while the lowest score is the nation with the lowest emissions intensity (Switzerland has a deviation from the mean of -76% and an adjustment factor of 0.09). Note that in this case the bounds for a “large economy” was set at GDP USD200bn, meaning that each of the largest fifty countries fall within the stated bounds.

4.1.3 Net impacts from short- and long-term impacts

As above, impact is assessed in both the short-term and medium- to long-term to ensure that natural balancing mechanisms are fully reflected. Short-term effects are defined as those that will come during policy implementation, usually on the scale of months to a few years. Long-term effects are those expected to continue over the course of decades, outlasting the economic impacts of the crisis that spawned the investment.

Defining the relative importance of short- vs long-term implications is left completely to the user. The suggested starting point is a 10% weighting for short-term impacts and a 90% weighting for long-term impacts since most GHG emissions (notably excluding CH4) do not have a natural atmospheric sink and therefore accumulate in the atmosphere. In this case, since long-term impacts act over a greater time-horizon, the net GHG impacts are significantly higher than short-term impacts, which act over a shorter horizon. It is noted that short-term emissions are often politically relevant as governments strive to meet year-by-year emissions targets under international agreements. In this case, depending on the policies under consideration, it may be in a government’s political interests to re-weight the short- vs long-term attribution to emphasise short-term impacts. However, this is clearly not the optimum outcome for limiting climate change.

Table 2. Summary net GHG emissions impact in short- and long-term, assessed by archetype. Where there is sub-archetype level variation in GHG emissions scores, the archetype name represents the score of the sub-archetypes with the most policies assigned to it, and other sub-archetypes with different GHG scores are listed separately.

		Change in GHG Emissions				
		-2 (High Increase)	-1 (Moderate Increase)	0 (Little Net Change)	+1 (Moderate Decrease)	+2 (High Decrease)
Time	Short-term	B3, B4, B5, B6, C2, O1, P2, β, γ, δ, ε, η, θ, λ, π, σ,	A, B, C, E, G, H, I, J, K, L, M, N, O, R, S1, T, U, V3, W, $\beta 2, \sigma 2, \tau$	D, F, J2, J3, J4, K1, P, Q, S, V, X, Y, Z, $\alpha, \beta 3$, $\beta 4, \varphi, \psi, \mu 5$	N3, μ,	
	Long-term	$\gamma, \varepsilon, \sigma$,	B5, $\gamma 4, \pi 3$,	A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, W, X, Y, Z, $\alpha, \beta, \gamma 1$, $\gamma 5, \theta, \lambda 3$, $\pi, \tau, \mu 5$	B2, B4, B6, B8, B10, B12, N3, U, μ, φ, $\theta 3$	T, V, X1, δ, $\eta, \lambda, \mu 2, \mu 3$, ψ,

Table 3. Indicative net GHG impact scores of archetypes ranked from least clean to most clean. In this example short term scores are weighted 10% and long term scores 90%. Where there is sub-archetype level variation in GHG emissions scores, the archetype name represents the score of the sub-archetypes with the most policies assigned to it, and other sub-archetypes with different GHG scores are listed separately.

Archetype	**Short term**	**Long term**	**Net score**
V Green market creation • *V3 - Capacity investments*	0 *-1*	2 *2*	1.8 *1.7*
ψ Clean research and development investment	0	2	1.8
T Electric vehicle incentives	-1	2	1.7
δ Clean transport infrastructure investment	-2	2	1.6
η Clean energy infrastructure investment	-2	2	1.6

λ Buildings upgrades and energy efficiency infrastructure investment • *λ3 - Other building upgrade support*	-2 *-2*	2 *0*	1.6 *-0.2*
μ Natural infrastructure and green spaces investment • *μ2 -Tree planting and biodiversity protection* • *μ3 - Ecological conservation initiatives* • *μ5 - Agricultural uplift*	1 *1* *1* *0*	1 *2* *2* *0*	1 *1.9* *1.9* *0*
φ General research and development investment	0	1	0.9
U Electronic appliance incentives	-1	1	0.8
D Liquidity support for not for profit organisations	0	0	0
F Direct provision of basic needs	0	0	0
P Reduced prices for centrally-controlled products and services • *P2 - Fuel prices (oil and gas)*	0 *-2*	0 *0*	0 *-0.2*
S Tourism and leisure industry incentives • *S1 - Incentives for tourism*	0 *-1*	0 *0*	0 *-0.1*
X Worker retraining and job creation • *X1 - Green worker retraining and job creation*	0 *0*	0 *2*	0 *1.8*
Y Education investment (non-infrastructure)	0	0	0
Z Healthcare investment (non-infrastructure)	0	0	0
α Social and cultural investment (non-infrastructure)	0	0	0
A Liquidity support for subnational public entities	-1	0	-0.1
B Liquidity support for large businesses • *B2 - Support for agriculture, forestry, and fishing (with green conditions)* • *B3 - Support for airlines and other transport (no green conditions)* • *B4 - Support for airlines and other transport (with green conditions)* • *B5 - Support for energy (no green conditions)* • *B6 - Support for energy (with green conditions)* • *B8 - Support for holiday and leisure (with green conditions)* • *B10 - Support for retail (with green conditions)* • *B12 - Support for specified other industry (with green conditions)*	-1 *-1* *-2* *-2* *-2* *-1* *-1* *-1*	0 *1* *0* *1* *-1* *1* *1* *1* *1*	-0.1 *0.8* *-0.2* *0.7* *-1.1* *0.7* *0.8* *0.8* *0.8*
C Liquidity support for start-ups and SMEs • *C2 - Support for energy*	-1 *-2*	0 *0*	-0.1 *-0.2*
E Temporary waiver of interest payments for businesses	-1	0	-0.1
G Targeted welfare cash transfers	-1	0	-0.1
H Job continuation support	-1	0	-0.1
I Temporary waiver of interest payments for individuals	-1	0	-0.1
J Healthcare services support • *J2 - Mental health support* • *J3 - Aged care support* • *J4 - General medical personnel support*	-1 *0* *0* *0*	0 *0* *0* *0*	-0.1 *0* *0* *0*
K Emergency services (disaster management) support	-1	0	-0.1

• *K1 - Pandemic administrative support*	*0*	*0*	*0*
L Income tax cuts	-1	0	-0.1
M VAT and other goods and services tax cuts	-1	0	-0.1
N Business tax cuts • *N3 - New tax exemptions for clean investments*	-1 *0*	0 *1*	-0.1 *0.9*
O Business tax deferrals • *O1 - Tax deferrals for dirty industries*	-1 *-2*	0 *0*	-0.1 *-0.2*
Q Other tax cuts and deferrals	-1	0	-0.1
R Targeted recovery cash transfers	-1	0	-0.1
W Other incentive measures	-1	0	-0.1
τ Disaster preparedness and capacity building investment	-1	0	-0.1
β Communications infrastructure investment • *β2 - Remote working infrastructure investment* • *β3 - Civil cybersecurity programmes* • *β4 - Implementation of digital programmes*	-2 *-1* *0* *0*	0 *0* *0* *0*	-0.2 *-0.1* *0* *0*
θ Local (project-based) infrastructure investment • *θ3 - Clean new housing investment*	-2 *-2*	0 *1*	-0.2 *-0.7*

4.2 Air pollution

Air pollution is defined as the presence of small anthropogenically-released particles in the atmosphere that are harmful to humans when inhaled. Common air pollutants include nitrogen dioxide, sulphur dioxide, and particulate matter.

For air pollution, an archetype rating of ‘Regress’ (-1) indicates that the implementation of the policy archetype would lead to an increase in harmful atmospheric particles. ‘Little net change’ (0) indicates an overall negligible or net zero effect on air pollution. ‘Improve’ (+1) indicates a decrease in harmful atmospheric particles as a direct effect of the archetype.

Table 4. Summary of net air pollution impact by archetype. Archetypes are listed by the score that encompasses the majority of their sub-archetypes, and sub-archetypes with different scores to their parent archetypes are listed separately.

Change in air pollution		
-1 (Regress)	0 (Little net change)	+1 (Improve)
S1, β, γ, ε, π, σ	R, S, U, W, X, Y, Z, α, β3, β4, θ, λ, τ, φ, A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, μ5	T, V, X1, δ, η, μ, ψ, N3

4.3 Natural capital

Natural capital is defined as the stock of the world's natural assets, both renewable and non-renewable. This includes water, soil, forests, green spaces, and ecological systems.

For policy impacts on natural capital, an archetype rating of 'Regress' (-1) indicates an expected decline in the quantity or quality of natural capital as a result of implementing the policy. 'Little net change' (0) indicates an expected overall negligible or net zero effect on natural capital. 'Improve' (+1) indicates an expected increase in the quantity or quality of natural capital.

Table 5. Summary net natural capital impact, assessed by archetype. Archetypes are listed by the score that encompasses the majority of their sub-archetypes, and sub-archetypes with different scores to their parent archetypes are listed separately.

Change in natural capital		
-1 (Regress)	0 (Little net change)	+1 (Improve)
T, γ, δ1, ε, π, σ, S1, η2	R, S, U, V, W, X, Y, Z, α, β, δ, η, θ, λ, τ, φ, ψ, A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, μ5	μ, ψ2

5. SOCIAL POTENTIAL IMPACT ASSESSMENT

We consider three social impact metrics for fiscal policy, namely: wealth inequality, quality of life, and rural livelihood. Following the approach used for air pollution and natural capital, policies are considered on their social impact through a first-principles assessment on a three-point Likert scale. Only first order effects are considered.

5.1 Wealth inequality

Wealth inequality is defined as the uneven distribution of assets like cash and property throughout a population. Policies that redistribute income are assumed to redistribute wealth as well.

For wealth inequality, an archetype rating of 'Regress' (-1) indicates an expected increase in the variance of population wealth distribution as a result of the policy. 'Little net change' (0) indicates an expected overall negligible effect on population wealth distribution. 'Improve' (+1) indicates an expected reduction in the variance of population wealth distribution.

Table 6. Summary net wealth inequality impact, assessed by archetype. Archetypes are listed by the score that encompasses the majority of their sub-archetypes, and sub-archetypes with different scores to their parent archetypes are listed separately.

Change in wealth inequality		
-1 (Regress)	0 (Little net change)	+1 (Improve)
T, σ, φ, N	R, S, U, V, W, α, β, γ, δ, ε, η, θ, μ, π, ψ, A, B, C, D1, D5, E, F, G, I, J, K, L, M, O, P, Q	R2, X, Y, Z, θ2, λ, τ, D, G2, H

5.2 Quality of life

Quality of life is defined as the well-being of individuals within a population. This can include health, employment, freedom, education, security, and others. With regard to employment, this assessment includes structural factors relating to access to employment and economic opportunities, but does not include, for example, the number of jobs created by any policy.

For quality of life, an archetype rating of ‘Regress’ (-1) indicates an expected reduction in average population quality of life because of the policy. ‘Little net change’ (0) indicates an expected overall negligible effect on average population quality of life. ‘Improve’ (+1) indicates an expected increase in average population quality of life.

Table 7. Summary net quality of life impact, assessed by archetype. Archetypes are listed by the score that encompasses the majority of their sub-archetypes, and sub-archetypes with different scores to their parent archetypes are listed separately.

Change in quality of life		
-1 (Regress)	0 (Little net change)	+1 (Improve)
ε	R, T, U, V, W, γ, θ, λ, π, σ, B, C, E, I, L, M, N, O, Q	S, X, Y, Z, α, β, σ, η, μ, τ, φ, ψ, A, D, F, G, H, J, K, M4, P

5.3 Rural livelihood

Rural livelihood concerns the quality of life of individuals and communities specifically living in rural environments. In this way, rural livelihood assessments are a subset of overall quality of life assessments (see Section 5.2). Rural communities often face different challenges to non-rural communities, and it is therefore useful for researchers

and policymakers to be able to evaluate specific impacts for rural communities. The purpose of this indicator is to identify archetypes that have particularly pronounced ability to uplift rural businesses and residents.

For rural livelihood, an archetype rating of ‘Regress’ (-1) indicates an expected reduction in average quality of life for domestic rural populations as a result of the policy. ‘Little net change’ (0) indicates an expected overall negligible effect on rural quality of life in domestic rural populations. ‘Improve’ (+1) indicates an expected increase to net quality of life in domestic rural populations.

Table 8. Summary net rural livelihood impact, assessed by archetype. Archetypes are listed by the score that encompasses the majority of their sub-archetypes, and sub-archetypes with different scores to their parent archetypes are listed separately.

Change in rural livelihoods		
-1 (Regress)	0 (Little net change)	+1 (Improve)
ε	R, S, T, U, V, W, X, α, η, θ, λ, μ, π, σ, φ, A, B, C, D, E, G, H, I, K, L, M, N, O, P, Q, ψ	Z, β, γ, δ, τ, ψ2, B1, B2, C1, E5, F, J, μ5

6. ECONOMIC POTENTIAL IMPACT ASSESSMENT

The development of economic assessments is currently underway and not included in this version of the methodology document, nor in the public Observatory dataset. Please contact brian.ocallaghan@smithschool.ox.ac.uk if you may be interested in providing input to further work on this topic.

We consider two economic impact metrics for fiscal policy, namely long-run economic multiplier and speed of policy implementation. The scores assigned to date are adapted from Hepburn et al. 2020, in which a survey of leading global economists was used to evaluate policy archetypes on a variety of social, economic and environmental metrics. As detailed in Appendix B, the survey sampled 231 leading global economists, including senior central bank officials and finance ministry leaders, across 53 countries including all G20 nations. The archetypes and sub-archetypes featured in the Oxford taxonomy do differ to some extent from the archetypes used in the Hepburn et. al. survey. Where archetypes do differ, values have been extrapolated from the most similar archetype present in the Hepburn et. al. study, and are supported by an academic literature review.

For the purposes of this study, 'long-run economic multiplier' is defined as the change in national income that results from a fiscal injection during or following from a recession. 'Speed of policy implementation' is defined as the pace at which a policy archetype can be deployed and exert its economic effect.

7. FIRST PRINCIPLE ASSESSMENTS

Policy impacts are assessed here at the archetype level, and in some instances, at the sub-archetype level. Sub-archetype assessments are included only when there is significant deviation in perceived impacts between sub-archetypes within the parent archetype. Table 11 summarises impacts across archetypes for each of the 8 indicators. Note that detailed literature review perspectives for economic impacts (speed of implementation and long-run economic multiplier) are a work in progress and not included in this document, nor in the public Global Recovery Observatory.

In this assessment, archetypes are broadly categorised in three economic rescue typologies and five economic recovery typologies. Recovery typologies include incentive measures, and investment measures. Meanwhile, rescue typologies include temporary liquidity measures, temporary life and livelihood measures, and temporary tax and payment relief measures.

Table 11. Summary of archetype assessments. Short-term GHG emissions (SE); Long-term GHG emissions (LE); Air pollution (AP); natural capital (NC); income inequality (II); quality of life (QL); rural livelihood RL); Speed of implementation (SI); Long-run multiplier (LM). Note that SI and LM (highlighted in red) are subject to significant changes as literature review and expert consultation processes are both ongoing.

Recovery: Incentive Measures										
R: Targeted recovery cash transfers		**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**
1	Payments targeted to families	-1	0	0	0	0	0	0	1	1
2	Payments targeted to low income individuals	-1	0	0	0	1	0	0	1	1
3	Payments targeted to individuals (other)	-1	0	0	0	0	0	0	1	1
4	Indirect payments through social programs	-1	0	0	0	0	0	0	1	1
S: Tourism and leisure industry incentives		**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**
1	Incentives for tourism	-1	0	-1	-1	0	1	0	1	1
2	Incentives for hospitality services	0	0	0	0	0	1	0	1	1
3	Incentives for arts and cultural activities	0	0	0	0	0	1	0	1	1
4	Measures to promote leisure participation	0	0	0	0	0	1	0	1	1
T: Electric vehicle incentives		**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**
1	EV transfer programs	-1	2	1	-1	-1	1	0	0	0
2	EV subsidies	-1	2	1	-1	-1	1	0	0	0
U: Electronic appliance and efficiency incentives		**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**
1	Electronic appliance specific ‘cash for clunkers’ programs	-1	1	0	0	0	0	0	0	0
2	Electronic appliance subsidies	-1	1	0	0	0	0	0	0	0
V: Green market creation		**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**
1	Increased clean energy market participation	0	2	1	0	0	0	0	0	1
2	Modernisation and transition investments	0	2	1	0	0	0	0	0	1
3	Capacity investments	-1	2	1	0	0	0	0	0	1
W: Other incentive measures		**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**
1	Other incentive measures	-1	0	0	0	0	0	0	0	1

Recovery: Investment Measures										
X: Worker retraining and job creation		**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**
1	Green worker retraining and job creation	0	2	1	0	1	1	0	0	0
2	General and other worker retraining and job creation	0	0	0	0	1	1	0	0	0
Y: Education investment (non-infrastructure)		**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**
1	Education capital and equipment	0	0	0	0	1	1	1	0	0
2	Scholarship funding	0	0	0	0	1	1	1	-1	0
3	Staff funding	0	0	0	0	1	1	1	0	0
Z: Healthcare investment (non-infrastructure)		**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**
1	General medical investment	0	0	0	0	1	1	1	0	1
2	Mental health investment	0	0	0	0	1	1	1	0	0
3	Aged care investment	0	0	0	0	1	1	1	0	0
4	Healthcare capital investment	0	0	0	0	1	1	1	0	0
α: Social and cultural investment (non-infrastructure)		**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**
1	Support for arts and culture	0	0	0	0	0	1	0	0	0
2	Support for social care	0	0	0	0	0	1	0	0	0
3	General and other non-profit investment	0	0	0	0	0	1	0	0	0
β: Communications infrastructure investment		**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**
1	Broadband investment	-2	0	-1	0	0	1	1	-1	1
2	Remote working infrastructure investment	-1	0	-1	0	0	1	1	0	1
3	Civil cybersecurity programmes	0	0	0	0	0	1	1	-1	0
4	Implementation of digital programmes	0	0	0	0	0	1	1	-1	0
γ: Traditional transport infrastructure investment		**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**
1	Road construction	-2	0	-1	-1	0	0	1	-1	1
2	ICE engine automobile support	-2	-2	-1	-1	0	0	1	-1	0
3	Aviation infrastructure	-2	-2	-1	-1	0	0	1	-1	1
4	Port and ship construction	-2	-1	-1	-1	0	0	1	-1	1
5	Rail construction and capacity	-2	0	-1	-1	0	0	1	-1	1
δ: Clean transport infrastructure investment		**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**
1	New public transport systems or line expansions	-2	2	1	-1	0	1	1	-1	1
2	Existing public transport capacity expansions	-2	2	1	0	0	1	1	-1	1
3	EV charging infrastructure	-2	2	1	0	0	1	1	0	1
4	Public transport digitalisation efforts	-2	2	1	0	0	1	1	-1	0
5	Cycling and walking infrastructure	-2	2	1	0	0	1	1	0	1
6	Efficiency initiatives to improve dirty transport	-2	2	1	0	0	1	1	-1	0
ε: Traditional energy infrastructure investment		**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**
1	New or refurbished power plants	-2	-2	-1	-1	0	-1	-1	-1	0
2	New or refurbished refineries	-2	-2	-1	-1	0	-1	-1	-1	0
3	New or refurbished coal mines and oil/gas fields	-2	-2	-1	-1	0	-1	-1	-1	0
4	New or refurbished infrastructure for transport and transmission of fossil energy inputs/outputs	-2	-2	-1	-1	0	-1	-1	-1	0
η: Clean energy infrastructure investment		**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**
1	New or refurbished renewable energy generation facilities	-2	2	1	0	0	1	0	-1	1

2	New or refurbished nuclear energy generation facilities	-2	2	1	-1	0	1	0	-1	0
3	New biofuel and other renewable fuel infrastructure	-2	2	1	0	0	1	0	-1	0
4	Upgraded (or new) transmission infrastructure	-2	2	1	0	0	1	0	-1	1
5	Upgraded (or new) distribution infrastructure including smart grids	-2	2	1	0	0	1	0	-1	1
6	Hydrogen infrastructure	-2	2	1	0	0	1	0	-1	1
7	Battery and storage infrastructure	-2	2	1	0	0	1	0	-1	0
8	Carbon capture and storage/utilisation	-2	2	1	0	0	1	0	-1	0
9	Other initiatives to clean dirty energy assets	-2	2	1	0	0	1	0	-1	0
θ: **Local (project-based) infrastructure investment**		**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**
1	Urban development programs	-2	0	0	0	0	0	0	0	0
2	General new housing investment	-2	0	0	0	1	0	0	0	1
3	Clean new housing investment	-2	1	0	0	1	0	0	0	1
4	Public building investment	-2	0	0	0	0	0	0	0	1
5	Local utility investment	-2	0	0	0	0	0	0	0	1
λ: **Building upgrades and energy efficiency infrastructure investment**		**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**
1	Green retrofitting programs (including daylighting, electricity and electrification, insultation)	-2	2	0	0	1	0	0	0	1
2	Rooftop solar support	-2	2	0	0	1	0	0	0	1
3	Other building upgrade support	-2	0	0	0	1	0	0	0	1
μ: **Natural infrastructure and green spaces investment**		**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**
1	Public parks and green spaces investment	1	1	1	1	0	1	0	0	0
2	Tree planting and biodiversity protection	1	2	1	1	0	1	0	0	0
3	Ecological conservation initiatives	1	2	1	1	0	1	0	0	0
4	Waterway protection and enhancement	1	1	1	1	0	1	0	0	0
5	Agricultural Uplift	0	0	0	0	0	1	1	0	0
π: **Other large-scale infrastructure investments**		**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**
1	Large-scale urban projects	-2	0	-1	-1	0	0	0	-1	1
2	Large-scale regional infrastructure (dams, non-coal mines, etc)	-2	0	-1	-1	0	0	0	-1	1
3	Large-scale space infrastructure	-2	-1	-1	-1	0	0	0	-1	0
σ: **Armed forces investment**		**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**
1	Arsenal funding	-2	-2	-1	-1	-1	0	0	-1	1
2	Administration funding	-1	-2	-1	-1	-1	0	0	0	0
τ: **Disaster preparedness and capacity building investment**		**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**
1	Future epidemic reaction capabilities	-1	0	0	0	1	1	1	0	0
2	Disaster-response infrastructure (shelters, food-stocking, water supplies)	-1	0	0	0	1	1	1	0	0
3	Anti-flood, fires, and other climate adaptation measures	-1	0	0	0	1	1	1	-1	0
φ: **General research and development investment**		**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**
1	Health and science programmes	0	1	0	0	-1	1	0	-1	1
2	Digitisation and AI programmes	0	1	0	0	-1	1	0	-1	1
3	Space programmes	0	1	0	0	-1	1	0	-1	1
4	General and other programmes	0	1	0	0	-1	1	0	-1	1
ψ: **Clean research and development investment**		**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**

1	Energy sector R&D programmes	0	2	1	0	0	1	0	-1	1
2	Agriculture R&D programmes	0	2	1	1	0	1	1	-1	1
3	Industrial R&D programmes	0	2	1	0	0	1	0	-1	1
4	Other sectoral R&D programmes	0	2	1	0	0	1	0	-1	1
Rescue: Temporary liquidity measures										
A: Liquidity support for subnational public entities		**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**
1	Support for states/regions	-1	0	0	0	0	1	0	0	0
2	Support for localities	-1	0	0	0	0	1	0	0	0
B: Liquidity support for large businesses		**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**
1	Support for agriculture, forestry, and fishing (no green conditions)	-1	0	0	0	0	0	1	1	0
2	Support for agriculture, forestry, and fishing (with green conditions)	-1	1	0	0	0	0	1	1	0
3	Support for airlines and other transport (no green conditions)	-2	0	0	0	0	0	0	1	0
4	Support for airlines and other transport (with green conditions)	-2	1	0	0	0	0	0	1	0
5	Support for energy (no green conditions)	-2	-1	0	0	0	0	0	1	0
6	Support for energy (with green conditions)	-2	1	0	0	0	0	0	1	0
7	Support for holiday and leisure (no green conditions)	-1	0	0	0	0	0	0	1	0
8	Support for holiday and leisure (with green conditions)	-1	1	0	0	0	0	0	1	0
9	Support for retail (no green conditions)	-1	0	0	0	0	0	0	1	0
10	Support for retail (with green conditions)	-1	1	0	0	0	0	0	1	0
11	Support for specified other industry (no green conditions)	-1	0	0	0	0	0	0	1	0
12	Support for specified other industry (with green conditions)	-1	1	0	0	0	0	0	1	0
13	Support for unspecified industry	-1	0	0	0	0	0	0	1	0
C: Liquidity support for startups and SMEs		**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**
1	Support for agriculture, forestry, and fishing	-1	0	0	0	0	0	1	1	1
2	Support for energy	-2	0	0	0	0	0	0	1	1
3	Support for holiday and leisure	-1	0	0	0	0	0	0	1	1
4	Support for retail	-1	0	0	0	0	0	0	1	1
5	Support for specified other industry	-1	0	0	0	0	0	0	1	1
6	Support for unspecified industry	-1	0	0	0	0	0	0	1	1
D: Liquidity support for not for profit organisations (NFPs)		**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**
1	Support for arts and culture	0	0	0	0	0	1	0	1	0
2	Support for social care	0	0	0	0	1	1	0	1	0
3	Support for education and research institutions	0	0	0	0	1	1	0	1	0
4	General non-profit support	0	0	0	0	1	1	0	1	0
5	Support for animal services	0	0	0	0	0	1	0	1	0
E: Temporary waiver of interest payments for businesses		**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**
1	Commercial rent interest relief	-1	0	0	0	0	0	0	1	0
2	Automotive interest relief	-1	0	0	0	0	0	0	1	0
3	Utility payment interest relief (i.e. electricity, gas, water)	-1	0	0	0	0	0	0	1	0
4	Microcredit interest relief	-1	0	0	0	0	0	0	1	0
5	Rural investment interest relief	-1	0	0	0	0	0	1	1	0
6	General and other	-1	0	0	0	0	0	0	1	0
Rescue: Temporary life and livelihood measures										

F: Direct provision of basic needs	SE	LE	AP	NC	II	QL	RL	SI	LM
1 Nutrition support	0	0	0	0	0	1	1	1	1
2 Shelter support	0	0	0	0	0	1	1	1	1
3 Social services support	0	0	0	0	0	1	1	1	1
4 Utility access support	0	0	0	0	0	1	1	1	1
5 General and other support	0	0	0	0	0	1	1	1	1
G: Targeted welfare cash transfers	**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**
1 Payments targeted to families	-1	0	0	0	0	1	0	1	1
2 Payments targeted to low income individuals	-1	0	0	0	1	1	0	1	1
3 Payments targeted to individuals (other)	-1	0	0	0	0	1	0	1	1
4 Indirect payments through social programs	-1	0	0	0	0	1	0	1	1
H: Job Continuation Support	**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**
1 Job continuation subsidies	-1	0	0	0	1	1	0	1	1
2 Job continuation incentives	-1	0	0	0	1	1	0	1	1
I: Temporary waiver of interest payments for individuals	**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**
1 Mortgage interest and rental relief	-1	0	0	0	0	0	0	1	0
2 Student debt interest relief	-1	0	0	0	0	0	0	1	0
3 General and other relief	-1	0	0	0	0	0	0	1	0
4 Automotive interest relief	-1	0	0	0	0	0	0	1	0
J: Healthcare services support	**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**
1 General medical equipment/services spending (including PPE)	-1	0	0	0	0	1	1	1	1
2 Mental health support	0	0	0	0	0	1	1	0	0
3 Aged care support	0	0	0	0	0	1	1	0	0
4 General medical personnel support	0	0	0	0	0	1	1	1	0
5 Vaccine and COVID-19 research, manufacturing, and application spending	-1	0	0	0	0	1	1	1	1
K: Emergency services (disaster management) support	**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**
1 Pandemic administrative support	0	0	0	0	0	1	0	0	0
2 Equipment procurement	-1	0	0	0	0	1	0	1	1
3 Infrastructure support (short-term shelters, food-stocking, water supplies)	-1	0	0	0	0	1	0	1	1
Rescue: Temporary life and livelihood measures									
L: Income tax cuts	**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**
1 Reduction in marginal rates (including increases in tax-free thresholds)	-1	0	0	0	0	0	0	0	0
2 Expanded deductions	-1	0	0	0	0	0	0	0	0
3 New tax exemptions	-1	0	0	0	0	0	0	0	0
4 Permitted delays in payment	-1	0	0	0	0	0	0	0	0
M: VAT and other goods and services tax cuts	**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**
1 VAT reductions	-1	0	0	0	0	0	0	0	0
2 VAT deferrals	-1	0	0	0	0	0	0	0	0
3 Non-discretionary payment relief	-1	0	0	0	0	0	0	0	0
4 Reduced taxes for emergency medical imports	-1	0	0	0	0	1	0	0	-1
N: Business tax cuts	**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**

1	Reduction in rates	-1	0	0	0	-1	0	0	1	0
2	Expanded deductions	-1	0	0	0	-1	0	0	1	0
3	New tax exemptions for clean investments	0	1	1	0	-1	0	0	1	1
4	New tax exemptions for general and other investments	-1	0	0	0	-1	0	0	1	1
O: Business tax deferrals		**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**
1	Tax deferrals for dirty industries	-2	0	0	0	0	0	0	1	-1
2	Tax deferrals for other industries	-1	0	0	0	0	0	0	1	-1
P: Reduced prices for centrally controlled products and services		**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**
1	Public service payments	0	0	0	0	0	1	0	1	0
2	Fuel prices (oil and gas)	-2	0	0	0	0	1	0	1	0
3	Utility prices (electricity and water)	0	0	0	0	0	1	0	1	0
Q: Other tax cuts and deferrals		**SE**	**LE**	**AP**	**NC**	**II**	**QL**	**RL**	**SI**	**LM**
1	Other tax cuts and deferrals	-1	0	0	0	0	0	0	1	0

6.1 Recovery: incentive measures

R. Targeted recovery cash transfers

GHG Emissions – The aim of targeted recovery cash transfers is usually to promote spending and therefore a return to business as usual (BAU) practices. Several studies have shown that direct transfers do by and large increase consumption (Parker et al., 2013), (Broda & Parker, 2014). These measures are usually only implemented during a crisis, and intended to bring rapid recovery. Long-term emissions impacts are low compared to immediate impacts. Hence, targeted transfers are generally expected to increase short term GHG emissions (-1) as BAU practices return, but bring little net change (0) to long-term GHG emissions.

Air pollution – There is little evidence to suggest that targeted recovery cash transfers have significant impacts on air pollution, especially as they are not designed to be long term measures. We therefore expect little net change (0) as a result of these policies.

Natural capital - There is little evidence of natural capital effects resulting directly from targeted recovery cash transfers. Therefore, we expect little net change (0) as a result of these policies.

Wealth inequality - There is little evidence of natural capital effects resulting directly from targeted recovery cash transfers, especially when they do not involve income thresholds. Therefore, we expect little net change (0) as a result of these policies.

- Payments that are targeted to low-income individuals (R2) are expected to bring some improvements in wealth inequality. Since these payments are made directly

from public funds, they are a direct redistribution of wealth from those who contribute large amounts through taxation to low-income individuals. We therefore expect an improvement (+1) in wealth inequality as a result of these policies.

Quality of life - As opposed to rescue-type cash transfers, there has been little research to date on exactly how individuals spend recovery-type payments. Given the variation in this category and a lack of evidence, we conservatively estimate that these policies will, overall, have little net impact on quality of life (0), noting that there will be policy level variation that is unable to be captured here.

Rural livelihood – There is little evidence to suggest that rural communities are to be affected by recovery cash transfers to a greater extent than the general population, unless they are specifically targeted there. We therefore expect little net change in rural livelihoods (0) as a result of these policies.

S. Tourism and leisure industry incentives

GHG Emissions – On the whole, whilst there are some GHG effects of the leisure industry, they are small relative to other industries (Dubois & Ceron, 2010). We therefore ascribe little net change (0) as a result of these policies, short-term or long-term.

- Notable exceptions to this are incentives for the tourism industry (S1). These incentives are expected to increase travel, particularly long-distance travel, which is emissions intensive (Peeters & Dubois, 2010). We therefore expect a moderate increase in short-term GHG emissions (-1) resulting from policies in this sub-archetype, but little net change long-term (0) due to the temporary nature of these policies. .

Air pollution – There is little evidence to suggest that there are significant air pollution consequences of air pollution incentives. Therefore, little net change (0) is expected as a result of these policies.

- Incentives for the tourism industry (S1) are expected to have impacts on air pollution through inducing long distance travel, which is pollution intensive (Harrison et al., 2015). We therefore expect air pollution to worsen (-1) as a result of these policies.

Natural capital – There is little evidence to suggest that leisure industry incentive measures have significant impacts on natural capital. We therefore expect little net change (0) as a result of these policies.

- Incentives for the tourism industry (S1) are expected to have negative impacts on natural capital (-1), particularly marine life and coastal environments (Burak et al.,

2004). We note that there are country-level differences that we are unable to capture with this assessment.

Wealth inequality – Whilst in some countries, low income workers may be protected by these incentives, there are others in which the exploitation of workers is rife in the tourism and leisure industry. Given these opposing factors, we expect little net change (0) as a result of these policies, noting that there is significant country-level variation that we are unable to capture with this assessment.

Quality of life – Leisure industry incentives increase access to leisure activities, which have positive effects on quality of life through mental health, wellbeing and social relationships (Brajša-Žganec et al., 2011). Therefore, improvements in quality of life (+1) are expected to result from these policies.

Rural livelihood – There is little evidence to suggest that leisure industry incentives that are not specifically targeted towards rural communities will have significant effects on rural livelihoods beyond what is expected in the general population. We therefore expect little net change (0) to result from these policies. We note that there is significant country-level variation in this archetype, particularly for tourism incentives (S1) which can contribute to poverty reduction in rural areas, but also cause climate related damage to rural areas. We are unfortunately unable to capture this variation in our policy assessment.

T. Electric vehicle incentives

GHG Emissions – At the manufacturing stage, electric vehicle production results in moderate increases in GHG emissions, in some cases even more than conventional vehicles due to battery production (Hawkins et al., 2013). However, in the long term, electric vehicles result in a substantial decrease in GHG emissions, especially when compared to conventional ICE vehicles, and they are a crucial component of the transition towards a clean economy (Buekers et al., 2014). It is important to note that the GHG impacts of electric vehicles over their lifespan depends somewhat on the carbon intensity of electricity generated in the country. These things considered, electric vehicle incentives are likely to cause a moderate increase in short-term GHG emissions (-1) and a high decrease in GHG emissions long-term (+2).

Air pollution – Though electric vehicles are not usually free of air pollution impacts over their lifespan, they produce substantially fewer pollutants than their conventional counterparts, and this is somewhat variable by the electricity generation mix in the country (Ke et al., 2017).

Therefore electric vehicle incentives are expected to cause a net improvement (+1) in air quality.

Natural capital – Though after the manufacturing stage the natural capital impacts of electric vehicles are negligible, there are some significant impacts involved in the manufacturing process, particularly for batteries. There are high environmental costs to the mining of lithium for these batteries, though there is high potential for recycling these and other materials used in EV construction (Van Mierlo et al., 2017). These impacts considered, these policies are expected to have negative natural capital impacts (-1).

Wealth inequality – The impacts of these incentives on wealth inequality depend in large part on how well they are targeted, but it is often the case that, because of the prohibitively high costs of electric vehicles at present, the vast majority of electric vehicle incentives go to very wealthy consumers despite the subsidy (Borenstein & Davis, 2016). Therefore, unless policymakers learn from mistakes of the past, on average, electric vehicle incentives are likely to worsen wealth inequality (-1).

Quality of life – The air pollution benefits of electric vehicle use are likely to result in better health outcomes for individuals in those communities (Kampa & Castanas, 2008). We therefore expect improvements in quality of life (+1) as a result of these policies.

Rural livelihood – Uptake of electric vehicles is much higher in metropolitan areas than in rural areas, due to economic factors as well as lack of charging infrastructure (Chen et al., 2020), (Westin et al., 2018). These policies are therefore unlikely to impact rural populations significantly (0).

U. Electronic appliance and efficiency incentives

GHG Emissions – Electronic appliance incentives definitionally lead to increased manufacturing to produce these appliances, which can result in a moderate increase in GHG emissions through material use (Behrens, 2016). Long term, however, energy efficient electronic appliances are a vital part of the transition away from fossil fuel use and facilitate large reductions in GHG emissions (Ungar & Nadel, 2019). There is mixed evidence surrounding the effectiveness of incentive measures for increasing their consumption, with them being highly effective in some cases (Huh et al., 2019) but less effective in others (Houde & Aldy, 2017). The studies do show some impact on GHG emissions, though they vary on the magnitude. These factors considered, we expect these policies to cause a moderate increase in short term GHG emissions (-1), but a moderate reduction in GHG emissions long term (+1).

Air pollution – There is little evidence of significant air pollution effects that directly result from electronic appliance incentives. Though there are some air pollutants involved in

manufacturing, these are small relative to other manufacturing procedures, therefore we expect little net change (0) as a result of these policies.

Natural capital – There is little evidence to suggest that electronic appliance incentives have significant impacts on natural capital. We therefore expect little net change (0) as a result of these policies.

Wealth inequality – Electronic appliance incentives have not yet been analysed in any depth for their impact on wealth inequality. Whilst one might expect that incentive measures may increase access to goods for low-income individuals, evidence suggests that many takers of these incentives use them to upgrade to higher quality appliances when they were likely to have done so even without the incentive (Houde & Aldy, 2017). Based on this information, we expect that electronic appliance incentives will result in little net change (0) in wealth inequality.

Quality of life – There have been limited studies on the social impacts of electronic appliance incentives. For this lack of evidence, spending on this archetype is assumed to have little net effect (0) on quality of life.

Rural livelihood –There is little evidence to suggest that electronic appliance incentives have benefits for rural communities beyond what is expected in the general population. We therefore expect little net change (0) as a result of these policies.

V. Green market creation

GHG Emissions - Green markets, like most emerging markets, usually take time to become established and for GHG emissions impacts to be observed, so there is little evidence to suggest that there are significant short-term GHG impacts resulting from these policies. Long-term, however, increasing energy market participation for renewables and investing in the transitional technologies are vital components of reducing emissions. We therefore expect little net change short-term (0) as a result of these policies, but large improvements in GHG emissions (+2) long-term.

- For sub-archetype V3 (capacity investments), some degree of construction is usually involved, which is expected to have short-term GHG impacts (Huang et al., 2018). Long-term, however, this sub-archetype does not differ from the rest of this archetype in terms of large GHG emissions reductions. We therefore expect some GHG emissions in the short-term (-1), but large reductions in GHG emission long-term (0).

Air pollution - Though there is significant variation in this category, there is evidence to suggest that a wide range of climate-oriented oriented policies that may fall under this archetype may result in air quality improvements as these are often co-benefits of clean technologies, energy efficiency policies and other clean investments (McCollum et al., 2013). We therefore expect an improvement in air pollution (+1) as a result of these policies.

Natural capital – Since there is wide variation in the kinds of policies included in this category, there is mixed evidence regarding the natural capital effects of the policies. Some examples of policies such as cleaning up orphan wells have clear positive effects for natural capital through the prevention of soil and groundwater contamination among other things (Alboiu & Walker, 2019). Other policies have minimal direct natural capital effects whilst some of the construction-based policies may incur significant natural capital costs (Sabdo et al., 2019). Given these mixed effects, we conclude that overall, these policies are expected to cause little net change (0) to natural capital.

Wealth inequality - There is little evidence suggesting significant wealth inequality impacts resulting from these policies. We therefore expect little net change (0).

Quality of life -There is little evidence suggesting significant quality of life impacts resulting from these policies. We therefore expect little net change (0).

Rural livelihood – There is little evidence to suggest that green market creation has benefits for rural communities beyond what is expected in the general population. We therefore expect little net change (0) as a result of these policies.

W. Other incentive measures

GHG Emissions – There is expected to be broad variation in this archetype, and little academic research exists on general incentive measures in isolation, therefore this assessment is made with consideration of scores given to incentive measures listed in other archetypes. The broad goal of individual incentives is to promote consumption, thereby inducing BAU greenhouse gas emissions. These policies are also intended to be short term measures for the recovery of the economy or of a particular industry, therefore long-term GHG impacts are, on the whole, unlikely. We therefore expect some increase in short term GHG emissions (-1) as BAU practices return, but little net change (0) in long-term GHG emissions.

Air pollution – There is little evidence to suggest that incentive measures have significant impacts on air pollution, unless they are targeted at particularly polluting sectors. We therefore expect little net change (0) as a result of these policies.

Natural capital – As incentive measures are generally consumption based and do not usually involve large-scale manufacturing of construction. There is little evidence to suggest that natural capital is significantly affected by incentive measures generally, unless they are targeted in sectors that do significant harm to natural capital. We therefore expect little net change (0) as a result of these policies.

Wealth inequality - Unless they are specifically targeted, there is little evidence to suggest that inventive measures in general have significant impacts on wealth inequality. We therefore expect little net change (0) as a result of these policies.

Quality of life - Unless they are specifically targeted to a quality of life increasing sector, there is little evidence to suggest that inventive measures in general have significant impacts on quality of life. We therefore expect little net change (0) as a result of these policies.

Rural livelihood – There is little evidence to suggest that incentive measures that are not specifically targeted at rural communities have significant impacts on rural livelihoods. We therefore expect little net change (0) as a result of these policies.

6.2 Recovery: investment measures

X. Worker retraining and job creation

GHG Emissions - Short-term, whie training programs are ongoing, there is little evidence that this archetype will induce significant GHG impacts. Long term, there is naturally variation in GHG impacts dependent on the industry for which individuals are being trained. In general, ascertaining the employment that workers will ultimately secure as a result of the training is many steps removed from the training itself and it is difficult to attribute GHG emissions of the employing industries to the original worker retraining programs. We therefore expect little net change in both short-term and long-term GHG emissions (0) as a result of these policies.

- For sub-archetype X1 (green worker retraining and job creation), it is well documented that in order for emissions to be reduced in accordance with current targets, there will need to be a significant shift in worker skills to meet the needs of a decarbonized economy (Pearce & Stilwell, 2008), (Bird & Lawton, 2009). These policies are essential for facilitating that transition, and we therefore expect significant improvements in GHG emissions long-term (+2) as a result of these policies.

Air pollution - There is little evidence to suggest that general worker retraining and job creation policies are likely to have first-order impacts on air pollution. In general, we expect little net change (0) as a result of these policies. We recognise that there is some variation by industry that we are unable to capture with this assessment.

- For sub-archetype X1 (green worker retraining and job creation), the air pollution co-benefits of green industries (McCollum et al., 2013) mean that workers impacted by these policies will likely facilitate reductions in air pollution. We therefore expect an improvement in air pollution (+1) as a result of these policies.

Natural capital – There is little evidence to suggest that worker retraining, and job creation have significant first order effects on natural capital. Even for programs relating to green jobs that could potentially have natural capital impacts in some form, there are few direct, first-order natural capital impacts resulting from the worker retraining and job creation itself. We therefore expect little net change (0) as a result of these policies.

Wealth inequality - There is evidence to suggest that when workers are displaced, income losses are significant and persistent (Jacobson et al., 1993), which naturally contribute to increased wealth inequality. Since these policies are designed to reduce the effects of worker displacement, it follows that they will likely improve wealth inequality (+1) relative to no policy intervention.

Quality of life - Though specific jobs are not included in quality of life measures broadly, worker retraining programs aim to reduce structural barriers to economic opportunities, and have been shown to be successful in doing so (Cavaco et al., 2013). This constitutes an improvement in quality of life through increased opportunity, and we therefore expect increases in quality of life (+1) as a result of these policies.

Rural livelihood – There is little evidence to suggest that worker retraining and job creation policies are likely to have disproportionately large impacts on rural livelihoods relative to the rest of the population, unless the policies directly target rural communities. We therefore expect little net change (0) as a result of these policies.

Y. Education investment (non-infrastructure)

GHG Emissions – Whilst reducing greenhouse gas emissions has been a focus for some educational institutions in some countries, they produce a relatively small fraction of all greenhouse gas emissions (Sinha et al., 2010). Whilst higher rates of educational attainment have been shown to very slightly increase GHG emissions through faster economic growth, it has also been shown to substantially reduce the vulnerability of a population to climate change impacts (O'Neill et al., 2020). These things considered, there is likely little net change (0) in short term and long term GHG emissions resulting from these policies.

Air pollution – There have been few significant links found between the education sector and air pollution, thus there is little net change (0) expected as a result of these policies.

Natural capital – Whilst there may be some long-term natural capital benefits resulting from higher education attainment and therefore ecological literacy (Howell, 1992) this effect is likely small, far removed non-targeted educational investment, and significantly variable by country and education system. Therefore, little net change (0) is likely to result from these policies in general.

Wealth inequality – Education has been shown to have significant positive impacts on wealth inequality through increasing capacity of children, even from lower income backgrounds, to attain higher paying jobs (Abdullah et al., 2015). We therefore expect these policies to result in improvements in wealth inequality (+1).

Quality of life – Better educational outcomes improve quality of life through a number of means, including through the creation of social structures and, most significantly, though increasing access to economic resources in the long term (Ross & Van Willigen, 1997).We therefore expect these policies to result in increased quality of life (+1).

Rural livelihood – There exists significant disparities in educational access between rural and non-rural communities (Byun et al., 2012), and education has been shown to be a vital component of combating rural poverty (Schafft, 2016). We therefore expect these policies to result in improvements in rural livelihoods (+1).

Z. Healthcare investment (non-infrastructure)

GHG Emissions – With the notable exception of the US, the healthcare system in most countries is not a large contributor to overall GHG emissions (Sherman et al., 2019), especially in comparison to sectors such as energy, transport and construction. This effect also differs significantly by country, so on average there is little net change (0) from policies in this area. A significant proportion of GHG impacts in the healthcare sector arise from infrastructure, which is not covered under this archetype.

Air pollution – There is mixed evidence regarding the air pollution impacts of healthcare investment. Whilst there are some air pollution effects resulting from healthcare capital and practices (Sherman et al., 2019), Several national and sub-national healthcare providers have introduced sustainability units to consider the environmental impacts of new and existing service provision (NHS England, 2018). However, these programs are relatively nascent and impact so far unclear. Given these competing effects, we expect that overall, these policies will likely result in little net change in air pollution (0), recognising that there may be country level discrepancies that we are unable to capture here.

Natural capital – Whilst animal testing is used widely in drug tersting and development, there are international efforts to reduce this as much as possible (Akkermans et al., 2020). This is

also expected to make up a relatively small proportion of healthcare investment spending. There are few other significant connections between the healthcare industry and natural capital impacts, so little net change (0) is likely to result from these policies overall.

Wealth inequality – There are significant disparities in access to healthcare between individuals with differing wealth statuses (Lynch et al., 1998). Increasing access to healthcare is a key step in improving wealth inequality through lifting the disease burden on low income communities, and thereby improving educational and employment outcomes (Suhrcke & de Paz Nieves, 2011). We therefore expect these policies to result in improvements in wealth inequality (+1).

Quality of life – Health is one of the direct measures of quality of life, and it also impacts a number of other measures including life expectancy, access to economic opportunities and education (Preedy & Watson, 2009). Therefore healthcare investment is expected to improve (+1) quality of life.

Rural livelihood – Rural communities are less likely to have access to good quality health care in comparison to urban communities (Merwin et al., 2006), thus they are likely to face a higher marginal benefit from healthcare investment. Therefore healthcare investment is expected to improve (+1) rural livelihoods.

α. Social and cultural investment (non-infrastructure)

GHG Emissions – There is little evidence to suggest that social and cultural initiatives, in general, have any significant impact on greenhouse house emissions. We therefore expect little net change (0) as a result of these policies.

Air pollution - There is little evidence to suggest that social and cultural initiatives, in general, have any significant impact on air pollution. We therefore expect little net change (0) as a result of these policies.

Natural capital - There is little evidence to suggest that social and cultural initiatives, in general, have any significant impact on natural capital. We therefore expect little net change (0) as a result of these policies.

Wealth inequality – Whilst low income people are likely to benefit significantly from investment in social and cultural programs, as is captured in the quality of life measure (Gilmore, 2014), there is little evidence to suggest that there will be and direct impacts on wealth inequality. We therefore expect little net change (0) as a result of these policies.

Quality of life – There is vast evidence to suggest that increased access to social and cultural programs can significantly improve quality of life through increasing social connection and improving mental health outcomes, among other things (Gilmore, 2014). We therefore expect increases in quality of life resulting from these policies (+1).

Rural livelihood – Though increased access to social and cultural programs is beneficial for rural livelihoods and development (Duxbury & Campbell, 2011), it is unlikely that policies in this category will have an outsized impact on rural communities as they are not specifically targeted there. We expect these policies to have little impact (0) on average that is specific to rural communities.

β. Communications infrastructure investment

GHG Emissions – In general, manufacturing and construction work are high-emitting sectors, so policies that require higher production from these sectors will likely cause significant increases in GHG emissions in the short term (-2). Long term, however, there are mixed effects. The use of the internet and other communications infrastructure contributes somewhat to GHG emissions through electricity inputs for power and cooling (Gombiner, 2011). Most communications electricity requirements are high and most global electricity is generated through the burning of fossil fuels (Ritchie, 2019). However these investments may also facilitate remote working practices, which may reduce emissions via decreased travel necessity (IEA, 2020). Due to the wide variability and uncertainty of these impacts, we have elected to score these policies as causing little net change (0) in GHG emissions.

Air pollution – As with any manufacturing or construction process, there are likely to be a negative impact on air pollution resulting from materials and energy use. We therefore expect worsened air pollution (-1) as a result of these policies.

- In the case of sub-archetypes β3 (civil cybersecurity programs) and β4 (implementation of digital programs), there is little evidence significant air pollution effects as they primarily software measures. We therefore expect little net change in air pollution (0) as a result of these two sub-archetypes.

Natural capital – There are expected to be some natural capital impacts resulting from the expansion of communications infrastructure (Maeng & Nedovic-Budic, 2004), as well as impacts from hazardous materials use and often improper recycling (Williams, 2011). However, technological improvements and general investment in communications provide vital tools for facilitating the protection of natural capital. Considering these opposing natural capital impacts, we expect that, in general, policies under this archetype are likely to result in little net change (0) in natural capital. We recognise that there is variation at the policy level that is unable to be captured using this assessment method.

Wealth inequality – Digital connectivity has been shown to have mixed effects on income inequality, depending on surrounding economic, political and technological factors (Bauer, 2018). We therefore, on average, expect little change (0) resulting from these policies.

Quality of life – Increasing access to digital technologies, broadband and other communication infrastructure has been shown to increase quality of life via the facilitation of social connection, ease of access to services and educational opportunities, among other things (Van Deursen & Helsper, 2018).There are valid concerns for the role of digital access in diminishing mental health and engendering lower physical health standards, however these impacts can be partially addressed through productive social initiatives and education, and are deemed to be minor in comparison to the benefits of the tech. We therefore expect an overall increase in quality of life (+1) as a result of these policies.

Rural livelihood – There exists a significant disparity between connectivity and access to broadband and digital technologies between rural and non-rural communities. Rural communities benefit substantially from these policies as they help avoid problems of unequal access to information, services and social opportunities among other things (Townsend et al., 2013). We therefore expect that these policies will likely have a positive impact (+1) on rural livelihood.

γ. Traditional transport infrastructure investment

GHG Emissions – In the short term, traditional transport infrastructure projects are carbon intensive in construction due to materials and energy use (Huang et al., 2018). Long term GHG emission from these projects is also expected to be very large, as traditional transport is responsible for a large fraction of global emissions (Solaymani, 2019). Therefore, traditional transport infrastructure investment is expected to result in a significant increase in GHG emissions (-2) both short and long-term.

Air pollution – The air pollution effects of transportation methods that involve the combustion of fossil fuels have been well documented. A large body of evidence shows that this kind of transport causes large amounts of air pollution including nitrogen oxides and sulfur oxides (Lozhkina & Lozhkin, 2016). We therefore expect air pollution to worsen (-1) as a result of these policies.

Natural capital – There is evidence to suggest that traditional transport infrastructure has a negative impact on natural capital through the extensive land use required for many of these projects (Moretti et al., 2018). It is therefore expected that these policies will negatively impact natural capital (-1).

Wealth inequality – There is little evidence to suggest that traditional transport infrastructure has significant impacts in wealth inequality. We therefore expect little net change (0) as a result of these policies.

Quality of life - There is mixed evidence regarding the effects of traditional transport infrastructure on quality of life. Whilst expanded transportation networks may help with issues associated with congestion (Vickrey, 1969) and increase access to goods and services for isolated communities, there are also large health consequences associated with traditional transport and it's resultant air pollution (Smith et al., 2013). Considering these competing effects, we conclude that, in general, these policies are likely to result in little net change (0) to quality of life.

Rural livelihood – Rural communities are physically isolated from essential goods and services that may not exist in their location, therefore increased access to transportation disproportionately benefits rural communities (Arcury et al., 2005). It is therefore expected that these policies will improve rural livelihoods (+1).

δ. Clean transport infrastructure investment

GHG Emissions - In the short term, clean transport infrastructure projects are carbon intensive in construction due to materials and energy use (Huang et al., 2018). Long term, however, clean transport infrastructure is a vital part of reducing GHG emissions directly disincentivizes the use of ICE vehicles and other traditional transport (Dominković, 2018). It is therefore expected that clean transport investment results in significant short term increases in GHG (-2), but large improvements in GHG emissions long-term (+2).

Air pollution – Though there are some limited air pollution effects of the construction phase of these projects, they ultimately facilitate the transition away from traditional transportation methods which cause significant air pollution (Lozhkina & Lozhkin, 2016). We therefore expect the policies, in general, to result in an improvement in air pollution (+1). We note, however, this is dependent to some degree on the electricity generation mix in the country (Buekers et al., 2014). Unfortunately, we are unable to capture this effect with this archetype assessment.

Natural capital – Clean transport infrastructure is usually smaller in scale than traditional transport projects and do not in themselves involve additional land use. There is little evidence to suggest that these policies will have significant natural capital impacts. We therefore expect little net change (0) as a result of these policies.

- New public transport systems or line expansions (δ1) are larger scale infrastructure projects that could be expected to involve negative natural capital impacts through

land use. We therefore expect policies in this sub-archetype to have a negative impact on natural capital (-1).

Wealth inequality – Though many clean transport options such as public transport and cycling are low cost relative to other transport methods and therefore theoretically more likely to benefit low-income individuals, there is little evidence to suggest that this translates to tangible wealth inequality effects. We therefore expect little net change in wealth inequality (0) as a result of these policies.

Quality of life – There is evidence to suggest that clean transport infrastructure has positive impacts on quality of life, most significantly through the mitigation of health consequences related to traditional transport infrastructure (Smith et al., 2013), (Kampa & Castanas, 2008), for which it is a direct substitution. Other quality of life benefits derive from general increased mobility. We therefore expect quality of life to improve (+1) as a result of these policies.

Rural livelihood – Rural livelihood – Rural communities are physically isolated from essential goods and services that may not exist in their location, therefore increased access to transportation disproportionately benefits rural communities (Arcury et al., 2005). It is therefore expected that these policies will improve rural livelihoods (+1).

ε. Traditional energy infrastructure investment

GHG Emissions – As with almost all construction projects, traditional energy infrastructure projects are expected to have negative GHG impacts in the short term, mainly deriving from material use (Behrens, 2016). As these policies directly perpetuate fossil fuel production and consumption, they are likely to cause large increases in GHG emission long term. Therefore, these policies are expected to result in significant increases in GHG emissions (-2) both short term and long term.

Air pollution – The fossil fuels involved in traditional energy in traditional energy infrastructure are also sources of a number of air pollutants, including sulfur dioxide (Shindell & Smith, 2019). We therefore expect these policies to worsen (-1) air pollution.

Natural capital – Traditional energy projects, especially those involved with the extraction of fossil fuels, can have significant negative impacts on natural capital. Their effects can include but are not limited to soil erosion, vegetation destruction, aquatic ecosystem disturbance and toxic pollution (Lin et al., 2005), (Meng, 2017). Therefore these policies are expected to have a negative impact (-1) on natural capital.

Wealth inequality – There is little evidence to suggest that there are significant first order impacts on wealth inequality resulting from traditional energy infrastructure investment. We therefore expect little net change (0) to result from these policies.

Quality of life] – There is evidence to suggest that the perpetuation of fossil fuel use through traditional energy infrastructure investment may cause reductions in quality of life. Workers in that industry are susceptible to poor health outcomes as a result of the work (Castranova V & Vallyathan V, 2000), and health is often impacted in surrounding communities as a result of airborne particulate matter (Hendryx et al., 2020). Therefore, these policies are expected to have a negative impact (-1) on quality of life.

Rural livelihood – Traditional energy projects are often sited in rural areas and despite some short term financial gains (Mishra, 2009), rural communities face a number of negative consequences from these policies, including negative health impacts These policies are therefore expected to generate negative impacts (-1) for rural livelihoods.

η. Clean energy infrastructure investment

GHG Emissions – As with almost all construction projects, clean energy infrastructure projects are expected to have negative GHG impacts in the short term, mainly deriving from material use (Behrens, 2016). Long term, however, clean energy projects facilitate the transition away from fossil fuel and therefore significantly improve GHG emissions (Shafiei & Salim, 2014). Therefore, these policies are expected to result in a significant increase in GHG emissions short term (-2), but a significant decrease long term (+2).

Air pollution – Since clean energy is a direct substitute for fossil fuels based energy, which itself produces significant air pollution (Shindell & Smith, 2019), we expect a decrease in air pollution (+1) to result from these policies.

Natural capital – Clean energy infrastructure programs, whilst they may have some natural capital impacts in their own right, they offset the need for continued fossil fuel use, thereby mitigating further negative natural capital effects that result from traditional energy (Lin et al., 2005), (Meng, 2017). As a result of these mixed impacts, we expect, on average, little net change (0) as a result of these policies.

- In the case of nuclear energy investment (η2), there is ongoing debate around the environmental benefits and downsides. However, with present technology, the risk of serious negative environmental impacts resulting from nuclear waste and from accidents remains non-negligible (Prăvălie & Bandoc, 2018). Therefore, nuclear energy investment is expected to, on average, harm natural capital (-1).

Wealth inequality – There is mixed evidence surrounding the impact of renewable energy on wealth inequality. Whilst some studies have found that renewable energy adoption reduces income inequality (Topcu & Tugcu, 2020), others have found that the shift towards clean energy may exacerbate energy inequality and therefore exacerbate income inequality (McGee & Greiner, 2019). As a result of this mixed evidence, we expect, on average, little net change (0) as a result of these policies.

Quality of life – There is significant evidence that renewable energy projects improve quality of life, ranging from high-quality job creation, improved health outcomes resulting from air quality improvements, and a range of positive impacts resulting from the mitigation of climate change (CCSI et al., 2019), (Kampa & Castanas, 2008). Quality of life improvements may also come from improved energy security, accessibility, and affordability, depending on the context. Therefore, quality of life is expected to improve (+1) as a result of these policies.

Rural livelihood – There are mixed impacts of clean energy infrastructure in rural communities. Rural areas are often chosen as locations for renewable energy projects (Lombard & Ferreira, 2015), and impacts range from land use changes which may not be beneficial to rural communities, to increased availability of high-quality jobs in those areas (Bergmann et al., 2008), (Poggi et al., 2018). We therefore expect, on average, little net change (0) as a result of these policies.

θ. Local (project-based) infrastructure investment

GHG Emissions – In the short term, these, like almost all construction projects, are expected to cause significant increases in GHG emissions involved in various stages of the construction process (Nässén et al., 2007). However, there is little evidence of significant GHG effects of local infrastructure investment. Therefore, we expect significant increases in short-term GHG emissions (-2) and little net change long-term (0).

- Clean housing investments (θ3) are generally expected to be similar to general housing investments in terms of short-term GHG emissions due to the construction process (-2), but in the long-term, these buildings are expected to be more energy efficient than other homes and often use clean energy through rooftop solar or other means. Therefore, it is expected that these investments will reduce GHG emissions in the long-term (+1).

Air pollution – Though a small amount of pollution may result in the short term, it is low relative to large-scale infrastructure projects and is likely to terminate once construction ends. We therefore expect, in general, little net change (0) as a result of these policies.

Natural capital – There is little evidence to suggest that there are significant natural capital effects resulting from local infrastructure investment, in large part because these projects are

usually relatively small in size. Therefore, we expect little net change (0) as a result of these policies.

Wealth inequality – There is little evidence to suggest that isolated local infrastructure investments have significant effects on wealth inequality. Therefore, little net change (0) is expected as a result of these policies.

- Housing investments (both general (θ2) and clean (θ3)) increase access to stable, high quality housing for a population and often focuses on affordable housing for low-income individuals. Housing instability has been shown to be a significant barrier to employment opportunities and therefore a barrier to economic mobility (Mavromaras et al., 2011). It is therefore expected that these policies will improve wealth inequality (+1).

Quality of life – Local infrastructure investments have been shown to have a positive impact on quality of life, for a number or reasons that are largely specific to the project. Some examples include building local hospitals and schools, which increase access to good healthcare and educational opportunities, both of which are direct factors in quality of life (Preedy & Watson, 2009), (Ross & Van Willigen, 1997). Housing projects, particularly affordable housing projects increase access to safe and stable housing, which also improves quality of life (Baumstarck et al., 2015). Therefore, an increase in quality of life (0) is expected from these measures.

Rural livelihood – There is little evidence to suggest that these local infrastructure investments will have an outsized effect on rural communities if they are not specifically targeted there. Therefore, in general, little net change (0) is expected as a result of these policies.

λ. Building upgrades and energy efficiency infrastructure investment

GHG Emissions – In the short term, these programs involve construction and manufacturing, which have been shown to cause significant GHG emissions through materials and energy use (Behrens, 2016). Long term, however, energy efficiency improvements associated with building upgrades are expected to result in large decreases in GHG emissions (Ungar & Nadel, 2019). We therefore expect these policies to cause a large increase in GHG emissions short-term (-2), and a large decrease in emissions long-term (+2).

- For other building upgrades and support (λ3), these policies are not explicitly related to clean energy or energy efficiency. There is little evidence to suggest that these policies will cause significant changes in long-term GHG emissions. Therefore, they are expected to result in little net change (0) in long-term GHG emissions.

Air pollution – Though a small amount of pollution may result from building upgrades in the short-term, it is low relative to large-scale infrastructure projects and is likely to terminate once the upgrade is complete. There is little evidence to suggest significant air pollution impacts from building upgrades. We therefore expect, in general, little net change (0) as a result of these policies.

Natural capital – There is little evidence to suggest that building upgrades have significant effects on natural capital, as building upgrades are unlikely to involve any additional land use. Therefore, little net change (0) is expected as a result of these policies.

Wealth inequality – Building upgrades and energy efficiency upgrades are designed to reduce the amount of energy used. Lower income households spend, on average, a much higher proportion of their income on energy (Ofgem, 2018). The decrease in energy expenditures associated with these policies are likely to disproportionately benefit lower income households, therefore we expect an improvement in wealth inequality (+1) as a result of these policies.

Quality of life – Though some portions of the population may see quality of life benefits from these policies, there is little evidence to suggest that overall quality of life will be significantly altered by building upgrades and energy efficiency infrastructure investment, aside from their indirect aiding in the transition away from fossil fuels. We therefore expect little net change (0) as a result of these policies in terms of first order effects.

Rural livelihood – There is little evidence to suggest that building upgrades have an outsized impact on rural livelihood unless they are specifically targeted towards rural communities. We therefore expect little net change (0) as a result of these policies.

μ. Natural infrastructure and green spaces investment

GHG Emissions – Though there may be some negative GHG impacts resulting from short term construction efforts in some of these policies, for the vast majority, there is evidence that the expansion of green spaces results in decreased emissions both short-term and long-term (Pan et al., 2011). We therefore expect moderate improvements in GHG emissions (+1) both short term and long term.

- For sub-archetypes μ2 (tree planting and biodiversity protection) and μ3 (Ecological conservation initiatives), we expect very large long-term GHG benefits as they likely have a higher potential for carbon sequestration than waterways and public parks. We therefore expect large positive GHG impacts long-term (+2) as a result of these sub-archetypes.
- For sub-archetype μ5 (agricultural uplift), any recovery-type agricultural policies not accounted for by other subarchetypes are included. Whilst some agricultural recovery

policies may reduce GHG emissions through better land use among other mechanisms (Paustian et. al., 1997), others have been shown to increase emissions (Balsalobre-Lorente et. al., 2019). Without greater visibility on policy specificities we therefore expect little net change (0) as a result of this policy group.

Air pollution – Green spaces and natural infrastructure have been shown to improve air pollution, as porous greenery can assist with the removal of pollutants (Abhijith et al., 2017), (Brack, 2002). We therefore expect an improvement in air pollution as a result of these policies (+1).

- The air pollution impacts of agriculture practices ($\mu 5$) are heterogeneous among regions and it is therefore not possible to assign a score that is appropriate for all policies that may fall under this sub-archetype. Given the heterogeneity, we expect that on average, agricultural uplift policies will have little net impact on air pollution (0).

Natural capital – By their nature, these projects are designed to improve and protect natural capital, and they have been shown to be effective in this in the past (Chenoweth et al., 2018). Therefore, these policies are expected to have a positive impact on natural capital (+1).

- For sub-archetype $\mu 5$ (agricultural uplift), though some agricultural practices can improve natural capital if implemented sustainably, many current practices can cause significant soil degradation and other environmental issues (Kopittke et. al., 2019). Due to this variation, we expect agricultural uplift policies to have little net impact on natural capital (0).

Wealth inequality – There is little evidence that natural infrastructure and green space investment have significant first-order impacts on wealth inequality. Therefore, little net change (0) is expected as a result of these policies.

Quality of life – There is evidence to suggest that improvements in the natural environment and increased access to green spaces result in improvements in health outcomes and general wellbeing (Stigsdotter et al., 2010), (Mensah et al., 2016). Therefore, these policies are expected to result in an improvement (+1) in quality of life.

Rural livelihood– There is little evidence that natural infrastructure projects that are not directly targeted at rural communities will have significant impacts on that demographic beyond what is expected for the general population. We therefore expect little net change (0) as a result of these policies.

- For sub-archetypes $\mu 5$ (agricultural uplift), these policies are directed towards benefitting rural communities, therefore they are expected to improve rural livelihoods (+1).

π. Other large-scale infrastructure investments

GHG Emissions – As with the vast majority of construction projects in the short term, there are significant GHG emissions involved at many stages in the construction process (Arıoğlu Akan et al., 2017), (Cass & Mukherjee, 2011). Long term, however, there is little evidence to suggest GHG emissions are significantly impacted by these policies. Therefore, we expect a large increase in GHG emissions short term (-2) and little net change long-term (0).

- Large-scale space infrastructure (π3) may have GHG long term GHG emissions consequences resulting from the use of fuels, though this is small relative to other GHG sources (Larson et al., 2017). We therefore expect some increase in long-term GHG emissions as a result of these policies long term (-1).

Air pollution – Especially with reference to building materials, large-scale infrastructure projects usually result in significant amounts of air pollution (Gong & Zhang, 2004). Therefore air pollution is likely to worsen (-1) as a result of these policies.

Natural capital – Large scale infrastructure projects have been shown to negatively impact ecosystems and natural capital, through land clearing among other mechanisms (Sabdo et al., 2019). We therefore expect negative natural capital impacts (-1) resulting from these policies.

Wealth inequality – There is little evidence that, in general, large-scale infrastructure projects have significant first order impacts on wealth inequality. Therefore, little net change (0) is expected from these policies.

Quality of life – There is broad variation in the kind of policies that are included in this archetype. However, in general, there is little evidence that large scale infrastructure projects have significant first-order impacts on quality of life. We therefore expect little net change (0) as a result of these policies.

Rural livelihood – Though some large-scale infrastructure projects may negatively affect rural communities though poor siting choices and other factors, these policies usually take place outside of rural areas. We therefore expect little net change (0) as a result of these policies.

σ. Armed forces investment

GHG Emissions – Investment in the armed forces is likely to cause significant increases in GHG emissions, both short term and long term. Short term impacts will result from the construction of new military equipment, whilst long term effects result from continued hydrocarbon use as fuel (Belcher et al., 2019). We therefore expect large increases in GHG emissions (-2) both short-term and long-term as a result of these policies.

- In the case of administration funding (σ2), These effects are likely to be smaller (-1) in the short term for administrative investments, but long-term this sub-archetype still directly facilitates a carbon-intensive industry, thus the long-term score of -2 remains.

Air pollution – It is likely that armed forces investment will have a negative impact (-1) on air pollution, especially through construction and use of vehicles and aircraft, in addition to other military operations (Hamilton, 2016).

Natural capital – Land use by the armed forces is significant and can have large negative consequences for natural capital. In particular, military land use has been shown to decrease biodiversity and has sizable impacts on ecosystem structures (Lawrence et al., 2015). We therefore expect negative natural capital consequences (-1) as a result of these policies.

Wealth inequality – There is a significant body of evidence suggesting that spending on armed forces and the military has negative impacts for income inequality. The reasons for this include differences in pay between civilian and military work, gender inequality in the military compounding existing gender-based pay disparities, and increasing capital intensity (Abell, 1994), (Kentor et al., 2012), (Biscione & Caruso, 2019). We therefore expect income inequality to worsen (-1) as a result of these policies.

Quality of life – Conflicting evidence exists surrounding the net quality of life impact of armed forces investment. Though in some cases, armed forces spending is important for the safety of a population, the reverse is often true, with increased spending resulting in instability, as well as diversion of funds from other vital programs (Archer, 2013). Since this is an area of contentious debate, and because impacts vary hugely by country, we have elected to list this score as 0.

Rural livelihood – There is little evidence to suggest that there are significant impacts on rural livelihood resulting from armed forces investment. Though in some countries, individuals from rural communities are more likely to join the armed forces, this is not the case across the board. We therefore expect little net change (0) as a result of these policies, noting that there is country-level variation that we are unable to capture with this assessment.

τ. Disaster preparedness and capacity building investment

GHG Emissions – Manufacturing in general accounts for approximately one fifth of global greenhouse gas emissions (World Bank, 2014), therefore we would expect a moderate increase in short-term GHG emissions as disaster capacity is built. However, there are few disaster preparedness initiatives that have ongoing GHG effects beyond the manufacturing stage. Therefore, these policies are expected to result in a moderate increase in short-term GHG emissions (-1), but little net long-term impact (0).

Air pollution – There is little evidence of significant air pollution effects resulting from these policies (0). Though manufacturing is involved, it is often at a smaller scale than most other manufacturing projects, and few of the goods required for disaster preparedness are particularly air pollution-intensive to produce.

Natural capital – There is little evidence of significant natural capital impact resulting from these policies (0). However, in the case of disaster mitigation and preparedness related to floods, fires and earthquakes ($\tau 3$), projects often enhance natural capital as a protective measure, though others may involve the destruction of natural environments to protect urban centers (Heikkila & Huang, 2014). We therefore maintain our assessment of little net change (0) for this sub-archetype, since changes may be either positive or negative.

Wealth inequality – It has been well documented that disasters exacerbate wealth inequality, as low-income communities are less likely to have the resources to manage the effects of a disaster and are more likely to live in disaster-prone areas. This has been shown to be the case for both natural disasters (Howell & Elliott, 2019) and epidemics, including the present COVID-19 pandemic (Elgar et al., 2020). Therefore, policies designed to mitigate and manage disasters are expected to improve wealth inequality (+1).

Quality of life – Disasters, by their very nature, have devastating impacts on quality of life as they are happening, through displacing people from their homes, affecting their health and access to basic needs. There is evidence of significant negative quality of life impacts that continue well after the disaster has passed (Barile et al., 2020), (Papanikolaou et al., 2012). Therefore, policies designed to mitigate and manage disasters are expected to improve quality of life (+1).

Rural livelihood – Rural communities are often more vulnerable to natural disasters and epidemics than urban communities, as they usually have less access to healthcare and other services that make recovery possible. Furthermore, their income streams are heavily reliant on natural capital and are therefore extremely vulnerable in the case of natural disasters (Jerolleman, 2020). Therefore, policies designed to mitigate and manage disasters are expected to improve rural livelihood (+1).

φ. General research and development investment

GHG Emissions - Research projects, in general, have little short-term impact on GHG emissions as they do not usually involve large scale manufacturing or other emitting activities. However, even research projects that are not explicitly ‘clean’ often aim to reduce costs in existing processes and therefore result in some energy efficiency improvements

through innovation (Arnold, 2012). Therefore, we expect little net change in short-term GHG (0), but moderate improvements long-term (+1).

Air pollution - There is little evidence to suggest that research and development, in general, has any significant impact on air pollution. We therefore expect little net change (0) as a result of these policies.

Natural capital – There is little evidence of significant natural capital effects that are direct results of these policies. We therefore expect little net change (0) as a result of these policies.

Wealth inequality – There is evidence to suggest that wealth inequality is, in general, exacerbated by R&D. This is likely the result of changes in the distribution of labour income versus capital income, in addition to high income households being more likely to consume R&D intensive products (Kim et al., 2013). Other studies have found that a cause of this exacerbation is the inherently asymmetric nature of the resultant economic growth (Awaworyi Churchill et al., 2020). We therefore expect wealth inequality to worsen (-1) on average as a result of these policies. We recognise that there is policy and country level variation that we are not able to capture with this assessment. We also note in supplement that there are approaches for directing R&D benefits towards lower-income individuals.

Quality of life – Since the output of most R&D is improvements in healthcare, science and digital technologies which improve productivity, we find that, in general, R&D investments result in a direct improvement in quality of life (+1).

Rural livelihood – There is little evidence to suggest that there are significant impacts on rural livelihood resulting directly from R&D that is not specifically targeted at rural communities. We therefore expect little net change (0) as a result of these policies.

ψ. Clean research and development investment

GHG Emissions – Research projects, in general, have little short-term impact on GHG emissions as they do not usually involve large scale manufacturing or other emitting activities. By their nature, clean research and development projects are designed to assist in reducing GHG emissions long term, and this has been shown to be effective (Lee & Min, 2015). Therefore, we expect little net change in short-term GHG (0), but large improvements long-term (+2).

Air pollution – Though their aim is often to reduce GHG emission, clean R&D projects frequently have the side effect of reducing other air pollutants, including those that result from

fossil fuel combustion (Perera Frederica P., 2017). Therefore, these policies are expected to improve air pollution (+1).

Natural capital - There is little evidence of significant natural capital effects that are direct results of these policies. We therefore expect little net change (0) as a result of these policies.

- Agricultural R&D ($\psi 2$) is expected to have generally positive effects on natural capital, often by increasing the productivity of land and thereby minimizing land area required for agricultural operations. We therefore expect an improvement in natural capital (+1) resulting from these policies.

Wealth inequality – Though clean R&D policies can be expected to have many of the same effects as general R&D projects, assessed as worsening wealth inequality above, there are additional factors at play. Since there is vast evidence to suggest that low-income communities are likely to be disproportionately impacted by the effects of climate change (Islam & Winkel, 2017), it follows that R&D designed to mitigate the effects of climate change will result in improvements in wealth inequality. Therefore, with these two competing impacts considered, we expect little net change (0) as a result of these policies in general.

Quality of life – Clean R&D is intended to assist with mitigating the impacts of global climate change. Since climate change is expected to have a damaging effect on quality of life in a number of areas including food security (Wheeler & Braun, 2013), cultural experiences (Adger et al., 2013), forced migration and conflict (Reuveny, 2007) among others. We therefore expect that clean R&D policies will improve quality of life (+1) as a result of their impacts on climate change.

Rural livelihood – There is little evidence to suggest that there are significant impacts on rural livelihood resulting directly from R&D that is not specifically targeted at rural communities. We therefore expect little net change (0) as a result of these policies.

- Agricultural R&D ($\psi 2$), however, are expected to result in improvements in rural livelihood, since they are targeted specifically at that community and help to stabilise their production and income. We therefore expect improvements in rural livelihood resulting from these policies (+1).

6.3 Rescue: Temporary liquidity measures

A. Liquidity support for subnational public entities

GHG Emissions – We note that there is wide variation in industries and practices that may ultimately be supported by spending in this category, and it is therefore difficult to assign

GHG emissions scores. However, in general, considering broad impacts across industries, policies in this archetype are expected to increase consumption relative to before the policy was implemented and this general consumer behaviour is expected to cause a moderate increase in short-term GHG emissions (Dubois et al., 2019). These policies are temporary, however, and there is little evidence to suggest that they will have significant GHG emissions impacts long-term, compared to a state without intervention. We therefore expect a moderate increase in GHG emissions short term (-1), but little net change long-term (0).

Air pollution – There is little evidence of significant air pollution effects resulting from these policies, especially given that they are temporary measures. We therefore expect little net change (0) as a result of these policies.

Natural capital - There is little evidence of significant natural capital effects resulting from these policies, especially given that they are temporary measures and non-infrastructural. We therefore expect little net change (0) as a result of these policies.

Wealth inequality – There is little evidence of significant wealth inequality impacts resulting from these policies, unless states and localities choose to target these funds towards low income individuals. Broadly speaking, this has not been the case. We therefore expect, in general, little net change (0) in wealth inequality as a result of these policies.

Quality of life – We note that there is wide variation in policies under this category. However, examples thus far have suggested that funds issued under these policies are usually conditional on providing urgent life and livelihood support for individuals, businesses and essential services located within the state or locality. We therefore expect increases in quality of life (+1) relative to before the policy was implemented.

Rural livelihood – There is little evidence to suggest that liquidity support for subnational public entities has significant impacts on rural communities beyond what is expected for the general population, unless the policies are specifically targeted to those communities. We therefore expect little net change (0) as a result of these policies.

B. Liquidity support for large businesses

GHG Emissions – Though there is wide variation in the policies under this archetype, it is expected that they will, in general, result in an increase in material use, manufacturing and a general increase in consumption, relative to a scenario in which there was no intervention. In the no intervention scenario, businesses would face significant risk of insolvency or operational down-scaling. Increased material use, manufacturing and consumption have broadly been shown to increase GHG emissions short-term (Behrens, 2016), (World Bank,

2014), (Dubois et al., 2019). We therefore expect, in general, a moderate increase (-1) in short term GHG emissions as a result of these policies.

- For support for airlines, other transport and energy (B3, B4, B5 and B6), we expect even greater increases in GHG emissions relative to a scenario in which these policies were not implemented (i.e. where airlines would become insolvent), as these are both emissions-intensive sectors (IEA, 2020). We therefore expect large short-term GHG increases (-2) as a result of these policies.

For long term GHG impacts, there is significant variation by sub-archetype, based on green conditionality and industry:

- For liquidity support that is not green-conditional (B1, B3, B7, B9, B11, B13), we expect little net change in long-term GHG effects, as support for individual companies is unlikely to alter business as usual emissions without intervention due to competitive market dynamics. In other words, if these corporations were not kept solvent, they would disappear in time, but the demand that they previously satisfied would continue and other corporations would rise to take their place. We therefore expect little net change (0) in long term GHG emissions as a result of these policies.
    - An important exception to this is non-green conditional liquidity support for the energy industry (B5). Energy is an emissions intensive sector and it is expected that many traditional energy assets will become stranded under business as usual conditions with no intervention (IRENA, 2017). We therefore expect liquidity support for these businesses to result in increased long-term GHG emissions for an economy (-1).
- For liquidity support that is green conditional (B2, B4, B6, B8, B10, B12), we expect improvements in GHG emissions long term, as large corporations are unlikely to have implemented the green changes without the intervention. We therefore expect some decrease in long-term GHG emissions (+1) as a result of these policies.

Air pollution - There is little evidence of significant air pollution effects resulting from these policies, especially given that they are temporary measures. We therefore expect little net change (0) as a result of these policies.

Natural capital - There is little evidence of significant natural capital effects resulting from these policies, especially given that they are temporary measures and non-infrastructural. Even though sub-archetypes B1 and B2 (support for agriculture, forestry and fishing) are natural capital-intensive industries, the temporary nature of these measures mean that they are unlikely to result in capacity increases that would significantly affect natural capital. We therefore expect little net change (0) as a result of these policies.

Wealth inequality – Though there is evidence to suggest a strong link between the proportion of a population that is employed through large corporations and the severity of economic inequality within that country (Davis & Cobb, 2010), policies within this sub-archetype are not

expected to expand the capacity of large corporations, rather allowing them to maintain the functioning and employees that were already present at the company. We therefore expect little net change (0) in wealth inequality as a direct result of these policies.

Quality of life - There is little evidence of significant quality of life effects resulting from these policies, especially given that they are temporary measures. We therefore expect little net long-term change (0) as a result of these policies.

Rural livelihood – There is little evidence to suggest that liquidity support for large businesses has significant impacts on rural communities beyond what is expected for the general population, unless the policies are specifically targeted to those communities. We therefore expect little net change (0) as a result of these policies.

- In the case of support for agriculture, forestry and fishing (B1 and B2), these policies are usually specifically targeted towards rural communities and are therefore expected to provide first-order benefits to rural livelihoods. We therefore expect an improvement (+1) in rural livelihoods as a result of these policies.

C. Liquidity support for startups and SMEs

GHG Emissions – Though there is wide variation in the policies under this archetype, it is expected that they will, in general, result in an increase in material use, manufacturing and a general increase in consumption, relative to before the policy was implemented. These factors have broadly been shown to increase GHG emissions short-term (Behrens, 2016), (World Bank, 2014), (Dubois et al., 2019). We therefore expect, in general, a moderate increase (-1) in short term GHG emissions as a result of these policies.

- For support for energy (C2), we expect significant increases in GHG emissions relative to before these policies were implemented, as these are both emissions-intensive sectors (IEA, 2020). We therefore expect large short-term GHG increases (-2) as a result of these policies.

There is little evidence to suggest that liquidity support for startups and SMEs will have significant long-term GHG impacts. Due to competitive market dynamics long term, we expect that liquidity support for individual companies, especially smaller companies, will have little long-term effect compared to BAU practices without intervention. We therefore expect little net change (0) as a result of these policies.

- We note that for archetype B (liquidity support for large corporations), non-green conditional support for large energy companies was assessed as -1 for long term GHG emissions. For energy SMEs and startups (sub-archetype C1), we assume that because most of these operations are much smaller, their long term GHG impacts are unlikely to be comparable in magnitude to the long term GHG impacts of larger

energy companies. It is likely that in many cases smaller energy corporations skew towards clean energy operations (including for distributed energy resources, and emerging clean energy technologies). Hence, on balance, we maintain a score of 0 (little net change) for C1.

Air pollution - There is little evidence of significant air pollution effects resulting from these policies, especially given that they are temporary measures. We therefore expect little net change (0) as a result of these policies.

Natural capital - There is little evidence of significant natural capital effects resulting from these policies, especially given that they are temporary measures and non-infrastructural. We therefore expect little net change (0) as a result of these policies.

Wealth inequality - There is little evidence of significant wealth inequality effects resulting from these policies, especially given that they are temporary measures. We therefore expect little net change (0) as a result of these policies.

Quality of life - There is little evidence of significant quality of life effects resulting from these policies, especially given that they are temporary measures. We therefore expect little net change (0) as a result of these policies.

Rural livelihood – There is little evidence to suggest that liquidity support for start-ups and SMEs has significant impacts on rural communities beyond what is expected for the general population, unless the policies are specifically targeted to those communities. We therefore expect little net change (0) as a result of these policies.

- In the case of support for agriculture, forestry and fishing (C1), these policies are usually specifically targeted towards rural communities and are therefore expected to provide first-order benefits to rural livelihoods. We therefore expect an improvement (+1) in rural livelihoods as a result of these policies.

D. Liquidity support for not for profit organisations (NFPs)

GHG Emissions - As NFPs rarely utilise large-scale manufacturing efforts or other materials-heavy endeavours, they do not rank among the emissions-intensive sectors (IEA, 2020), and there is little evidence to suggest that they have significant GHG impacts over any time horizon. We therefore expect little net change in GHG emissions (0) both short-term and long-term as a result of these policies.

Air pollution - There is little evidence of significant air pollution effects resulting from these policies, as nonprofits are not among the emissions-intensive sectors (IEA, 2020). We therefore expect little net change (0) as a result of these policies.

Natural capital - There is little evidence of significant natural capital effects resulting from these policies, especially given that they are temporary measures and non-infrastructural. We therefore expect little net change (0) as a result of these policies.

Wealth inequality - The work of nonprofits is usually aimed at low-income or otherwise marginalised communities, directly helping to increase their access to economic opportunities and reducing overall wealth inequality. The education programs covered under D3 are also expected to positively impact wealth inequality by increasing the likelihood that those from disadvantaged backgrounds are able to access higher paying jobs (Abdullah et al., 2015). We therefore expect improvements in wealth inequality (+1) as a result of these policies.

- For sub-archetypes D1 (support for arts and culture) and D5 (support for animal services), there is little evidence to suggest that these policies have significant impacts on wealth inequality. We therefore expect little net change (0) as a result of these policies.

Quality of life - Policies under this archetype have been shown to improve quality of life through a number of mechanisms, some more direct than others. Educational institutions have been shown to increase quality of life by removing barriers to economic opportunities and fostering social relations (Ross & Van Willigen, 1997), and other non-profits are responsible for the direct provision of life-sustaining services. Arts and culture have also been shown to improve quality of life (Michalos, 2005). We therefore expect increases in quality of life (+1) as a result of policies in this archetype.

Rural livelihood – Though rural communities are likely to benefit from the support of not for profit organisations, there is little evidence to suggest that they will benefit to a higher degree than the general population, unless they are targeted specifically at rural communities. We therefore expect little net change in rural livelihoods (0) as a result of these policies.

E. Temporary waiver of interest payments for businesses

GHG Emissions - In general, these waivers allow businesses to direct the resources that they would have otherwise used for these payments towards other business practices. These may result in an increase in material use, manufacturing and ultimately increased consumption of end products by individuals, relative to before the policy was implemented. These factors have broadly been shown to increase GHG emissions short-term (Behrens, 2016), (World Bank, 2014), (Dubois et al., 2019). However, there is little evidence that long term GHG impacts will result from these measures, especially due to their temporary nature. We therefore expect some increases in GHG emissions short-term (-1), but little net change in long-term GHG emissions (0).

Air pollution - There is little evidence of significant air pollution effects resulting from these policies, especially given that they are temporary measures. We therefore expect little net change (0) as a result of these policies.

Natural capital - There is little evidence of significant natural capital effects resulting from these policies, especially given that they are temporary measures and non-infrastructural. We therefore expect little net change (0) as a result of these policies.

Wealth inequality - There is little evidence of significant natural capital effects resulting from these policies, especially given that they are temporary measures and non-infrastructural. We therefore expect little net change (0) as a result of these policies.

Quality of life - There is little evidence of significant quality of life impacts resulting from these policies. We therefore expect little net change (0) in quality of life.

Rural livelihood – Though rural communities are likely to benefit from temporary waivers of interest payments, there is little evidence to suggest that they will benefit to a higher degree than the general population, unless the policies are targeted specifically at rural communities. We therefore expect little net change in rural livelihoods (0) as a direct result of these policies.

- Sub-archetype E5 (rural investment interest relief) is directly targeted towards rural communities and is expected to help keep businesses there afloat. We therefore expect improvements in rural livelihoods (+1) as a result of these policies.

6.4 Rescue: Temporary life and livelihood measures

F. Direct provision of basic needs

GHG Emissions - There is little evidence of significant GHG effects resulting from direct provision of basic needs, as policies are usually relatively small and fund manufacturing or goods supply that would have occurred anyway and may have otherwise been wasted (e.g. food supply). Though there may be some manufacturing-related emissions involved here, they are not likely to be comparable in scale to other emissions-intensive industries. Therefore, we expect little net change (0) as a result of these policies, both short-term and long-term.

Air pollution - There is little evidence of air pollution effects resulting directly from the direct provision of basic needs. Therefore, we expect little net change (0) as a result of these policies.

Natural capital - There is little evidence of natural capital effects resulting directly from the direct provision of basic needs. Therefore, we expect little net change (0) as a result of these policies.

Wealth inequality – Though policies in this archetype are largely directed towards low-income individuals, they are emergency policies designed to compensate for the extreme hardships faced by these groups during a crisis. The measures are very temporary, and there is little evidence to suggest that they will have tangible impacts on wealth inequality. We therefore expect little net change (0) as a result of these policies.

Quality of life – Policies under this archetype are designed to ensure that populations have access to basic needs such as housing, nutrition, social services and utilities. These things are direct contributors to quality of life, and there is evidence to suggest that they also have large impacts on subjective well-being (Baumstarck et al., 2015), (Wong et al., 2015). We therefore expect and increase in quality of life (+1) as a result of these measures.

Rural livelihood – Rural communities are more likely to lack access to essential goods and services including nutrition (Smith & Morton, 2009) and social services (Edwards et al., 2009) among others. It follows that the direct provision of these goods and services is likely to disproportionately benefit rural communities who are most in need of access. Therefore, these policies are expected to have a positive effect (+1) on rural livelihoods.

G. Targeted welfare cash transfers

GHG Emissions – Policies in this archetype are direct transfers of money to individuals, designed to protect both support their direct urgent needs, and to support the businesses at which these individuals spend the payments. As such, we expect that in the short-term, these policies will result in an increase in consumer behaviour relative to before the policy was implemented. In general, consumer patterns of spending do result in some increases in GHG emissions (Dubois et al., 2019). Long-term, however, there is little evidence to suggest that these policies have significant impacts on emissions, especially given their temporary nature (unless one morbidly assumes that those who are not supported will be unable to provide for themselves or their family and perish - we exclude such scenarios from our GHG analysis). We therefore expect a moderate increase in short-term GHG emissions (-1), but little net change in long-term emissions (0) as a result of these policies.

Air pollution - There is little evidence of significant air pollution effects resulting directly from targeted welfare cash transfers, especially given the short-term nature of these cash injections. Therefore, we expect little net change (0) as a result of these policies.

Natural capital - There is little evidence of significant natural capital effects resulting directly from targeted welfare cash transfers, especially as they are unlikely to induce infrastructural development. Therefore, we expect little net change (0) as a result of these policies.

Wealth inequality – In general, there is little evidence that direct welfare cash transfers have significant impacts on long term wealth inequality. We therefore expect little net change (0) as a result of these policies.

- Payments that are targeted to low-income individuals (G2) can be expected to result in some improvements in wealth inequality. Since these payments are made directly from public funds, they are a direct redistribution of wealth between those who contribute large amounts to those public funds through taxation to low-income individuals (Esping-Andersen & Myles, 2011). We therefore expect an improvement (+1) in wealth inequality as a result of these policies.

Quality of life – Payments made through these programs are intended to help individuals access basic needs that they may have had difficulty accessing due to the crisis, including food, rent payments and healthcare payments. These are direct indicators of quality of life, therefore we expect these policies to have a positive impact on quality of life (+1) relative to no policy being put into place.

Rural livelihood – Though rural communities are likely to benefit from targeted welfare cash transfers, there is little evidence to suggest that they will benefit to a higher degree than the general population, unless they are targeted specifically at rural communities. We therefore expect little net change in rural livelihoods (0) as a result of these policies.

H. Job Continuation Support

GHG Emissions - In assisting companies to keep individuals employed when they may not have otherwise been able to, these policies increase the amount of disposable income of those who would otherwise have lost their jobs. This is naturally expected to result in increased consumer activity by those individuals relative to no policy intervention. Increased general consumerism increases GHG emissions (Dubois et al., 2019). However, there is little evidence to suggest that these policies have long-term impacts on GHG emissions (unless one makes assumptions of increased morbidity - we exclude such scenarios from our GHG analysis). We therefore expect some increases in short-term GHG emissions (-1), but little net change long-term (0).

Air pollution - There is little evidence of significant air pollution effects resulting directly from job continuation support. Therefore, we expect little net change (0) as a result of these policies.

Natural capital - There is little evidence of natural capital effects resulting directly from job continuation support. Therefore, we expect little net change (0) as a result of these policies.

Wealth inequality - Job continuation measures are likely to disproportionately benefit low-income individuals, since that group has faced some of the most severe job losses throughout the current crisis (OECD, 2020). We therefore expect the policies to have a positive impact on wealth inequality (+1) relative to no intervention.

Quality of life - Aside from job loss compromising the ability of an individual to provide for their basic needs, job loss has also been shown to have significant negative mental health impacts (Tsutsumi et al., 2001). We therefore expect quality of life to improve (+1) relative to no intervention and thereby more extensive job loss.

Rural livelihood – Though rural communities are likely to benefit from the support of not for profit organisations, there is little evidence to suggest that they will benefit to a higher degree than the general population, unless they are targeted specifically at rural communities. We therefore expect little net change in rural livelihoods (0) as a result of these policies.

I. Temporary waiver of interest payments for individuals

GHG Emissions - In terms of GHG impacts, these policies are expected to function similarly to welfare cash transfers to individuals, in that they are intended to increase the disposable income of the individual, thereby precipitating an increase in consumer behaviour. In general, consumer patterns of spending do result in some increases in GHG emissions (Dubois et al., 2019). Long-term, however, there is little evidence to suggest that these policies have significant impacts on emissions, especially given their temporary nature. We therefore expect a moderate increase in short-term GHG emissions (-1), but little net change in long-term emissions (0) as a result of these policies

Air pollution - There is little evidence of significant air pollution effects resulting directly from temporary waivers of interest payments for individuals, especially given the short-term nature of these policies. Therefore, we expect little net change (0) as a result of these policies.

Natural capital - There is little evidence of significant natural capital effects resulting directly from temporary waivers of interest payments for individuals, especially given the short-term and non-infrastructural nature of these policies. Therefore, we expect little net change (0) as a result of these policies.

Wealth inequality - In general, there is little evidence that temporary waivers of interest payments for individuals have significant impacts on long-term wealth inequality, especially if they are temporary and not targeted to low-income communities. We therefore expect little net change (0) as a result of these policies.

Quality of life - There is little evidence to suggest that temporary waivers of interest payments for individuals result in significant quality of life impacts, especially given their temporary nature. We therefore expect little net change (0) as a result of these policies.

Rural livelihood – Though rural communities are likely to benefit from temporary waivers of interest payments, there is little evidence to suggest that they will benefit to a higher degree than the general population, unless the policies are targeted specifically at rural communities. We therefore expect little net change in rural livelihoods (0) as a direct result of these policies.

J. Healthcare services support

GHG Emissions – The majority of the policies in this archetype are designed to rapidly scale up healthcare capacity to manage the COVID-19 pandemic. As such, rapid increases in manufacturing of medical goods were involved, which caused short-term GHG increases (Belkhir & Elmeligi, 2019). These policies are largely temporary, and there is little to suggest that they have significant long-term GHG impacts. We therefore expect moderate increases in GHG emissions in the short term (-1) and little net change long-term (0).

- Measures categorized as mental health support (J2), aged care support (J3), and general medical personnel support (J4) are either largely digital as a result of physical distancing requirements or otherwise involve little manufacturing. There is little evidence to suggest meaningful negative GHG impacts of this sub-archetype at any stage of its implementation, therefore we expect little net change (0) in short term GHG emissions from this sub-archetype.

Air pollution – There is little evidence of significant air pollution effects resulting directly from healthcare services support. Therefore, we expect little net change (0) as a result of these policies.

Natural capital - There is little evidence of significant natural capital effects resulting directly from healthcare services support. Therefore, we expect little net change (0) as a result of these policies.

Wealth inequality - There is little evidence of significant wealth inequality effects resulting directly from healthcare services support. Therefore, we expect little net change (0) as a result of these policies.

Quality of life - Health is one of the direct measures of quality of life, and it also impacts a number of other measures including life expectancy, access to economic opportunities and

education (Preedy & Watson, 2009). Therefore healthcare services support policies are very likely to improve (+1) quality of life.

Rural livelihood – Rural communities are less likely to have access to good quality health care in comparison to urban communities (Merwin et al., 2006), thus they are likely to face a higher marginal benefit from healthcare investment. We therefore expect an improvement in rural livelihoods (+1) as a result of these policies.

K. Emergency services (disaster management) support

GHG Emissions – Emergency services support is vital, but in the short term, does often involve manufacturing to ensure that the resources for crisis management are available. This manufacturing is likely to result in a short-term increase in GHG emissions, as a result of energy and materials used in the process (Behrens, 2016). Long-term however, there is little evidence to suggest significant GHG impacts. We therefore expect a moderate increase in emissions short-term (-1), but little net change long-term (0).

- Sub-archetype K1 (Pandemic administrative support) is not likely to involve the manufacturing, and therefore short-term GHG impacts, that may be seen in the other sub-archetypes. We therefore expect little net change (0) for both short and long-term GHG impacts for sub-archetype K1.

Air pollution - There is little evidence of significant air pollution effects resulting directly from emergency services support. Therefore, we expect little net change (0) as a result of these policies.

Natural capital - Air pollution - There is little evidence of significant natural capital effects resulting directly from emergency services support, especially because they are non-infrastructural in nature. Therefore, we expect little net change (0) as a result of these policies.

Wealth inequality -There is little evidence of significant wealth distribution effects resulting directly from emergency services support. Therefore, we expect little net change (0) as a result of these policies.

Quality of life - Since the current economic crisis is still underway, little research has been done thus far regarding the exact impacts of some of these measures on quality of life. However, the intention of these policies is ultimately preservation of life, and therefore are very likely to result in improvements in quality of life (+1) in comparison to no policy intervention.

Rural livelihood – Though rural communities are likely to benefit from emergency services support, there is little evidence to suggest that they will benefit to a higher degree than the general population, unless the policies are targeted specifically at rural communities. We therefore expect little net change in rural livelihoods (0) as a direct result of these policies.

6.5 Rescue: Temporary tax and payment relief measures

L. Income tax cuts

GHG Emissions - Policies in this archetype increase the disposable income of individuals. They are designed to protect both support their direct urgent needs, and to support the businesses at which these individuals spend this income. As such, we expect that in the short-term, these policies will result in an increase in consumer behaviour relative to before the policy was implemented. In general, consumer patterns of spending do result in some increases in GHG emissions (Dubois et al., 2019). Long-term, however, there is little evidence to suggest that these policies have significant impacts on emissions, especially given their temporary nature. We therefore expect a moderate increase in short-term GHG emissions (-1), but little net change in long-term emissions (0) as a result of these policies.

Air pollution – There is little evidence that income tax cuts have significant first order effects on air pollution. Therefore, we expect little net change (0) as a result of these policies.

Natural capital – There is little evidence of natural capital effects resulting directly from income tax cuts. Therefore, we expect little net change (0) as a result of these policies.

Wealth inequality - Though income taxes are progressive on the whole (Wagstaff & van Doorslaer, 2001), the specific wealth inequality impacts of income tax cuts are highly dependent on the specifics of the cuts in terms of which income brackets are affected, of what kind of deductions are expanded. Given the wide variation in this category, and also the temporary nature of this policy, we expect that, on average, these policies are likely to have little net impact (0) on wealth inequality, though we note that there is policy-level variation that is unable to be captured here.

Quality of life – It is difficult to measure quality of life changes resulting from general income tax cuts because there is wide variation in how policies are targeted. Given the wide variation in this category, and also the temporary nature of this policy, we expect that, on average, these policies are likely to have little net impact (0) on quality of life, though we note that there is policy-level variation that is unable to be captured here.

Rural livelihood – Though there is some evidence that income tax cuts can have positive effects for agricultural households, there is little evidence that these effects surpass those experienced by the general population. Therefore, little net change in rural livelihoods (0) is expected as a direct result of these policies.

M. VAT and other goods and services tax cuts

GHG Emissions - There is evidence to suggest that reductions in VAT result in increased demand for consumer goods (Blundell, 2009). In general, consumer patterns of spending are expected to result in some increases in GHG emissions short-term (Dubois et al., 2019), however studies have shown that temporary VAT changes are unlikely to increase demand long-term (Barrell & Weale, 2009), so long-term GHG impacts may not be significant. We therefore expect a moderate increase in GHG emission short-term (-1), but little net change in long-term emissions (0).

Air pollution - Given the temporary nature of these policies and the resulting increase in demand, it is not expected that they will have significant air pollution impacts. We expect little net change (0) as a result of these policies.

Natural capital - There is little evidence of natural capital effects resulting directly from VAT and other goods and services tax cuts. Therefore, we expect little net change (0) as a result of these policies.

Wealth inequality - VATs tend to be regressive taxes on the scale of annual income, but somewhat progressive when lifetime income is considered (Decoster et al., 2010). This variation, in conjunction with these policies being temporary, suggests that we can reasonably expect little permanent impact (0) on wealth inequality.

Quality of life - There is little evidence to suggest that, in general, changes in VAT and other goods and services tax cuts have significant direct impacts on quality of life. We therefore expect little net change (0) as a result of these policies.

- For sub-archetype M4 (reduced taxes for emergency medical imports), we expect to see direct increases in quality of life as a result of these policies, as they assist countries to meet the urgent medical needs of their populations. Health is one of the direct measures of quality of life, and it also impacts a number of other measures including life expectancy, access to economic opportunities and education (Preedy & Watson, 2009), We therefore expect quality of life to increase (+1) as a result of these policies.

Rural livelihood – Though rural communities are likely to benefit from VAT and other goods and services tax cuts, there is little evidence to suggest that they will benefit to a higher degree than the general population, unless the policies are targeted specifically at rural goods/services. We therefore expect little net change in rural livelihoods (0) as a direct result of these policies.

N. Business tax cuts

GHG Emissions - In general, these tax cuts allow businesses to direct the resources that they would have otherwise used for these payments towards other business practices. These may result in an increase in material use, manufacturing and ultimately increased consumption of end products by individuals, relative to before the policy was implemented. These factors have broadly been shown to increase GHG emissions short-term (Behrens, 2016), (World Bank, 2014), (Dubois et al., 2019). However, there is little evidence that long term GHG impacts will result from these measures, especially due to their temporary nature. We therefore expect some increases in GHG emissions short-term (-1), but little net change in long-term GHG emissions (0).

- For sub-archetype N3 (new tax exemptions for clean investments), we expect a different emissions profile due to the green nature of the policy. Whilst few GHG impacts are expected short term, in the long-term the new clean investments that are likely to result from these policies are expected to have positive impacts on GHG emissions. We therefore expect little net change in short-term GHG emissions (0), but a reduction in emissions long-term (1).

Air pollution - There is little evidence of significant air pollution effects resulting from these policies, unless the taxes cut related specifically to taxes on pollutants. We therefore expect little net change (0) as a result of these policies.

- For sub-archetype N3 (new tax exemptions for clean investments), air pollution improvements are expected, as these are often a co-benefit of clean technologies, energy efficiency policies and other clean investments (McCollum et al., 2013). We therefore expect an improvement in air pollution (+1) as a result of these policies.

Natural capital - There is little evidence of significant natural capital effects resulting from these policies, especially given their non-infrastructural nature. We therefore expect little net change (0) as a result of these policies.

Wealth inequality – There is evidence to suggest that business tax cuts have negative impacts on wealth inequality. Though most earners may benefit from the tax cuts, higher income earners benefit disproportionately (Nallareddy et al., 2018). We therefore expect wealth inequality to worsen (-1) under these policies.

Quality of life - There is little evidence of significant first order quality of life effects resulting from these policies, especially given that they are temporary measures. We therefore expect little net change (0) as a result of these policies.

Rural livelihood – There is little evidence to suggest that business tax cuts, in general, have significant impacts on rural communities if they are not specifically targeted there. We therefore expect little net change (0) as a result of these policies.

O. Business tax deferrals

GHG Emissions - In general, these tax deferrals allow businesses to direct the resources that they would have otherwise used for these payments towards other business practices. These may result in an increase in material use, manufacturing and ultimately increased consumption of end products by individuals, relative to before the policy was implemented. These factors have broadly been shown to increase GHG emissions short-term (Behrens, 2016), (World Bank, 2014), (Dubois et al., 2019). However, there is little evidence that long term GHG impacts will result from these measures, especially due to their temporary nature. We therefore expect some increases in GHG emissions short-term (-1), but little net change in long-term GHG emissions (0).

- For sub-archetype O1 (tax deferrals for dirty industries), we naturally expect increases in short-term GHG emissions to be larger in magnitude than they would be for other industries, as these have particularly high emissions intensities. Long-term impacts, however, are still expected to be minimal due to the temporary nature of the policies. We therefore expect large increases in GHG emissions short-term (-2), but little net change in long-term GHG emissions (0) for policies on sub-artchetype O1.

Air pollution - There is little evidence of significant air pollution effects resulting from these policies, unless the taxes related specifically to taxes on pollutants. We therefore expect little net change (0) as a result of these policies.

Natural capital – There is little evidence of significant natural capital effects resulting from these policies, especially given their non-infrastructural and temporary nature. We therefore expect little net change (0) as a result of these policies.

Wealth inequality - There is little evidence to suggest that business tax deferrals have significant impacts on wealth inequality, especially due to the temporary nature of these policies. We therefore expect little net change in wealth inequality (0) as a result of these policies.

Quality of life - There is little evidence of significant first order quality of life effects resulting from these policies, especially given that they are temporary measures. We therefore expect little net change (0) as a result of these policies.

Rural livelihood – There is little evidence to suggest that business tax deferrals, in general, have significant impacts on rural communities if they are not specifically targeted there. We therefore expect little net change (0) as a result of these policies.

P. Reduced prices for centrally controlled products and services

GHG Emissions - There is little evidence of significant GHG effects resulting directly from reduced prices for centrally controlled products, short-term or long-term, especially given the temporary nature of the changes. Therefore, we expect little net change (0) as a result of these policies, both short-term and long-term. We note that there is likely variation at the country level within this archetype that unfortunately we are not able to capture with our assessment.

- The sub-archetype relating to fuel prices including oil and gas (P2) is expected to have different short-term effects to the other sub-archetypes. Though variation is expected on a country-by-country basis, the reduction of prices of these items should increase their consumption, and since they are fossil fuels, this is expected to increase GHG emissions short term. Long-term though, these measures are still temporary and therefore expected to have a minimal effect. We therefore expect a significant increase in short-term GHG emissions (-2), but little net change long term (0) for sub-archetype P2.

Air pollution - There is little evidence of significant air pollution effects resulting directly from reduced prices for centrally controlled products, especially given the short-term nature of these policies. Therefore, we expect little net change (0) as a result of these policies.

Natural capital - There is little evidence of significant natural capital effects resulting directly from reduced prices for centrally controlled products, especially given the short-term and non-infrastructural nature of these policies. Therefore, we expect little net change (0) as a result of these policies.

Wealth inequality – Whilst lower income houses are disproportionately burdened by the costs associated with essential utilities and services (Kontokosta et al., 2020), due to the temporary nature of these measures, it is unlikely that they will have long term effects on wealth inequality. We therefore expect little net change (0) as a result of these policies.

Quality of life – Though these policies also impact corporations, they may have significant impacts on individual lives too. They aim to make essential goods such as energy and water more accessible. Evidence has shown that lack of access to these goods has damaging consequences for quality of life (Thomson et al., 2017). We therefore expect improvements in quality of life (+1) as a direct result of these policies.

Rural livelihood – Though rural communities are likely to benefit from reduced prices for centrally controlled products, there is little evidence to suggest that they will benefit to a higher degree than the general population, unless the policies are targeted specifically at rural communities. We therefore expect little net change in rural livelihoods (0) as a direct result of these policies

Q. Other tax cuts and deferrals

We note that this is a particularly broad category, and assessment differences may exist at the policy level that we are unfortunately unable to capture with this archetype-based assessment model.

GHG Emissions – Though there is wide variation in the policies that might be covered in this category, we can reasonably assume that the final output they ultimately allow for increased materials use, manufacturing or consumption relative to no policy intervention. These factors have short-term GHG impacts (Behrens, 2016), (World Bank, 2014), (Dubois et al., 2019), though due to the temporary nature of these policies, there is little evidence of significant long-term GHG impacts. We therefore expect some increases in GHG emissions short-term (-1), but little net change long-term (0).

Air pollution - There is little evidence to suggest that tax cuts and deferrals without specific targeting have significant impacts on air pollution. We therefore expect little net change (0) as a result of these policies.

Natural capital - There is little evidence of natural capital effects resulting directly from tax cuts and deferrals. Therefore, we expect little net change (0) as a result of these policies.

Wealth inequality - There is little evidence to suggest that tax cuts and deferrals without specific targeting have significant impacts on wealth inequality. We therefore expect little net change (0) as a result of these policies.

Quality of life – There is little evidence to suggest that tax cuts and deferrals without specific targeting have significant impacts on quality of life. We therefore expect little net change (0) as a result of these policies.

Rural livelihood – There is little evidence to suggest that tax cuts and deferrals, in general, have significant impacts on rural communities if they are not specifically targeted there. We therefore expect little net change (0) as a result of these policies.

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Appendix A: Definitions of policy archetypes and sub-archetypes

Fiscal policy archetypes and sub-archetypes function to categorise fiscal interventions. The Oxford archetype list intends to be collectively exhaustive, such that any fiscal policy intervention can be categorised into an archetype family. Naturally, given variation in policy approach across geographies, a small subset of fiscal interventions could reasonably be placed within multiple archetype families. In this instance, we suggest that policies are allocated to the most specific relevant archetype.

Table A.1: List of Oxford University fiscal intervention archetypes. Archetype names in bold. Sub-archetype names preceded by shaded circular bullets. Examples are for illustrative purposes only and are guided by policies from the ToRFS. These are in italics and preceded by hollow circular bullets. Archetype typologies (a, b, c) are denoted by sections.

Recovery: Incentive Measures	
R.	**Targeted recovery cash transfers**
	Recovery-type direct cash transfers to individuals to promote spending and restore consumer demand. Does not include cash transfers designed to meet basic needs due to COVID-19. ● R1. Payments targeted to families ● R2. Payments targeted to low income individuals ● R3. Payments targeted to individuals (other) ● R4. Indirect payments through social programs
S.	**Tourism and leisure industry incentives**
	Government subsidies for consumers of leisure activities and measures to promote leisure participation. ● S1. Incentives for tourism ○ *Reduced fees on public transport routes that directly serve tourist activities* ● S2. Incentives for hospitality services ○ *50% off all meals from Monday to Wednesday* ○ *Discounts for individuals using hotels* ● S3. Incentives for arts and cultural activities ○ *Discounts for going to the theatre*

	● S4. Measures to promote leisure participation ○ *Tourism marketing support* ○ *Arts and culture sector support*
T.	**Electric vehicle incentives**
	Support for electric vehicle production and consumption, including schemes like Cash-for-Clunkers, aimed at replacing the vehicle fleet with electric vehicles. ● T1. EV transfer programs ○ *Fleet exchange program for new EVs* ● T2. EV subsidies ○ *Electric and hybrid car purchase subsidy*
U.	**Electronic appliance incentives**
	Incentives for individuals to purchase appliances, specifically with energy efficiency conditions, through transfer schemes or subsidies. ● U1. Electronic appliance specific 'cash for clunkers' programs ● U2. Electronic appliance subsidies ○ *Energy-efficient home appliances partial refunds*
V.	**Green market creation**
	Investments promoting the creation of green markets and promoting participation in green markets. For instance investments that prompt the integration of more renewable energy generation into electricity markets, or investments which catalyse new green transitional industries. ● V1. Increased clean energy market participation ○ *Cutting the renewable energy levy on electricity bills* ○ *Allow major energy users to be rewarded for scaling down demand during peak periods* ● V2. Modernisation and transition investments ○ *Establishment of an Emissions Reduction Fund, supporting workers and reducing emissions in the oil and gas sector, with a specific focus on methane* ○ *Promoting more efficient aircraft fleets* ○ *Promoting modernisation of shipping, including traffic innovation and support for renewing government vessels* ○ *Funding to clean up orphan and inactive oil and gas wells* ○ *Support for auto industry transformation* ● V3. Capacity investments ○ *Building an industrial cluster for green tech*

	○ *Promoting low-carbon manufacturing such as by building an energy efficient testing platform in smart industrial complexes* ○ *Support for regional innovation clusters*
W.	**Other incentive measures**
	Incentive measures that are not covered by archetype R, S, T, U or V. ● W1. Other incentive measures
Recovery: Investment Measures	
X.	**Worker retraining and job creation**
	Measures designed to train and retrain workers for new and growing industries. ● X1. Green worker retraining and job creation ○ *Investing in green jobs for long term unemployed* ○ *Retraining for green transition* ● X2. General and other worker retraining and job creation ○ *Investing in training workers in innovative industries* ○ *Retraining fund for general reskilling* ○ *Subsidising jobs for young people*
Y.	**Education investment (non-infrastructure)**
	Injections to fund improved teacher training, in-classroom and digital materials, and other education capital for pre-primary, primary, and secondary; increased support for tertiary sectors in high-productivity sectors. Includes scholarship funding. ● Y1. Education capital and equipment ○ *Funding for placement of teachers and teaching assistants* ○ *ICT and equipment funding* ● Y2. Scholarship funding ○ *Creation of new arts scholarships* ● Y3. Staff funding ○ *Increased non-research university staff* ○ *Increased school administration staff* ○ *Funding for new teachers* ○ *Funding for new research posts* ○ *Support to nurses and carers in education*
Z.	**Healthcare investment (non-infrastructure)**

	Non-emergency, non-infrastructural investments in the healthcare system, including mental health, aged care and technological upgrades. ● Z1. General medical investment ● Z2. Mental health investment ● Z3. Aged care investment ● Z4. Healthcare capital investment ○ *Purchase of IT systems*
α.	**Social and cultural investment (non-infrastructure)**
	Non-emergency, non-infrastructural investments in social and cultural sectors including non-profits. ● α1. Support for arts and culture sector ○ *Establishing a new institute of music* ● α2. Support for social care ● α3. General and other non-profit investment
β.	**Communications infrastructure investment**
	Policies designed to expand existing communication infrastructure or create new infrastructure, including provisions for remote learning and broadband. Soft infrastructure including digital programs and cybersecurity are also included. ● β1. Broadband investment ○ *Simplify fibre broadband expansion* ○ *5G infrastructure acceleration with focus on remaining white spots* ● β2. Remote working infrastructure investment ○ *Production of equipment to ensure telework modality* ○ *Buying new computers to improve connectivity in education* ● β3. Civil cybersecurity programmes ○ *Cybersecurity implementation funding* ● β4. Implementation of digital programmes ○ *AI networks implementation funding*
γ.	**Traditional transport infrastructure investment**
	Spending on traditional infrastructure including road upgrades, airports, ports infrastructure. ● γ1. Road construction ○ *Funding for road upgrades* ○ *Funding for new highways* ○ *Funding for bridge repairs*

	• γ2. ICE engine automobile support
	  ○ *Relief for road transport passengers*
	  ○ *Loans for autoparts industry*
	• γ3. Aviation infrastructure
	  ○ *Purchase of air routes*
	  ○ *Building new airports*
	  ○ *Building new airplanes*
	• γ4. Port and ship construction
	  ○ *Funding for upgrading ships*
	  ○ *Funding for port repairs*
	• γ5. Rail construction and capacity
	  ○ *Expansion of rail network and system*
	  ○ *Building new trains*

δ.	**Clean transport infrastructure investment**

	Investment in new or expanding public transport systems, including increasing capacity and transport digitalisation, in cycling and walking infrastructure, and in electric vehicle (EV) charging infrastructure.
	
	• δ1. New public transport systems or line expansions
	  ○ *Investment in major public infrastructure programme aiming to expand and improve city metro, bus, and tram services*
	• δ2. Existing public transport capacity expansions
	  ○ *Funding to increase frequency and capacity*
	• δ3. EV charging infrastructure
	  ○ *All petrol stations to be required to offer EV charging points*
	  ○ *Investment in JET EV charging*
	• δ4. Public transport digitalisation efforts
	  ○ *Improved internet access on metro services*
	• δ5. Cycling and walking infrastructure
	  ○ *Investments in bike lanes, wider pavements, safer junctions*
	• δ6. Efficiency initiatives to improve dirty transport

ε.	**Traditional energy infrastructure investment**

	Investment into fossil fuels and related infrastructure.
	
	• ε1. New or refurbished power plants
	  ○ *Finance for restarting coal power projects*
	• ε2. New or refurbished refineries
	  ○ *Construction of new oil refineries*
	• ε3. New or refurbished coal mine and oil/gas fields
	  ○ *Expansion of existing coal mines*
	• ε4. New of refurbished infrastructure for transport and transmission of fossil energy

	○ *Building rail capacity for the sole purpose of coal transport* ○ *Increasing transmission capacity to allow for higher fossil fuel use*
η.	**Clean energy infrastructure investment**
	Increased spending in clean electricity, and heat generation and storage; upgraded transmission or hydrogen infrastructure. ● η1. New or refurbished renewable energy generation facilities ○ *Abolishing the national solar capacity cap* ○ *Raising expansion target for offshore wind raised and removal of restricting the development of onshore wind within 1,000m of homes* ○ *Investment in offshore windfarms and hydropower infrastructure* ● η2. New or refurbished nuclear energy generation facilities ● η3. New biofuel and other renewable fuel infrastructure ● η4. Upgraded (or new) transmission infrastructure ○ *Funding to extend the national electricity grid and support a high voltage transmission line* ● η5. Upgraded (or new) distribution infrastructure including smart grids ○ *Establish a State Power Grid and Study Program to invest in and develop responsible grid infrastructure* ● η6. Hydrogen infrastructure ○ *Develop new domestic supply chains, export infrastructure and to help grow domestic demand for hydrogen* ○ *National hydrogen strategy backed by investment in domestic hydrogen production, transport* ● η7. Battery and storage infrastructure ○ *Procuring large-scale battery system to help balance the local electricity grid* ○ *Advancement of geothermal and lithium battery projects* ○ *Utility customers will be able to access "Community Power Banks," or neighbourhood batteries that store solar energy and help neighbourhoods balance the grid* ● η8. Carbon capture and storage/utilisation ● η9. Other initiatives to clean dirty energy assets
θ.	**Local (project-based) infrastructure investment**
	Funding for schools, hospitals, social housing, and local councils to improve local asset bases. ● θ1. Urban development programs ○ *Smart City' program, which targets sustainable and integrated urban development (including linkage of information and*

	communication technologies to coordinate energy, buildings, traffic, sewage, and water) ● θ2. General new housing investment ○ *Social housing building* ● θ3. Clean new housing investment ● θ4. Public building investment ○ *Building schools* ○ *Renovating courts of justice* ● θ5. Local utility investment ○ *Financing gas, electric, and sanitary infrastructure*
λ.	**Buildings upgrades and energy efficiency infrastructure investment**
	Increase thermal efficiency through improved insulation, improved energy efficiency of appliances, and clean heating (heat pumps or heat networks). ● λ1. Green retrofitting programs (including daylighting, electricity and electrification, insulation) ○ *Funding for a CO2-focused building renovation programme* ● λ2. Rooftop solar support ○ *Financial support scheme for household solar procurement* ○ *Enacts new feed-in tariffs for solar projects in order to stimulate solar power development.* ● λ3. Other building upgrade support
μ.	**Natural infrastructure and green spaces investment**
	Upgrading public parks, green spaces, national parks, tree planting and biodiversity protection, ecological conservation initiatives, ecological system services. ● μ1. Public parks and green spaces investment ● μ2. Tree planting and biodiversity protection ○ *Funds for the conservation and sustainable management of forests* ● μ3. Ecological conservation initiatives ○ *Support for smaller municipalities to access the national climate protection initiative* ● μ4. Waterway protection and enhancement ● μ5. Agricultural uplift
π.	**Other large-scale infrastructure investments**
	Investment into large scale construction projects.

	• π1. Large-scale urban projects
	  ○ *Finance for stadiums*
	  ○ *Construction of major government buildings*
	• π2. Large-scale regional infrastructure (dams, non-coal mines, etc)
	  ○ *Dam construction*
	  ○ *Non-coal mining*
	  ○ *Land reclamation activities*
	• π3. Large-scale space infrastructure

σ.	**Armed forces investment**

	Funding for armed capacity and arsenals.
	
	• σ1. Arsenal funding
	  ○ *Finance for purchasing military equipment, such as tanks, bombs, and planes*
	  ○ *Expanding police capacity through purchasing police vehicles*
	• σ2. Administration funding
	  ○ *Expanding armed forces and police administration networks*
	  ○ *Military digital technology investment*

τ.	**Disaster preparedness and capacity building investment**

	Cash spending in preparation for future pandemics, fires, floods, cyclones, and other extreme events.
	
	• τ1. Future epidemic reaction capabilities
	  ○ *Investment in production facilities of pharmaceuticals, medical devices, PPE*
	  ○ *Stocking pharmaceuticals, medical devices, PPE*
	• τ2. Disaster-response infrastructure (shelters, food-stocking, water supplies)
	• τ3. Anti-flood, fires, and other climate adaptation measures
	  ○ *Fire backburning*
	  ○ *Flood protection walls*

φ.	**General research and development investment**

	Cash support for technology-agnostic research and development programmes and innovative businesses.
	
	• φ1. Health and science programmes
	  ○ *Budget reallocation for health and science projects*
	  ○ *Coronavirus related R&D*
	• φ2. Digitisation and AI programmes
	  ○ *Funding start-ups and SMEs in technology industries*

	○ *Cybersecurity research investment* ○ *Quantum research investment* ● φ3. Space programmes ○ *Support for innovation in satellite telecommunications, earth observations, and nanosatellite technologies* ● φ4. General and other programmes
ψ.	**Clean research and development investment**
	Cash support for R&D in green technologies, including electrolysis, heat pumps, energy storage, plant genetics, and greenhouse gas removal. ● ψ1. Energy sector R&D programmes ○ *Focus on digitalisation and "sector coupling"* ○ *Supporting vehicle manufacturers and the associated supply industry in the form of a bonus program.* ○ *Accelerating digitalisation in forestry, including investment in modern operating machines and devices* ○ *Investing in R&D on electromobility and batteries* ○ *Support the development of hydrogen transport options* ● ψ2. Agriculture R&D programmes ○ *Investments to develop a more secure and sustainable forestry sector* ○ *Launching an agricultural flexibility program meant to support the agriculture sector as it adapts to new pressures* ● ψ3. Industrial R&D programmes ○ *R&D of low-carbon manufacturing, such as building an energy efficient testing platform in smart industrial complexes* ● ψ4. Other sectoral R&D programmes ○ *Investment in R&D of CCS technology*
Rescue: Temporary Liquidity Measures	
A.	**Liquidity support for subnational public entities**
	Transfer of funds from the national government to provinces, municipalities, federal states, state-owned enterprises etc. for indiscriminate use. ● A1. Support for states/regions ○ *Federal aid to states to combat coronavirus* ○ *Loans to states* ● A2. Support for localities ○ *Ring-fenced funding for municipalities* ○ *Restructuring cities' debt* ○ *Finance for provinces* ○ *Transfer of funds to autonomous communities*

B.	**Liquidity support for large businesses**
	Government support for banks to rapidly provide liquidity to large corporations on terms favourable to the government, including emergency grants to particular sectors. ● B1. Support for agriculture, forestry and fishing (no green conditions) ○ *Agricultural bank equity investment* ● B2. Support for agriculture, forestry and fishing (with green conditions) ● B3. Support for airlines and other transport (no green conditions) ○ *Loan guarantees for airlines* ● B4. Support for airlines and other transport (with green conditions) ○ *Loans to airlines conditional on carbon offsets* ● B5. Support for energy (no green conditions) ○ *Support for electricity distribution companies* ● B6. Support for energy (with green conditions) ● B7. Support for holiday and leisure (no green conditions) ○ *Emergency funds for entertainment industry* ● B8. Support for holiday and leisure (with green conditions) ● B9. Support for retail (no green conditions) ○ *Emergency cash grants for businesses in retail* ● B10. Support for retail (with green conditions) ● B11. Support for specified other industry (no green conditions) ○ *Support for exporting industries* ● B12. Support for specified other industry (with green conditions) ○ *Support for car manufacturer on condition of participation in battery development program* ● B13. Support for unspecified industry ○ *Direct equity stakes in companies*
C.	**Liquidity support for start-ups and SMEs**
	Government support for banks to rapidly provide liquidity to startups and small/medium sized businesses on terms favourable to the government. ● C1. Support for agriculture, forestry and fishing ○ *Direct support for fishing businesses* ● C2. Support for energy ● C3. Support for holiday and leisure ○ *Credit line for tourism SMEs* ● C4. Support for retail ○ *Direct support for small retailers* ● C5. Support for specified other industry ○ *Compensation for childcare businesses* ● C6. Support for unspecified other industry ○ *Co-lending program for SMEs*

D.	**Liquidity support for not for profit organisations**
	Government support for banks to rapidly provide liquidity to not for profit organisations on terms favourable to the government, including emergency grant programs. ● D1. Support for arts and culture ○ *Emergency funds for cultural institutions* ● D2. Support for social care ○ *Support for self-help groups* ● D3. Support for education and research institutions ○ *Funding for specific universities and research offices* ● D4. General non-profit support ○ *Emergency cash grants for charities* ● D5. Support for animal services
E.	**Temporary waiver of interest payments for businesses**
	Holidays on interest payments or other relief on commercial rent and loans. ● E1. Commercial rent interest relief ○ *Loan principal payment deferrals* ○ *Loan payment delays for struggling companies* ○ *Suspension of interest payments for tourism industry* ● E2. Automotive interest relief ○ *Motor finance and high-cost credit support* ● E3. Utility payment interest relief (i.e. electricity, gas, water) ○ *Increased flexibility for utility payments* ○ *Postponement of collection of electricity and natural gas consumption fees* ● E4. Microcredit interest relief ○ *Support for small companies using credit* ● E5. Rural investment interest relief ○ *Postponement of farmer's debt without interest* ● E6. General and other ○ *Reduction in interest rates for borrowers* ○ *Reduced interest rates for small taxpayers*
Rescue: Temporary life and livelihood measures	
F.	**Direct provision of basic needs**

	Direct funds to the immediate local production and distribution of essential goods such as food, health, and transport, irrespective of whether these are part of the formal or informal economies. ● F1. Nutrition support ○ *Food banks support* ○ *Indigenous food support* ● F2. Shelter support ○ *Housing the homeless* ● F3. Social services support ○ *Exploitation prevention fund* ○ *Funding for children in care* ● F4. Utility access support ○ *Allocation to social water funds* ○ *Free cooking gas cylinders to poor families* ○ *Covering heating costs* ● F5. General and other support ○ *Subsidising basic needs*
G.	**Targeted welfare cash transfers**
	Direct cash transfers targeted to individuals and families, or in the form of a bonus to COVID-19 essential workers. Wage increases for those with government-controlled wages (public sector, minimum wage). ● G1. Payments targeted to families ○ *Payments to families with children* ○ *Payments to families with COVID-19 deaths* ● G2. Payments targeted to low income individuals ○ *Bill exemptions* ● G3. Payments targeted to individuals (other) ○ *Payments to out-of work individuals with (suspected) COVID-19* ○ *Payments to self-employed workers* ○ *Payments to workers with reduced hours/remuneration* ○ *Payments to COVID-19 emergency workers* ○ *Payments to workers who have been made redundant/furloughed* ○ *Extending/increasing unemployment benefits* ○ *Increase in government-controlled wages* ● G4. Indirect payments through social programs ○ *Insurance expansion/reduced payments* ○ *Pension support*
H.	**Job continuation support**

	Schemes to continue employment in declining sectors, including furlough schemes and related incentives. ● H1. Job continuation subsidies ○ *Furlough schemes* ○ *Credit for salary payments* ● H2. Job continuation incentives ○ *Firm payouts for bringing back furloughed workers*
I.	**Temporary waiver of interest payments for individuals**
	Permitted delays in individual payments relating to rents, mortgages, student loans and other individual payments. ● I1. Mortgage interest and rental relief ○ *Foreclosure and eviction moratorium and mortgage restrictions* ○ *Mortgage support, including six-month mortgage payment deferment* ○ *Business rent reductions in special zones* ○ *Delay rent payments and debts for households and SMEs* ● I2. Student debt interest relief ○ *Removal of tax on employer student loan repayment benefits* ○ *Suspending repayment and interest on student and apprentice loans* ● I3. General and other relief ○ *Allowed deferral of payments on credit and interest* ● I4. Automotive interest relief ○ *3 month payment freeze on car loan repayments*
J.	**Healthcare services support**
	All emergency health measures designed to manage the effects of the COVID-19 pandemic, and to develop treatments and vaccines. ● J1. General medical equipment/services spending (including PPE) ○ *Expanding stockpile of flu drug* ○ *Purchases of masks and medical equipment* ● J2. Mental health support ○ *Funding for mental health phone line* ● J3. Aged care support ○ *Funding for aged care facilities* ● J4. General medical personnel support ○ *Medical insurance for frontline workers* ● J5. Vaccine and COVID-19 research, manufacturing and application ○ *Funding for vaccine development program*

K.	**Emergency services (disaster management) support**
	Measures to facilitate the management of the COVID-19 pandemic beyond the healthcare industry. ● K1. Pandemic administrative support ○ *Funding for media campaigns regarding COVID-safety* ● K2. Equipment procurement ● K3. Infrastructure support (short-term shelters, food-stocking, water supplies)
Rescue: Temporary tax and payment relief measures	
L.	**Income tax cuts**
	Reduction in marginal income tax rates, increase in tax-free thresholds, or expanded deductions. ● L1. Reduction in marginal rates (including increases in tax-free thresholds) ○ *Reduced rates for lowest income tax bracket* ● L2. Expanded deductions ○ *Tax deductions for childcare household spending* ○ *Tax credit for taxpayers spending on accommodation, food, and non-alcoholic beverages* ● L3. New tax exemptions ○ *Income tax exemption for health and security personnel* ● L4. Permitted delays in payment ○ *Relaxation of tax payment schedules* ○ *Temporary suspension of payments for over 65s*
M.	**VAT and other goods and services tax cuts**
	Reduction in the rate of regressive value-added taxes (VAT) or goods and service taxes (GST) on consumption, e.g. taxation of alcohol. Includes changes to taxes on specific goods, as well as adjustments to import tariffs. ● M1. VAT reductions ○ *Reduction of VAT by 15%* ○ *Taxable sales income of 3% exempt from VAT* ○ *30% reduction in auto sales tax* ○ *Increase in stamp duty threshold* ● M2. VAT deferrals ○ *Deferral of VAT payments for 3 months* ○ *Extend payment deadline of import duties*

	• M3. Non-discretionary payment relief
	  ○ *ATM charge suspension*
	  ○ *Toll road charge suspension*
	  ○ *License fee waivers*
	• M4. Reduced taxes for emergency medical imports
	  ○ *Duty and tax exemption for emergency medical imports*

N.	**Business tax cuts**

	Temporary or permanent reductions in business tax, changes to tax-free thresholds, or expanded deductions.
	
	• N1. Reduction in rates
	  ○ *Corporate investment tax discounts*
	• N2. Expanded deductions
	  ○ *Tax deductions for materials in production during the pandemic*
	• N3. New tax exemptions for clean investments
	• N4. New tax exemptions for general and other investments
	  ○ *Tax waivers for hoteliers and restaurants*

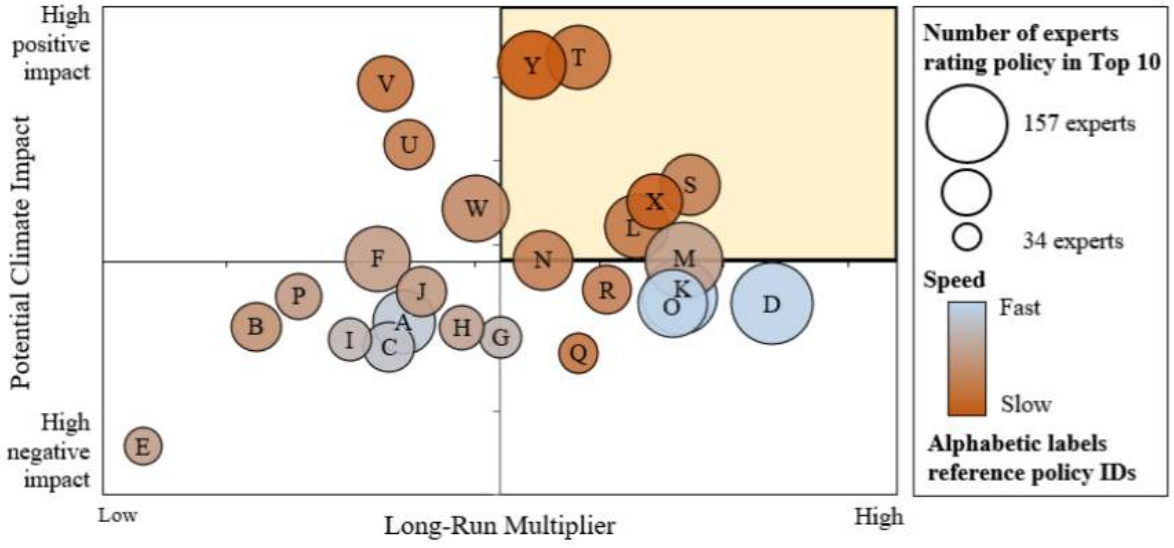
O.	**Business tax deferrals**

	Deferral of payment of corporate taxes or strengthen carry-back provisions in tax loss offsets.
	
	• O1. Tax deferrals for dirty industries
	  ○ *Freezing fees and charges for coal and gas explorers*
	• O2. Tax deferrals for other industries
	  ○ *General business tax deferrals*

P.	**Reduced prices for centrally-controlled products and services**
	Any measures that reduce the price of goods and services controlled by a federal government. • P1. Public service payments • P2. Fuel prices (oil and gas) • P3. Utility prices (electricity and water) ○ *Electricity cost cuts for businesses*
Q.	**Other tax cuts and deferrals**
	Any tax-related measures not covered by archetypes L, M, N and P. • Q1. Other tax cuts and deferrals

Appendix B: Results of survey of 231 leading economists

In May of 2020, in an effort to better understand the potential economic and climate impacts of COVID-19 related fiscal spending, the Oxford Smith School of Enterprise and the Environment published their work entitled 'Will COVID-19 fiscal recovery packages accelerate or retard progress on climate change?'. The paper involves a survey of 231 central bank officials, finance ministry officials, and other economic experts from G20 countries regarding the economic and climate impact of fiscal recovery archetypes. Figure 1 illustrates the archetype assessments made in that paper.



A	Temporary waiver of interest payments	N	Worker retraining
B	Assisted bankruptcy (super Chapter 11)	O	Targeted direct cash transfers or temporary wage increases
C	Liquidity support for large corporations	P	Rural support policies
D	Liquidity support for households, start-ups and SME's	Q	Traditional transport infrastructure investment
E	Airline bailouts	R	Project-based local infrastructure grants
F	Not for profits, education, research, health inst. bailouts	S	Connectivity infrastructure investment
G	Reduction in VAT and other goods and services taxes	T	Clean energy infrastructure investment
H	Income tax cuts	U	Buildings upgrades (energy efficiency)
I	Business tax deferrals	V	Green spaces and natural infrastructure investment
J	Business tax relief for strategic and structural adj.	W	Disaster preparedness, capacity building
K	Direct provision of basic needs	X	General R&D spending
L	Education investment	Y	Clean R&D spending
M	Healthcare investment		

Figure 1. Results of Hepburn et al. (2020) April survey of 231 leading global economists, testing 25 fiscal policy types (represented by bubbles). Policies with higher long-run economic multipliers have greater economic impact per dollar spent. Faster policies achieve their desired economic impact more quickly. Policies with positive climate impact are likely to support efforts to achieve net-zero emissions.

This work laid some of the foundations for our work here, though the majority of the present work exists independently from the May 2020 paper. However, the paper does still play a large role in our economic evaluations of archetypes and sub-archetypes. Though the archetypes have changed and broadened substantially relative to those in the May paper, economic evaluations have been mapped onto the new archetypes and extrapolated to cover archetypes that did not previously exist.