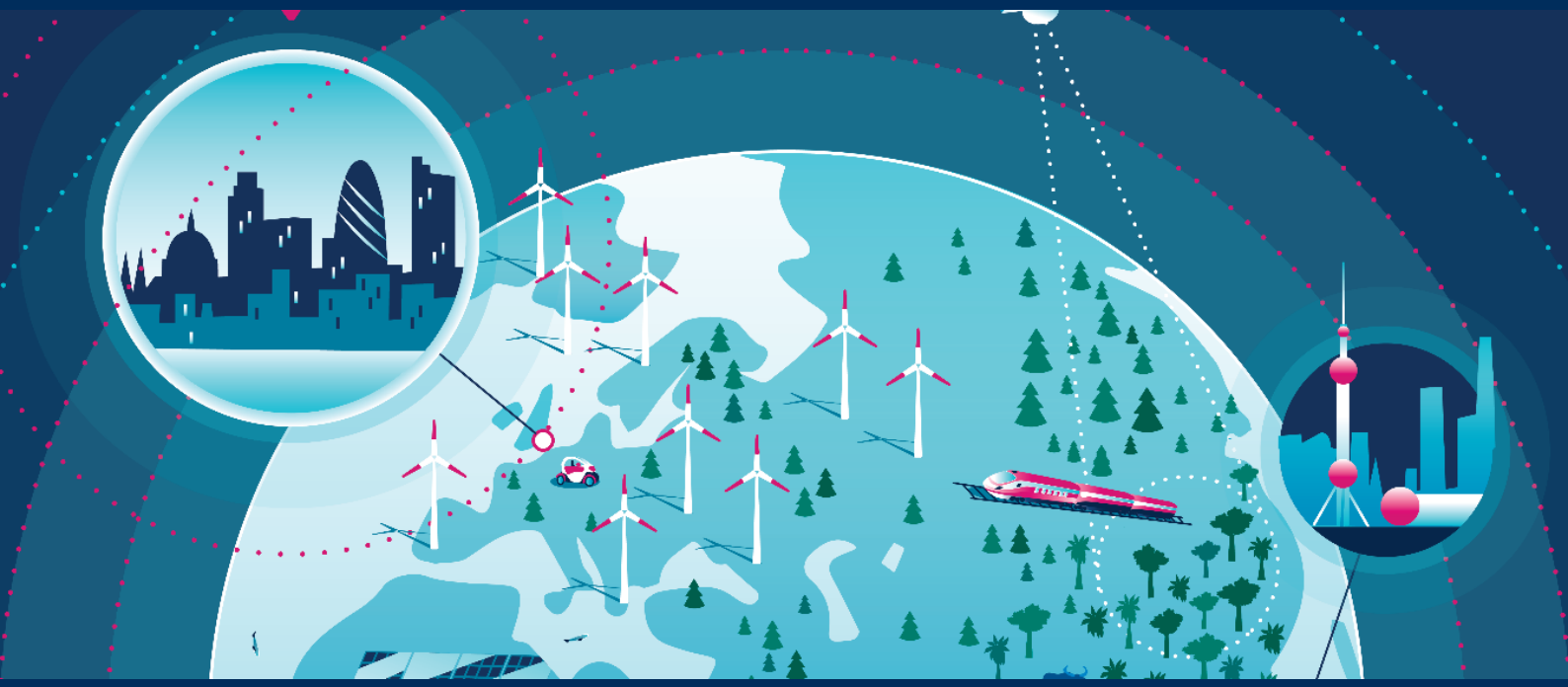
INEVITABLE POLICY RESPONSE

Why a just transition is crucial for effective climate action



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Executive Summary

This discussion paper is part of The Inevitable Policy Response (IPR), a landmark project which aims to prepare financial markets for climate-related policy risks. This is a paper for feedback and will be updated before COP 25 in light of the IPR Forecast.

What is 'Inevitable' is some further policy response as the realities of climate change become increasingly apparent. The key questions are when this response will come, what policies will be implemented, and where the impact will be felt. The IPR forecasts a response by 2025 that will be forceful, abrupt, and disorderly because of the delay. It quantifies the impact of this response on the real economy and financial market. The project is a collaboration between PRI, Vivid Economics and Energy Transition Advisors, with the Grantham Research Institute on Climate Change and the Environment, London School of Economics, contributing this study on a just transition.

The concept of a just transition has emerged as a key pillar of climate strategy; it is crucial to understanding 'where' the impact of policies will be felt and 'what' policies will be implemented to ensure the transition can happen at speed and scale. It emphasises the imperative for the transition to a net zero and resilient economy to have a strong social dimension; not only is it the right thing to do to deliver sustainable development, but it is the necessary thing to do to build broad-based coalitions for transformational change. Importantly for investors, the just transition is also the smart thing to do as it reduces systemic risk, enhances human capital, and strengthens their societal licence to operate.

This discussion paper's key findings are as follows:

- Managing Change: Managed well, the transition to a net zero economy will not only help to reduce the immense human and economic costs of climate disruption, it could also generate net new jobs and sustainable, inclusive growth, now and into the future. However, these benefits will not happen automatically. Failure to adequately address questions of fairness and equity in the transition is already undermining efforts to achieve the Paris Agreement targets. Questions of fairness and equity span across national borders and will have global ramifications for international cooperation and international financial flows.

- A Systemic Question: Climate change is arguably one of the greatest injustices in history in terms of the duration of negative human impacts centuries into the future. The just transition is part of the wider 'climate justice' agenda and was included in the Paris Agreement to focus on the implications of the transition primarily for workers. Experience shows that the just transition has wider systemic implications for consumers, communities and citizens, for both the decarbonisation and the resilience agendas across the global economy.

- The Size of the Challenge: The employment implications of the low-carbon transition appear manageable at the aggregate whole economy level. Job impacts from climate policy are expected to be about ±0.5% of total employment – quite small compared with the overall job 'churn' that normally occurs in market economies. However, there will be significant implications in key sectors and regions, raising profound transition issues for workers and communities. The inevitable interaction of the net zero transition with other technology-driven transitions such as automation and artificial intelligence (AI) may increase job impacts.

- Characteristics of the Challenge: As industries and economic sectors transform, affected by the net zero and other technology-driven transitions, there are likely to be changes in the numbers, types and locations of jobs, and there could be significant adjustment issues as workers need to move from declining to expanding sectors, firms and job types. Increases in the speed of technological change across multiple transitions – innovation, adoption and diffusion rates are accelerating with new technologies – combined with the need for a rapid transition, implies that policymakers need to take a comprehensive, economy-wide approach to this challenge.

- The Need for Policy: Carefully targeted government and company policies will be required to ensure a just transition for workers and communities. There are substantial economic and social benefits from 'just transition' policies, compared with a low-carbon transition without them. This doesn't imply just transition policy will be needed across all processes of change in the economy, only where climate policies lead to rapid and disruptive change that existing markets and institutions can't deal with adequately on their own due to market failures and other barriers.
- The Essential Elements: At least five key elements are needed for successful country transitions where climate policy will lead to rapid and potentially disruptive change:
  - *Anticipating* changes in advance to enable adjustment;
  - *Empowering* those impacted so that human rights are respected, enabling people to participate in the process of change;
  - *Investing* in the human and social capital and capabilities needed to underpin the transition;
  - *Focusing* on the spatial and place-based dimensions; and
  - *Mobilising* the capital required from the public and private sectors, including from institutional investors as holders of corporate as well as public assets (e.g. sovereign bonds).
- Insights from Country Case Studies: Several case studies indicate that a just transition will require careful coordination of transition policy at the macroeconomic and place-based level. Just transition policy must also tackle political economy and social challenges that have the power to delay the transition. The case studies reinforce the view that a just transition is not only about ensuring a responsible decarbonisation process, but also about credible alternatives for inclusive and sustainable growth.
- The Role of Institutional Investors: Responsible investors have a key role to play in supporting a just transition as part of their commitment to incorporate environmental, social and governance factors across their operations. More than 140 institutions with US$8 trillion in assets have made a commitment to the just transition, linked to a guide that shows how investors can take action in terms of active ownership, capital allocation and policy advocacy.
- The Just Transition is Key for an Effective Policy Response: Without a strong social dimension, the IPR will be less effective or may stall – higher levels of social trust/capital make it easier for institutions to undertake policy reforms that are in the general long-term interests of society. A just transition 'filter' is applied across the IPR forecast 'policy levers'. This filter discusses the policy options available to ensure a just transition under the IPR Forecast, which is rapid and disruptive. These are summarised in Table 1. Future research could apply a filter across the IPR Forecast results to ensure the outcomes are consistent with a just transition. For example, the Forecast results will be highly differentiated by country type. This will raise challenging questions around north-south finance flows.

Table 1 Summary of IPR policy levers and the just transition

IPR policy lever*	Just transition considerations
Coal bans and CCS for energy and industry	Comprehensive place-based just transition policies are needed for coal workers, communities, and associated supply chain businesses. These policies need to provide a range of support including adequate pensions, payouts, relocation assistance and regional revitalisation (including enterprise promotion). Carbon capture and storage (CCS) could be just transition positive, allowing workers and communities in industrial regions to be sustained. It may be particularly helpful in hard-to-decarbonise industries, for example, cement, where it may be cost effective with some additional investment. Renewable energy, energy storage and related supply chain jobs could also provide new job opportunities in affected regions.
Internal combustion engine (ICE) bans	The ICE bans and the shift to electro-mobility will have profound employment impacts along the transport value chain. Supply chain firms for ICE original equipment manufacturing (OEM) could be particularly exposed, while jobs growth in electric vehicles (EVs) could take place beyond centralised auto manufacture. Here, a strategic focus is needed to link the climate driver of change with wider processes of automation and digitisation to ensure that this does not result in a reduction in social standards (also applies to coal bans and the shift to renewables). Options include new and/or stronger enforcement of existing employment laws and stronger worker representation by unions. ICE bans will help to achieve economies of scale, bring down EV prices, and should be strongly positive for consumers (including for two- and three-wheelers in developing countries). This will also need to be accompanied by modal shifts in the transport system through investments in public transport, cycling and walking, all of which have strong social benefits.
Zero carbon power	The just transition priority for zero-carbon power is to realise the huge potential for the rapid expansion of renewables to deliver decent work and positive spillovers in the community. This includes building up the skilled workforce and ensuring opportunities for women and men to participate. At the heart of this opportunity lies the promotion and protection of human rights to deliver the full socio-economic benefits of zero-carbon growth. This is increasingly important, with renewable energy jobs rising to over 11 million worldwide in 2018; 60% of these are in Asia. The task is urgent as allegations of human rights abuse grow globally, putting investments and the transition itself at risk" (BHRRC, 2019). Governments, business, labour unions, civil society and investors will need to work together to ensure that transition is not only fast, but also fair.
Energy efficiency	Inclusive energy efficiency improvements are likely to be achieved through a combination of strong standards and cost-effective public finance, particularly for building construction and retrofit. Construction sector workers could be most exposed to the transition in terms of positive and negative implications for existing skill sets (for example, in the UK, around 30% of construction worker jobs could require reskilling and another 30% could benefit from the transition (Robins et al., 2019). Pure market-based solutions, which are designed to incentivise investment in energy efficiency by households and businesses, have so far not proved effective. This points to the need for government policy to focus more directly on the delivery of energy efficiency programmes. Here it is important to consider their implicit carbon price, avoid unfair cost burdens and learn lessons from recent experiences. A focus on retraining and raising workplace standards in an often fragmented construction sector will be key. The impact of energy efficiency on the demand for power is also relevant and should be considered as this may impact power production jobs.
Carbon pricing	Carbon pricing can tend to be regressive, but can be designed to offset costs and deliver social benefits. For example, a share of revenues raised can be used to compensate low-income households. In addition, Border Carbon Adjustments (BCAs) can theoretically level the playing field for emissions-intensive, trade-exposed firms. Reforms that boost an industry's competitiveness may also help. Reform of fossil fuel subsidies (negative carbon prices) can be achieved in a way that ensures a just transition and prevents social unrest. Options include announcing the reforms well in advance and providing compensation to key groups prior to the reforms. In developing agricultural countries, transfers of carbon market revenues from developed and key emerging nations including China could drive investment and boost rural productivity.
Land use- based greenhouse gas removal -re/afforestation	Re/afforestation has the potential to deliver a boost to rural incomes, stimulate job creation, and improve rural working conditions, which are some of the worst in the working world. Transparency, dialogue and information, key to all transition planning, will be especially crucial for overcoming barriers and making the transition process more positive for farmers and forest communities. Options to ensure a just transition could involve education, development policies that incentivise

IPR policy lever*	Just transition considerations
	re/afforestation (including REDD+ frameworks that can be implemented and scaled up[2]), government compensation, and comprehensive reforms to agricultural labour working conditions.
Land use- based greenhouse gas removal - bioenergy	Expansion of bioenergy will need to be managed carefully, especially the use of biomass as a 'renewable' energy source. Using scarce arable land for biomass production – land which was previously or could be used for food crops – may trigger rising food prices, impacts on the poor and social unrest. One option for scaling up this technology and ensuring a just transition is to promote innovation in bioenergy – for example, rapid development of third-generation, advanced biofuels that can be grown in labs, or re-use existing oils and fats.
Agriculture	Large improvements in agricultural productivity, through investing in technology and infrastructure, will displace agricultural workers. This has been the story of development. Agricultural employment in low-middle income countries is around 35 per cent of total employment in 2018, compared to 3 per cent in high income countries. If workers are forced to change jobs, retrain and/or relocate, then governments should ensure they will have adequate working conditions and basic human rights respected. Strong labour institutions, labour laws and effective unions will be needed. This has not always been the case in past transitions, with workers forced to relocate to crowded urban areas and accept poor working conditions. Their former communities also experience disruptive restructuring through loss of population and incomes. There is a unique opportunity to invest in agricultural productivity while also ensuring the transition is just and fair for farmers and traditional communities.
Public finance	Public finance is critical to successful and inclusive transitions, not least in terms of the setting of taxes and incentives across the economy (such as carbon pricing) as well as through carefully targeted government spending and investment. The just transition will need to be incorporated into macroeconomic and financial policy, along with industrial and regional planning, education and skills strategies, as well as welfare spending and social protection. By anticipating the shift to a net zero economy, much of this expenditure will be growth-enhancing. Domestic and international development banks will also play a critical role in moving the economic frontier in favour of a just transition, stimulating the infrastructure and innovations required. Institutional investors will have a direct stake in these public finance strategies through their holdings in sovereign, municipal and other public sector bonds.

Note: Vivid Economics, 2019. The Inevitable Policy Response: Policy Forecasts. Preparing financial markets for climate-related policy and regulatory risks.

[2] REDD+ refers to the conservation of forest carbon stocks, sustainable management of forests, and enhancement of forest carbon stocks.

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Unpacking the just transition

Originating in the labour movement, the notion of a 'just transition' was incorporated in the 2015 Paris Agreement as a way of signalling the importance of minimising negative repercussions from climate policies and maximising positive social impacts for workers and communities. Box 1 contains a widely adopted definition for a just transition that we follow in this paper. The preamble to the Paris Agreement states that governments should take into account 'the imperatives of a just transition of the workforce and the creation of decent work and quality jobs in accordance with nationally defined development priorities' (UNFCCC, 2015). At the 2018 COP 24 climate conference, 53 countries signed the Just Transition Declaration, which recognised the importance of factoring in the needs of workers and communities for building public support for a rapid shift to a zero-carbon economy.

The just transition is also gaining traction with other stakeholders, not least investors. The Grantham Research Institute at the London School of Economics and Harvard's Initiative on Responsible Investment have produced an investor guide in partnership with the Principles for Responsible Investment and the International Trade Union Confederation (Robins et al., 2018). This has been backed by an investor statement supported by over 140 institutions with more than US$8 trillion in assets under management.[3] The Annex contains further information on why investors should support a just transition and what actions they can take.

Box 1 What is the just transition

The International Labour Organisation (ILO) provides a comprehensive and widely used definition of just transition that captures a holistic approach (Smith, 2017):

> 'It is a bridge from where we are today to a future where all jobs are green and decent, poverty is eradicated, and communities are thriving and resilient. More precisely, it is a systemic and whole of economy approach to sustainability. It includes both measures to reduce the impact of job losses and industry phase-out on workers and communities, and measures to produce new, green and decent jobs, sectors and healthy communities.'

The concept has been adopted in various international agreements, including: the UN Framework Convention on Climate Change (UNFCCC); the UN Sustainable Development Goals (SDGs); international federations, such as the International Trade Union Confederation; and in the context of key international meetings, such as the 2018 G20 Summit hosted by Argentina. The ILO proposes three policy pillars that lay the foundations of a just transition: macroeconomic and sectoral, employment, and social. At first glance, these appear to be standard policy categories, but the secret of integrating the 'just' factor relies on cohesiveness between policies, which is captured from active dialogue between stakeholders. This dialogue helps minimise unintended consequences associated with individual policies and allows for differing views (Worrall et al. (2018).

[3] https://www.tfaforms.com/4694571

The growing recognition of the need for a just transition

A just transition is both good economics and good politics (New Climate Economy, 2018).[4] Managed well, the net zero transition[5] will not only help to mitigate and largely prevent the immense human and economic costs of climate disruption, it could also generate net new jobs and sustainable, inclusive growth now and in the future (Rydge et al., 2018). This could help to maintain decent employment and thriving communities over the coming decades. However, these benefits will not happen automatically. Policies are needed to ensure that jobs and workers in the 'new' low-carbon economy have working conditions that are at least as good, or better, as those in the 'old' high-carbon industries.

Managed poorly, however, countries and regions could see not only 'stranded assets' but also 'stranded workers' and 'stranded communities'. Past experience of deindustrialisation in many parts of the world highlights the importance of looking beyond the direct employment impacts to understand the wider ecosystem of prosperity in affected regions. Failing to do so could slow or even stall climate progress, while contributing to economic stagnation and political instability.

Economic and climate policies are often assessed against the principles of effectiveness, efficiency and equity (fairness). By 'effective', we mean that they achieve their aim. By 'efficiency', we mean that they are implemented in the most cost-effective way. And by 'equity', we mean that the costs and benefits are shared fairly across society. This means both shaping the transition so it brings positive benefits to under-served groups (for example, by extending access to energy) and also ensuring that those less well-off do not bear a disproportionate share of policy costs (Stern, 2008). In a globalised world it also means that countries need to consider the cross border impact of their climate policies.[6] The depth, speed and scale of the global economic policy-led transformation needed to meet the Paris climate change targets mean that these issues need to be addressed with foresight. Given levels of inequality already present in society today, and between countries, the low-carbon transition is far more exposed to societal concerns and community push-back if the processes of change are not perceived to be just.[7]

Scoping the just transition

Climate change is arguably one of the greatest injustices in history in terms of the extent and duration of the damage to humanity. Many of those most affected by climate change have contributed least to its causation, often due to poverty. It is therefore a matter of fundamental global justice to deliver the goals of the Paris Agreement to protect current and future generations.

The transition to a climate-resilient, net zero economy presents a global opportunity to deliver inclusive development in the 21st century, not just avoiding the damage of climate change, but also offering the potential for tackling poverty and inequality as well as ensuring protection of and respect for human rights. To seize this opportunity, the transition itself needs to be just, and how it is achieved should be fair for all. This places the just transition as a way of implementing the framework of the SDGs at the intersection of environmental, social and economic priorities.

[4] A just transition involves policies and measures to reduce the impact of job losses and industry phase-out on workers and communities, and measures to produce new, low-carbon and decent jobs, sectors and healthy communities. It aims to address environmental, social and economic issues together (Just Transition Centre, 2017).

[5] 'Net zero' emissions means that the total of active removals of greenhouse gases from the atmosphere (e.g. by afforestation) offsets any remaining emissions from the rest of the economy. These 'removals' are expected to be important given the difficulty in entirely eliminating emissions from some sectors (Committee on Climate Change, 2019).

[6] The United Nations (UN) is aware of the potential for negative cross-border impacts from mitigation policies or response measures taken by parties to its agreements, e.g. the Paris Agreement. "Parties shall take into full consideration, in the implementation of the commitments of the Convention, the specific needs and concerns of developing country Parties arising from the impact of the implementation of response measures." This is an area of future research and is not covered in detail here. See: https://unfccc.int/topics/mitigation/workstreams/response-measures

[7] It is accepted that the direction and rate of technical progress and the stages of the innovation process around low-carbon technologies can be influenced through good policy, but there is little research to draw on that examines how social processes of change can be influenced and directed by policy. See, for example, Jamasb and Köhler (2007), Acemoglu (2002), and Acemoglu et al. (2012).

Box 2 **The Pope: Climate change as a source of injustice**

In June 2019, Pope Francis made clear that, faced with the climate emergency, 'We must take action accordingly, in order to avoid perpetrating a brutal act of injustice towards the poor and future generations.' He remarked that a just transition to cleaner energy, which is called for in the Preamble to the Paris Agreement, if managed well, can generate new jobs, reduce inequality and improve the quality of life for those affected by climate change. But action is urgent: 'The climate crisis requires "our decisive action, here and now" and the Church is fully committed to playing her part' (O'Kane, 2019).

The just transition starts from the perspective of how workers (both those employed today and in the future) are affected, positively and negatively, by the transition, but its scope goes much further. Communities are affected by the spatial implications of industrial change. For example, renewable energy may be more decentralised than large fossil fuel power stations. Consumers are also impacted by the regressive nature of some climate policies, such as carbon prices. Ultimately, all citizens are impacted in terms of the distributional and procedural aspects of the transition.

The just transition is also a whole-economy agenda, addressing the upside potential from low-carbon growth as well as the downside social risks for those affected by the decline of high-carbon sectors. In addition, many argue that the resilience agenda should also be included in the just transition agenda, which is particularly relevant for developing countries, where most of the world's 1 billion agricultural workers and residents live. Resilience applies across multiple dimensions. For example, infrastructure will need to be able to withstand more frequent and severe weather events; supply chains will need to be resilient to climate impacts, reducing the risk of disruption to production processes; and workers will need protection from heat stress, especially in countries where a larger share of workers operate outside in the direct sunlight. Without measures to boost resilience to increased heat stress, hours worked, wages, health and productivity will all fall.

Figure 1 sets out these interlocking 'human' relationships. Policymakers and investors will need to consider all four dimensions. Table 2 sets out the potential scope of the just transition according to these dimensions.

These just transition 'dimensions' are not new: the economy is always in transition. Focusing specifically on the need for a just transition is helpful as it brings more awareness and focus to the issue. This is particularly important during the coming low-carbon transition, which will initially be largely policy-led and on a scale not seen since reconstruction after the Second World War. It should not be seen as an add-on from welfare advocates that will burden the processes of transition and change. **One of the ways to accelerate climate action – and optimise its benefits – is to ensure that it is inclusive. This means taking account of the distributional consequences so that no one is left behind.**

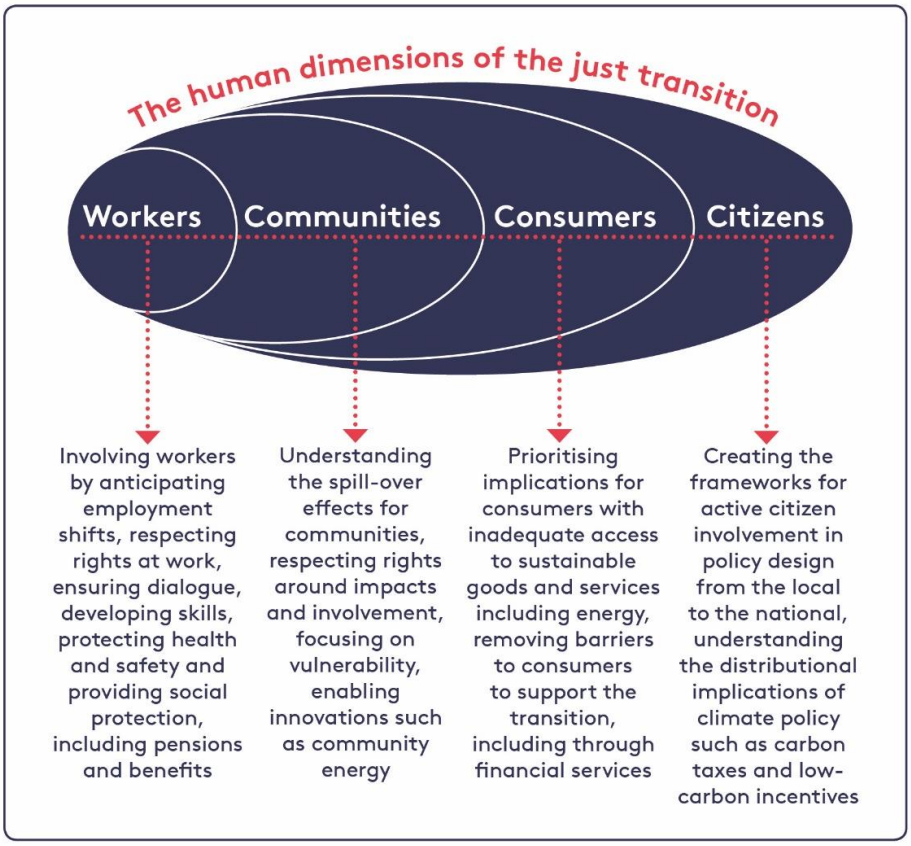
While it is a sound objective to aspire to a just transition across all processes of change in the economy, and an economy-wide approach to just transition policy is needed, the scope of the just transition examined in this paper is not limitless. Processes of change are constantly transforming industries, jobs and communities. In a well-functioning market economy with strong institutions, including welfare and education, workers and communities should have adequate means and resources and be able to cope with adjustment on their own without special compensation packages or assistance measures. University students transitioning to the world of work have to compete in a competitive jobs market to secure good graduate jobs, they are not given attractive transition packages by government. But where change is imposed or accelerated through public policy that impacts particular groups harder than others, and where the speed or size of change overwhelms the ability of labour and other markets and social institutions to guide and manage this change efficiently and fairly, there is a role for just transition policy. For example, to strengthen university and education institutions. This paper describes where just transition policy is likely to be necessary because the processes of change are directly influenced by public policy, which is likely to be rapid, disruptive and beyond the capacity of existing markets and institutions to ensure fair outcomes for workers, communities and consumers, i.e., the IPR Forecast. There will be rent seeking and other gaming but this is always present in

public policy making and particular attention will need to be given to ensuring that the just transition is not used by incumbents to delay climate action.

The consequences of failing to advance a just transition are severe for climate progress

Failure to adequately consider the socio-economic dimensions of emissions reduction and sustainable growth policies is already hindering the pace of the transition. Broad anxiety about the overall consequences of economic change, in particular for inequality, have been fused with concerns over the impacts of climate action. This is reflected at the ballot box, where anti-climate action politicians have come to power partly on the basis of claiming to protect vulnerable workers and communities from change.

Figure 1 The human dimensions of the just transition



Source: Robins et al. (2019)

Table 2 Setting the scope: illustrations of the different dimensions of the just transition

	Workers	Communities	Consumers	Citizens
High-exposure, high-carbon sectors	Ensuring responsible decarbonisation in the fossil fuel energy sector, transport, industry, etc.	Responding to the spill-over impacts on industrial communities. Revitalising regional economies	Tackling energy poverty in industrialised countries; ensuring fairness in carbon pricing	Managing the distributional and participative issues of phasing out fossil fuels (e.g. those unfairly impacted by changes or excluded from decision-making)
Zero-carbon, green sectors	Delivering good green jobs in renewables, building efficiency, EVs, and their supply chains (e.g. local jobs, gender dimension)	Building a strong licence to operate, empowering community action, protecting community rights (e.g. land rights around renewable energy)	Delivering universal access to sustainable energy, promoting prosumers and citizen-investors	Managing the distributional and participative issues of 100% zero-carbon energy (e.g. broadening the beneficiaries)
Resilience	Ensuring workers are resilient to heat stress and other physical impacts of climate change to protect wellbeing, incomes and productivity	Ensuring communities have resilience plans, including trees, green space, adequate building codes, disaster recovery plans, etc.)	Ensuring households have access to affordable cooling to prevent overheating/ heat stress)	All citizens to have a voice on resilience measures, ensuring planning is not only directed by central governments and/or vested interests

The election of President Trump in the US is linked to his support for coal communities at risk from climate policies and the transition to a low-carbon economy. Among the many reasons given by President Trump for pulling out of the Paris Agreement was his claim that compliance would cost the US millions of jobs, including in the coal industry: 'I happen to love the coal miners', the President explained. However, the available evidence does not support this assertion (OECD, 2017).[8] International evidence collected by the OECD, for example, shows that green policies 'do not need to harm overall employment if they are well implemented' (OECD, 2017).

[8] According to a fact-check conducted by Germany's Environment Ministry, President Trump's assertions on job losses are 'doubtful and misleading', relying on research generated by anti-climate organisations.

Box 3 **Australia's long-standing challenges in managing the transition**

In Australia, carbon pricing (introduced by the Labor party in 2011) was removed by the Liberal-National Coalition (Liberal party) in 2013 after its successful federal election campaign. It continues to argue that a carbon price will force up electricity prices, hurting families and businesses. In other words, it was a threat to the social fabric of the nation.

In the 2019 Australian federal election, the Liberal party held on to power. This unexpected result was, in part, due to the failure of the opposition Labor party to sufficiently assure coal-dependent communities and workers that it had a credible plan for their future. The Labor Party promised a 'just transition authority', but no finance to restructure vulnerable economies (Climate Change News, 2019). In contrast, the Liberal party promised to protect coal communities and workers and shore up the coal industry, in particular by approving the Adani Coal Mine in Queensland.

While coal-dependent communities are a relatively small part of the Australian population, climate policy has become inextricably linked in people's minds to the fairness and justice of processes of change across the entire economy, a theme which is deeply embedded in the Australian ethos.

The lessons from this are that progress on climate action, especially in fossil fuel-dependent nations, will require smarter, better conceived and fairer just transition policies that are properly thought through. There are examples in other countries of successful strategies and policies, but failure to learn from these and design smarter policy will also lead to social resistance. For example, in Spain, coal workers were included in the design of plans and negotiations to shut down the industry. As a result, Spain's election result was very different, with affected coal communities increasing their vote for the government that will shut them down.

The importance of considering the social dimension of transition is also evident in Europe, especially in France. The Gilets Jaunes 'yellow vest' protests in central Paris, which started in late 2018 over substantial fuel tax increases to tackle climate change and their perceived impact on middle- and low-income workers, led to disruptive protests and violence on the streets. President Macron has since announced tax cuts for poor and middle-income workers.

As a result of these developments, there is growing awareness that the social dimension of the transition needs to be actively managed. In the words of the UK's Committee on Climate Change (2019), '*if the impact of the move to net-zero emissions on employment and cost of living is not addressed and managed, and if those most affected are not engaged in the debate, there is a significant risk that there will be resistance to change, which could lead the transition to stall*.'

The Committee on Climate Change stated that it is critical that the transition is 'fair and perceived to be fair', encouraging the UK government to adopt policies to ensure a just transition.

Guiding principles for a just transition

The discussion above allows us to draw out some guiding principles for the just transition. At least five key elements are needed:

- ***Anticipation*** reflects the fact that all stakeholders need to anticipate change in advance to enable adjustment. The more time there is to prepare, the more likely the transition will be just and the less disruptive to workers and communities.
- ***Empowerment*** of those impacted is key to ensuring that human rights are respected, enabling people to participate in the process of change and transformation, particularly within industries. If workers

are empowered they will not only be able to secure better outcomes from former employers, but also ensure that working conditions are not inferior in their new 'clean' jobs.

- *Investment in human capital*, including capabilities needed to underpin the transition, will be key. Here the role of education institutions is central. For example, they will help workers reskill and retrain for new jobs with rising demand. Universities and technical education will need to be far more responsive to a rapidly changing economy.

- *Location* means focusing on the spatial and place-based dimensions of change. Some regions and communities will need to undergo more structural and challenging transformations – for example, coal-reliant communities. They will need the most assistance and support from governments and institutions.

- *Capital mobilisation* from the public and private sectors, including from institutional investors as holders of corporate as well as public assets (for example, sovereign bonds). Ensuring a just transition will require investments in people and places and those investments must be financed, most likely by a combination of public and private capital. Development banks will pay a role in their countries of operation, as will institutional investors, who could purchase attractive sovereign bonds dedicated to financing just transition measures.

The just transition in the context of long-run economic transition

The just transition is about managing a dynamic and, initially, policy-led economic transformation, rather than a narrower concept of helping displaced workers in a few high-carbon industries. As Lord Nicholas Stern has remarked in Grantham Research Institute on Climate Change and the Environment (2018):

'We should see the just transition as part of the new story of inclusive, sustainable growth. This is a highly attractive economic model, with strong innovation and growth and able to overcome poverty in an effective and lasting way. But it requires us to manage the process of change in much better ways ... We need to be organising for transitions in the plural including technologies, economic structures, cities and the international division of labour. And we must accelerate the pace of decision-making if we are to respond to the urgency of climate change.

Economic history can help us better understand the story of long-run transformation, providing valuable insights on managing change and fostering a more inclusive, just and sustainable growth model. We have the advantage of learning from several transformations since the industrial revolution (Figure 2) (Crafts, 2010; Pearson and Foxon, 2012), including the current information and communications technology (ICT) revolution, and there is a rich Schumpeterian tradition of analysis on medium- to long-run technological transformations (Freeman, 1994; Schumpeter, 1939). This tradition argues that capitalism develops through innovations by entrepreneurs – namely, the creation of new production technologies, new products and new markets, with new and innovative business models/firms and progressive ideas displacing existing firms and ideas from the previous period. The role of the state in fostering innovation and change is also key, through correcting market failures and influencing the direction of change, particularly in the early stages of a transition (Mazzucato, 2014).

An informative neo-Schumpeterian interpretation of transformations is offered by economic historian Carlota Perez.[9] She argues that in the middle of the depression of the 1930s, it was difficult to recognise the vast range of viable innovations connected with plastics, energy-intensive materials, energy-using devices and the new mass production methods that were capable of creating a consumerist way of life that could fuel economic expansion for decades.

Today an equivalent, perhaps even greater, technological potential resulting from advances in ICT, automation/robotics, AI, etc., is yet to be unleashed and its consequences are equally difficult to predict. The potential of these technologies to transform industries and activities has barely been realised. Historically, every technological revolution has led to a radical change in consumption patterns, reflecting the range of products shaped by new technologies. However, as with every other aspect of paradigm shifts brought by each technological revolution, the processes of change are slow and uneven, and intensify only when society in general assimilates the new possibilities and gives a clear impulse to the transformation, e.g. through policy.

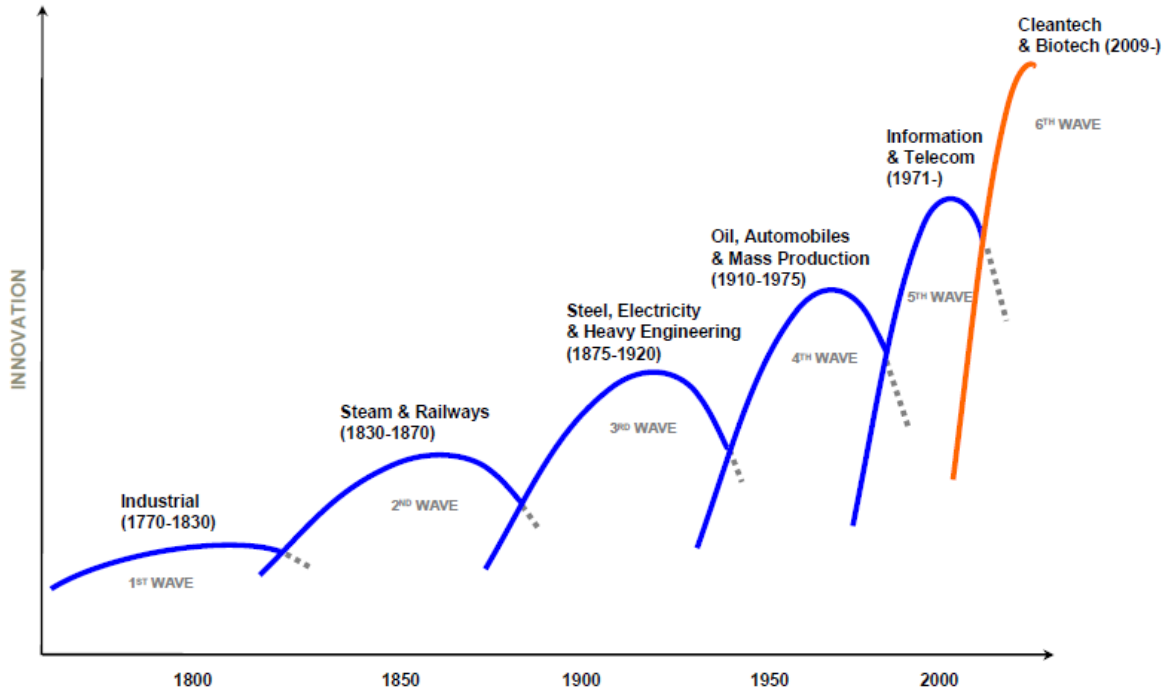
What is lacking today is a strategic policy direction that will tilt the playing field to deliver broad-based societal benefits, in a manner similar to that in which the policy for 'suburbanisation' did in the post-war boom – i.e. the era of mass production. It is not easy to steer such change, and requires deep economic and social understanding and bold leadership. Both businesses and politicians need to be persuaded that it is in everybody's interest – medium- and long-term – to build a new positive-sum game. It was not any easier to set up the conditions for the flourishing of this post-war mass production, suburban revolution than it will be today. But measures taken then across many European countries, Australia and North America (this did not apply across all countries), such as public roads, mortgage guarantees, subsidies, new taxes, official labour

[9] This perspective was previously published in New Climate Economy (2014).

unions, expansion of public services (health and education), income policies and unemployment security, created the demand conditions for mass consumption as well as for tax-funded military innovation.

Global structural change in a net zero direction needs systematically important and powerful countries to take policy action that tilts the playing field decisively. With coherent, credible and stable policies stimulating energy and resource savings, strong and supportive institutions, and by ensuring a just transition for workers and communities, a significant wave of mutually reinforcing low-carbon innovations driven by ICT and other technologies could be stimulated across nearly all sectors of the economy.

Figure 2 Waves of innovation



Note: Illustrative only.
Source: Based on a Perez (2002) interpretation of a diagram by Merrill Lynch (schematic not precise quantitative vertical axis)

Unleashing the transformative power of technology to drive both labour and resource productivity and sustainable global growth could do for the world population what the post-war 'golden age' did for Western democracies. Crucial for maximising the net benefits from net zero transformation will be strong and trusted institutional structures, including universities and social welfare systems (including pensions). Such structures, it is argued, have supported people and communities during past transitions (since the Industrial Revolution), acting as the conduit for translating periods of innovation in ideas and technologies into better jobs, productivity growth, and permanent increases in welfare and living standards.[10]

[10] In contrast, periods of growth in the pre-industrial era did not translate into permanent increases in living standards due to weak or absent institutions. See Haldane (2018).

Sizing the challenge and examples of transition

Global estimates of the implications of the transition

A growing number of studies have examined the macroeconomic and societal implications of the transition, largely focusing on the potential impacts on the world of work. A summary of these is set out in Table 3. Overall, three broad conclusions can be drawn:

- The employment implications of the transition appear manageable at the aggregate whole-economy level.
- Policy interventions to deliver a just transition can make a material difference.
- The real implications are likely to rest in key sectors and regions, within and across generations, raising profound issues of political economy.

On the production side of the economy there is no specific reason to expect any significant net job gains or losses from climate policies at the macro level, given that their aim is to induce a substitution between different types of production and consumption, away from more-polluting to less-polluting activities (New Climate Economy, 2014). While there is a clear finding in the research that any overall employment effects of environmental policies are small, in particular in the energy industry where most of these studies focus, there is no consensus on whether those small effects would be positive or negative.[11]

Quantitative estimates of job destruction and job creation directly linked to climate policies are expected to be around ±0.5% of total employment – quite small compared with the overall 'churn' that normally occurs in market economies. For example, over the 12 months ending February 2019, total hires in the US economy were 69.3 million, and separations 66.6 million. Given that the total US workforce employed was 157 million as at February 2019, this implies a churn rate of close to 50% of the US workforce. In addition, studies suggest that the recycling of carbon tax revenues to reduce labour taxes can fully offset any adverse impacts of climate policies on employment.

The New Climate Economy (2018) report quantifies a range of benefits from strong climate policy action – for example, resource efficiency gains and energy efficiency gains. It finds that over 65 million additional jobs in low-carbon activities could be created by 2030 (equivalent to the labour force of Bangladesh or Japan today), compared with the baseline. This more than offsets the loss of around 28 million high-carbon jobs over the same period. However, expressed annually, a net positive addition of around 3.7 million jobs per year globally is relatively small when compared with labour market churn, which is many orders of magnitude larger.

[11] A major survey of the literature for the European Commission in 2013 regarding a shift to low-carbon energy in 2050 concluded that there was no clear consensus about whether the overall net impact on employment would be positive or negative, but in almost all cases the impacts were small at the macroeconomic level (European Commission, 2013).

Table 3 Quantitative findings from the key job studies

Global assessments	Region/country/sector	Low-carbon transition policies	Employment change
OECD (2011) (Chateau et al., 2011)	OECD countries	With just transition policies	-0.32% in 2030
OECD (2011)	OECD countries	No just transition policies	-2.00% in 2030
IRENA (2019)	Global/energy sector	Energy transition policies only	+2.00% in 2050
New Climate Economy (2018)	Global	Carbon pricing and sector policies only	65 million additional low-carbon jobs, 37 million net additional by 2030
EU (2018)	EU	Policies consistent with 2°C (1.5°C) path – carbon price with revenues used to reduce taxes	Up to 1.3 (2.1) million new jobs compared with baseline by 2050. 0.6% (0.9%) increase in total employment compared with baseline in 2050
OECD (2018) (Chateau et al., 2018)	OECD and non-OECD	Policies consistent with 2°C (1.5°C) path	0.3% (0.8%) reallocation of jobs (sum of jobs created and destroyed) compared with 20% past reallocation rates across OECD countries
ILO (2018)	Global/energy, transport and construction sectors	Energy-related policies to achieve 2°C path	24 million additional jobs, 18 million net additional, by 2030

There will, however, be changes in the numbers, types and locations of jobs across and within economic sectors, and there could be significant adjustment issues, as workers need to move from declining to expanding sectors, firms and job types. For example, China is expected to lay off 1.8 million coal and steel workers (15% of the workforce) in the coming years (International Labour Organisation, 2018). Furthermore it is uncertain how other transitions running concurrently will intertwine with the low-carbon transition (see below). The combination of these factors will require tailored policies to shape a just transition for workers (current and future) and communities, consumers and citizens in different places. An OECD (2011) study finds substantial economic and social benefits from just transition policies compared with a low-carbon transition without them, in the form of lower unemployment and GPD impacts (see Table 2 above, rows 2 and 3) (Chateau et al., 2011).

However, these assessments have little to say about the quality of low-carbon jobs compared with today's existing jobs, and they do not capture labour market change beyond the simple metric of net employment change. For example, research suggests that most existing jobs will need only minor reskilling and it is most efficient to do this in-house (Rydge at al., 2018), implying that many new green jobs could be 'created' internally. Assessments also have little to say about the many concurrent transitions under way that are already starting to intertwine with the low-carbon transition in often unpredictable and significant ways, in particular with respect to jobs. Most importantly, they have little to say about the places where workers, communities, consumers and citizens live their lives.

Crucially, job losses and change may be concentrated in particular places, such as industrial communities, where targeted government and private sector just transition policies will be required to minimise dislocation and social deprivation for workers and communities. Sector assessments tell a similar story. A recent International labour Organisation (ILO) study indicates that the transition will directly impact only a small share of workers in most sectors. Only 14 of 163 sectors surveyed by the ILO are likely to experience employment losses of more than 10,000 jobs globally. In the sectors that are most impacted, usually energy-related sectors, which are often located in emerging and developing nations, just transition policies will be crucial to avoid dislocation of workers and communities, many of which have only recently emerged out of

poverty. However, the latest evidence suggests that poorer countries are badly prepared, and that coherent just transition strategies do not yet exist (Worrall et al., 2018).

Lessons from national experience

Insights on how to deliver a just transition can be gleaned from national experience both with environmentally driven change and other disruptive processes (such as trade liberalisation). Recent literature also covers a number of coal energy transition cases not presented here, which are also helpful. See, for example, Gambhir et al. (2018), Strambo et al. (2019), and EU (2019a, b).

Germany

The West German Ruhr region is one of Europe's largest industrial clusters. At its peak in the 1950s, its population rose to 6 million, with more than 1 million workers in coal and steel (70% of the labour force). From the 1960s the region experienced significant decline as world market prices for coal and steel fell below production costs in the region. Even with strong German economic growth in the 1960s, which partly compensated for job losses, unemployment in the region rose to 15% and led to mass migration out of the region (Schepelmann, 2018). The government tried to counter decline through subsidies, while at the same time implementing a transformative economic development strategy. The German coal industry received nearly €300 billion in subsidies to 2008, much of which went to the Ruhr district. At the same time the government established 21 universities in the region, invested in transport infrastructure, waterway rehabilitation, and the conversion of former mine sites and coking plants into parks, exhibition areas and museums (O'Malley, 2019). These development policies have seen the Ruhr region transition from a largely coal- and steel-based economy to a knowledge-based service economy with a leading green industrial sector. The Ruhr green sector expanded by more than 15% over 2009–12, with the region's green exports increasing by 26% over the same period (2.1% of global market share) (Schepelmann, 2018).

This process of transformation offers many important lessons for managing economic transformation. Key to the success of this transformation was the active management of economic diversification by federal and regional governments, as well as workers' participation in the restructuring process. Over the period 1960–2001, the number of mining industry workers declined by 90% to just 2.5% of the region's workforce, while iron and steel employment fell 80%. The initial response to this market-driven industrial decline – to attract extra-regional capital to shore up the industries – gave way to a more active diversification of the region's industries through industrial and technology policy. This bore fruit in the early 1990s when existing firms began to diversify into new activities, while the local government began to focus on innovation (particularly environmental technology, including R&D in renewables energy, recycling and waste combustion). Many former coal miners have found new employment in building restoration (including rooftop solar installations), and there are plans to convert a former mine site into a forest plantation. European funds have been targeted towards wage subsidies, labour market support and the development of new infrastructure, bringing with it new employment opportunities. A series of 'socially responsible downsizing practices', including worker redistribution between jobs, shifts and sites, early retirement support and worker retraining and development programmes, have been central to the successful response to declining coal and steel demand since the early 1990s. An important lesson is that cooperation between governments, municipalities, employers and trade unions is a prerequisite for a successful transition, as is a clear vision of the future, supported by a comprehensive policy framework (Gambhir et al., 2018). Rhenish capitalism is characterised by an aversion to conflict. Unions work closely with management and major business decisions are not made without significant community consultation (O'Malley, 2019).

More recently, the German Coal Commission, the 'Commission on Growth, Structural Change and Employment', was established in June 2018 by the German government to facilitate a coal phase-out and just transition process. It brought together key stakeholders from industry, trade unions, coal regions, environmental NGOs, research institutes and communities affected by the expansion of coal mines. It has completed its work and its non-binding recommendations include a phase-out of coal by 2038 at the latest with a review in 2032 if the exit date can be moved forward to 2035; investment of €40 billion in transition

measures in lignite mining regions over a 20-year period, detailed in a transition law; compensation of up to €2 billion per year for energy users (private and industry) in the event of rising energy prices caused by the coal phase-out; and compensation for operators of coal-fired power plants, subject to negotiations with the government (just transition for owners of capital). Many lessons can be learned from both the governance and outcomes of the German Coal Commission. Some of the benefits come from bringing together a very diverse group to ensure maximum representation, but this also creates challenges in ensuring consensus. Leaving out certain groups, such as youth, is unwise and creates polarisation. Finally, ensuring social protections and adequate funding is crucial in achieving community buy-in (Reitzenstein and Popp, 2019).

Canada

Canada has also been through a structured process of dialogue and analysis for its coal sector. The Canadian 'Task Force: Just Transition for Canadian Coal Power Workers and Communities' completed its work in 2019 and reported on how to make the transition away from coal-fired electricity a fair one for Canadian coal workers and communities. It made ten non-binding recommendations to the Canadian Federal Government. Some of these included specific measures to secure workers' livelihoods, such as creating a pension-bridging programme for workers retiring earlier than planned due to the coal phase-out; the creation of a detailed and publicly available inventory with labour market information pertaining to coal workers, such as skills profiles, demographics, locations, and current and potential employers; creating a comprehensive funding programme for workers staying in the labour market to address their needs across the stages of securing a new job, including income support, education and skills building, re-employment, and mobility; and identifying, prioritising, and funding local infrastructure projects in affected communities. It also recommended funds for the establishment and operation of locally driven transition centres in affected communities.

Canada has just transition policy experience from the coal phase-out completed in Ontario in 2014. The success of this transition included cross-party political support for the phase-out, largely on the basis of local air quality concerns; the fact that the Ontario government could absorb the cost of the phase-out as the plants were publicly owned; and a long-term vision and gradual implementation, including broad-based consultations with multiple stakeholders from civil society, municipalities and industry.

South Africa

Climate action in South Africa has proved particularly challenging over the past decade, reflective of its high fossil fuel dependency and the broader economic, social and policy environment. It is within this whole economy perspective that climate action in South Africa must be understood. Despite these many challenges, discussed below, South Africa recognises the need for the transition and has made progress. As noted in the 2018 report by the National Planning Commission, the risk of stranded infrastructure investments in South African coal is 'significant' and action is needed for a 'just energy transition' (National Planning Commission, 2018). South Africa was one of the few countries to highlight the importance of the just transition in its 2015 Nationally Determined Contribution, stating that 'an inclusive and just transition requires time and well-planned low-carbon and climate resilient development' (Government of South Africa, 2016). Two significant pieces of climate legislation have also been enacted over recent years: the renewables programme and the carbon tax. The latter has now been implemented after many years of delay.

Challenges for South Africa's climate policies and just transition come from many sources. First, climate policy coalitions of coal-related industries and their lobbies have continuously raised concerns around the design, policy interaction and implementation capacity of the carbon tax. Second, South Africa's coal mining and use sector is a major source of employment and union membership. Unions have raised concerns around energy sector reform and risks to jobs. There have been a number of union strikes and court cases trying to halt energy reform, largely based on potential coal worker (union member) job losses that could be caused by the renewable energy programme (Averchenkova et al., 2019).

This resistance comes even though the carbon tax is very low and weak, and adds only very minor costs for the majority of industry. The carbon tax will also be relatively neutral as the existing 'non-renewable

electricity levy' is being removed. During a consultation the South African Treasury implemented measures to mitigate the impacts of the removal of the non-renewable electricity levy and promised support for energy efficiency measures.

Third, broader economic development issues further complicate policy and the just transition. Arguments against the carbon tax were often based around the broader political and economic situation in South Africa. These include stagnant economic growth, falling government revenues, persistent high unemployment and declining manufacturing/mining. Cost pressures come from multiple sources, including electricity price rises due to corruption and lack of maintenance, fuel price rises due to exchange rate fluctuations, collapsing infrastructure (water, electricity, and transport), lack of any policy clarity, and widespread corruption. Rising inflation, increased wage demands from unions with settlements above inflation, and widespread civil unrest leading to operating shutdowns, also increases costs. These conditions have led to a tough operating environment, and on top of all this the carbon tax was seen as another burden. As such the coal-industry coalitions argued that it was an additional cost pressure that was unnecessary because South Africa's greenhouse gas emissions were flat or falling (due to economic stagnation). An argument that the carbon tax was simply about raising additional revenues was supported through the refusal of the Treasury to earmark funds for climate change support. The distributional impacts of the tax are also uncertain, as the poorest already receive support (through a free electricity allocation).

Where South Africa has been able to make more progress is with its renewables programme. This was designed explicitly to achieve buy-in and support just sustainable development. The private sector placed bids for renewable contracts. Projects were awarded based on price (70%) and a community support/empowerment element (30%). This 30% can involve community investment and support, for example in schools and hospitals. Bids must also comply with legal requirements, including the Black Economic Empowerment Laws and Labour Standards.

Box 4 Reform of fossil fuel subsidies in Ghana

Ghana has made several attempts to reform fossil fuel subsidies. The total cost of fuel subsidies represented 2.2% of GDP in 2004, which exceeded the total budget of the Ministry of Health.

In addition, liquefied petroleum gas (LPG) subsidies led to over-consumption and fuel shortages, to the point where drivers of commercial LPG vehicles lobbied for the government to remove the subsidy.

Following initial failures, in 2005 the government was able to make more permanent reforms by establishing the National Petroleum Authority (NPA). One of the objectives in setting up the NPA was to depoliticise the price-setting process, mandating it to establish a formula for adjusting fuel prices and to review oil prices twice a month. The 2005 reforms have been considered successful in that they did not lead to widespread protests (as happened following the 2003 reforms, which hit the poor hardest) and were maintained over a longer period.

In addition to establishing the NPA, the 2005 reforms were supported by preliminary research, including a Poverty and Social Impact Assessment (PSIA), a scientific survey with the IMF around impact on sectors, constant dialogue with stakeholders and civil society, a social protection programme, and a communications campaign.

The PSIA found that existing subsidies were poorly targeted, with the rich receiving the biggest share of the benefits, and less than 2.3% benefiting the poor. The results of the PSIA were made public through a widespread communications campaign, and were discussed with various stakeholders. The finance minister announced that the savings from subsidy reform would be directed to complementary measures including the elimination of fees for state primary and secondary schools; a ceiling on public transport fares; additional funding for healthcare in poor areas; and a rise in the minimum wage. The government also continued to cross-subsidise kerosene and LPG (by charging a fee for petrol which is used to subsidise kerosene and LPG, fuels that are typically used by the poor), and distributed compact fluorescent light bulbs to reduce household electricity costs.

The 2005 reforms did not remove all subsidies to fossil fuels, as there continued to be (cross-) subsidisation for petrol, diesel, kerosene and LPG, and the NPA continued to make ad hoc price adjustments. In addition, in 2007 and 2008 the automatic price adjustment was suspended in response to rising commodity prices. By 2013, the cost of fuel subsidies had risen to US$1.2 billion, or about 3.2% of GDP. To address the increasing budgetary burden, in 2013 the government raised the price of petroleum products by 15% (for kerosene) and 50% (for LPG), while the price for pre-mix (petrol with a lubricant blended in) was not adjusted and remains heavily subsidised. Similarly, there were reductions in the large subsidies for electricity through increases in tariffs.

This recent round of reforms was complemented by a 17% rise in the minimum wage and an expansion of the cash-transfer programme (LEAP) from 100,000 to 150,000 households. Research has found that the LEAP programme is well targeted, has positive impacts in terms of reducing inequality, and costs far less than fossil fuel subsidies. These recent reforms have contributed to a fiscal surplus and are expected to help reduce fossil fuel consumption and emissions, and reduce road traffic which in turn may reduce local air pollution.

In response to recently falling oil prices, in 2015 the Ghanaian government made statements about reforms to fossil fuel pricing which may reverse efforts to reform subsidies. Ghana's state of the nation address also hinted at the need for new consumption and production subsidies, indicating that due to low rainfall, the country's baseload generation would have to be shifted from hydro to thermal power and that the country stands to lose about US$700 million from oil exports if the price remains at current levels.

Source: Whitley and van der Burg (2015)

Wider experience with industrial restructuring can also be instructive.

United States

The US Trade Adjustment Assistance (TAA) programme was implemented several decades ago to help workers adjust to trade liberalisation. The programme provides income support for over 100 weeks; training expenses; health coverage tax credit; wage insurance that 'tops up' a potential lower income in a new occupation for up to two years for workers over 50 years of age; and costs associated with job search and relocation. This assistance package is designed to be targeted and calibrated to worker needs. However, recent assessment of its effectiveness found mixed results (Global Commission on the Economy and Climate, 2014).

In 1976, the first full year of operation under the TAA law, the programme covered 62,000 workers at a cost of $79 million per year. A 1980 expansion led to coverage of 532,000 workers at a cost of $1.6 billion per year. The Reagan administration then severely curtailed the scheme until only 30,000 workers were covered at one point. The TAA Reform Act of 2002 was expected to double the number of TAA recipients and more than triple the total cost of the programme to almost $2 billion annually. From 1976–2002 the scheme covered a total of 3.35 million workers. However, the relative size and cost was small. In 2000 the scheme covered less than 1% of unemployed workers in the US and less than 2% of the total US unemployment compensation programme (Baicker and Rehavi, 2004).

Japan

The Japanese government provides a good example of actively managing structural change in industries that are in decline. From 1987, the government provided long-term support to smooth the decline of what it called 'structurally depressed' industries, including textiles and shipbuilding. This support reallocated resources within and outside the depressed industries, provided financial assistance to troubled firms, and mitigated negative impacts on the labour force (Global Commission on the Economy and Climate, 2014).

Poland

Starting in 1990, the Polish government restructured its loss-making mining sector through debt restructuring, mine closures, and a radical reduction in employment. Initial reforms were resisted as they did not provide a just transition for miners. From 1998 the employment reduction programme was accompanied by incentives for firms to hire ex-miners; free retraining programmes financed by the European Commission; social benefits and severance payments, which were effective but very costly for government; loans and credits for ex-miners, which were mainly used for household consumption; job guarantees for miners close to retirement; and benefits for miners with long tenure, such as five-year voluntary vacations at 75% pay. These measures were designed in cooperation with the unions, which helped overcome resistance to the reforms. From 1998 to 2002 alone, some 53,000 workers left the industry and 33,000 received some form of support (total coal mining employment in Poland fell from around 390,000 in 1990 to 120,000 in 2006). The total cost of the 1998 programme was around €1 billion (Global Commission on the Economy and Climate, 2014). While this was a restructuring of the industry, not a shutdown, and many workers were rehired back into the coal industry, it demonstrates the resistance from workers if they are not treated fairly. The EU still employs around 240,000 coal workers, with many coal regions in decline. To ensure that no regions are left behind in the transition a low-carbon economy, the European Commission launched the 'Platform for Coal Regions in Transition' in late 2017. It aims to provide needs-oriented technical assistance and advice to coal regions in transition, focusing on three key areas: strategies and governance; project identification; and project design and development. It also develops support materials including toolkits, guidelines and reports (these cover key transition-related issues for coal regions in transition in Europe, such as: governance, environmental rehabilitation, employment, financing, clean air and technologies). It also connects stakeholders by facilitating collective dialogue and cooperation among regions and the wider stakeholder community. In person meetings to connect stakeholders are held regularly (European Commission, 2019).

Box 5 **High-level lessons from the case studies for just transition policy**

- Just transition policies need to include, as a minimum: consultation with workers and adequate information on the characteristics of labour supply and demand in the area; tailored transition plans for workers that respond to worker feedback; funding to ensure adequate social protections and socially responsible downsizing (health, pensions, payouts, retraining, etc.). This will help to get community and worker buy-in around change, but is not enough on its own (Canada, Poland, Germany, US TAA).
- Long-term community development strategies, including gradual implementation of transition policies and new investment (infrastructure or new industries) for affected areas, are crucial. Rushed or abrupt transitions make a just transition harder as these strategies take time to come to fruition (Canada and Germany).
- Politically, ensuring an effective just transition will require: cross-party political support; consultation across all key stakeholder groups, including youth, government, municipalities, employees and trade unions; worker participation in the restructuring process; and strengthening the voice of the winners from change, who are often more diffuse and harder to predict than the losers (champions are emerging) (Germany, South Africa).
- Policy design must take into account perceptions of gains and losses from transition policies now and in the future, and try to manage these, including countering those who use perceptions of losses to generate fear of change – for example, as we have seen around carbon pricing or fossil fuel subsidy reform (South Africa).
- Macroeconomic transition policy, including fiscal, investment, industrial strategy, labour and technology, needs to be carefully coordinated and integrated with place-based just transition and development policy (Ghana, South Africa).
- A just transition will be possible only if credible alternatives are presented in times of change that alleviate fears and reduce resistance. In other words, this is not only about responsible decarbonisation on the way down, but inclusive green growth and quality jobs on the way up (Ghana, Japan, Germany).

Emerging implications for the Inevitable Policy Response

Human capital formation and links to productivity growth

As discussed above, capitalism develops through innovations by entrepreneurs, namely the creation of new production technologies, products and markets. Young innovative firms and progressive ideas displace existing firms and ideas from the previous period – a process referred to as 'creative destruction'. There is no reason to expect the coming policy- and technology-led transition, as it intertwines with other transitions, to be any different. During these periods of creation and destruction, history points to the central role of institutions in enabling the development of the different types of capital (human, social, infrastructure, and intellectual) that are prerequisites for turning the 'creative' into productive capital and then economic growth. It also points to the crucial role of institutions in cushioning human, social and other forms of capital from the damaging effects of recessions and transitions – i.e. ensuring that the processes of change are just.

In terms of human capital specifically, past economic transitions characterised by rapid technological change have had immense impacts on labour markets. Job displacement and loss of livelihoods were common during these periods, which can increase inequality and social discord. Although the evidence suggests that the low-carbon transition (energy) in itself will have a relatively small impact on jobs globally, the coming economic transition will see the low-carbon transition intertwine with the 'Fourth Industrial Revolution'.[12] Contemplating a low-carbon transition without considering this wider dimension is likely to lead to poor policy choices. New technologies, where innovation, adoption and diffusion rates are accelerating, are already transforming what is possible and will continue to do so. For example, forest loss could be monitored using only helicopters in the past, but now have high-resolution satellites and apps that rapidly deliver real-time forest information to anybody across the world with a smartphone. This has transformed our ability to manage forest use and the types of jobs needed to do it.

This intertwining of multiple transformations could lead to much greater job displacement as sectors transform, jobs disappear, and new technologies such as AI go beyond replacing mechanical and manual labour to replacing cognitive 'thinking' workers. Some estimates suggest that automation could replace over half of all jobs by 2055, and, when combined with further globalisation, it could accelerate the trend in the hollowing-out of middle-skill jobs that require routine manual and cognitive skills such as machine operators and clerical workers (NCE, 2018). In such a scenario, which is likely and evidence suggests is already under way, there is potential for significant destruction of human and other types of capital, which would hit productivity and growth.

This very quickly becomes transformation of the whole economy, everybody everywhere, with particularly acute impacts in key sectors and regions. It also implies that this is not about a shift of jobs and sectors from dirty to clean. This is about transformation within industries to clean. In terms of justice, what is important is how the lives of individuals are impacted in terms of dislocation and other factors, not just price rises from climate policy.

This discussion starts to shape the policy story. Governments will need strong institutional and policy frameworks to 'cultivate the creative' and 'disarm the destructive' impacts on workers in key sectors and regions, if innovation is to translate into increasing levels of social, human and other forms of capital and, subsequently, higher living standards. A range of institutions emerged in past transitions, including trade

[12] The Fourth Industrial Revolution involves emerging technology breakthroughs in fields such as AI, robotics, the Internet of Things, autonomous vehicles, 3D-printing, nanotechnology, biotechnology, materials science, energy storage, and quantum computing. It is characterised by a fusion of technologies that is blurring the lines between the physical, digital, and biological spheres, with huge potential for transformation of entire systems of production, management and governance. The First Industrial Revolution used water and steam power to mechanise production. The Second used electric power to create mass production. The Third used electronics and information technology to automate production. See World Economic Forum (2016).

unions, social housing, healthcare systems and an expanded university system. These institutions helped cushion the financial and social impacts of job losses, and contributed to reskilling and a more just process of transition across the workforce. The success of the low-carbon transition will depend on the strength of these and other institutions, including private sector financial institutions, and their ability to ensure that the processes of transformation are just for affected workers and communities.

If these institutions fail or are too weak to protect the destruction of human capital – for example, if technical and higher education institutions are chronically underfunded and unable to teach the skills new businesses and industries demand, or investors are unable to transform their own asset allocation strategies or engage successfully with companies – then not only will human capital be lost (e.g. through job destruction and skills atrophy), but welfare payments will rise and will be slow to decline, creating fiscal constraints (drag) on the economy. Governments must ensure that key public institutions are strengthened and capable of managing the transition and its impacts.

Applying a just transition filter to the IPR

The IPR (Box 6) involves two interconnecting dimensions:

- The Forecast Policy Scenario (FPS) lays out the implemented policies from 2025 to 2050 based on more rapid policy announcements between 2023 to 2025. It is a policy response that will be forceful, abrupt, and disorderly because of the delay. It then quantifies the impact of this response on the real economy and financial markets.
- An aspirational strategy, which points to the challenges of a 1.5°C ambition given current political and technological realities, while also highlighting specific areas where stakeholders need to act now to achieve the Paris Agreement climate goals.

Box 6 What is the Inevitable Policy Response (IPR)?

The IPR is a landmark project which aims to prepare financial markets for climate-related policy risks.

Financial markets today have not adequately priced in the likely near-term policy response to climate change.

We consider that the market default assumption is that there will be no further climate-related policies in the near term beyond those announced in 2015. However, it is inevitable that governments will be forced to act more decisively than they have so far, especially as the realities of climate change and its impact on people and our physical environment become increasingly visible.

The key questions are when they will do so, what policies they will use, and where the impact will be felt. We forecast a response by 2025 that will be forceful, abrupt, and disorderly because of the delay.

The Forecast Policy Scenario quantifies the impact of this response on the real economy and financial markets: on the macroeconomy, key sectors, regions, asset classes, and on the world's most valuable companies.

What makes the Forecast Policy Scenario unique?

- It provides a realistic outline of future policy response and quantifies financial risk.
- Unlike climate scenarios, it does not work backwards from a predefined target temperature.
- Instead, it is based on robust, real-world analysis of probable policy and technology developments.
- It is focused on a policy response within timeframes relevant to investors.
- It provides a granular analysis that breaks down to the regional, sector and, for the first time, asset level.

The Forecast Policy Scenario will have different ramifications for the transition than the desired or aspirational strategy:

- Forecast: This would involve delay of meaningful climate action and then a forceful and disruptive policy response from 2023-2025. Ensuring that the process of transition is just across the economy, and in particular for those workers and communities most affected, will be extremely challenging. To avoid public resistance, governments will need to rapidly strengthen and/or reform key social institutions, including schools, universities, hospitals, social services, and regulatory bodies. These public institutions will need to have the capacity to rapidly deliver just transition policies, such as pensions and other forms of welfare, training/retraining, mental health support for workers and communities, etc. Many countries already have strong welfare institutions (e.g. across many EU countries), while others do not (e.g. the US). Other countries have more cooperative capitalist structures (e.g. Germany, where governments, unions and other stakeholders work together), while others do not (e.g. Australia, where unions are often in conflict with (liberal) governments and company management). This will have implications for just transition policy. For example, Germany with strong institutions and cooperative capitalism may find a just transition less challenging than the US or Australia.

  Institutional investors will need to ensure that their internal strategies, processes and practices are consistent with making low-carbon and sustainable investments, which would be facilitated by regulatory and other financial system reforms that integrate sustainability across the financial system (as recommended in United Nations Environment, 2019). This will include mainstreaming just transition policies into investment practices. It may involve using active ownership techniques such

as influencing boards to adopt just transition strategies, and capital allocation options such as reallocation of capital to firms that take just a transition seriously. All financial institutions, including institutional investors, will need to share knowledge and best practice, helping each other act with speed. It is likely that blended and public sources of finance will be necessary – a rapid and disruptive transition will impact risk and return, and private capital may be deterred without public funds to de-risk investment. Governments could issue green social sovereign bonds to fund just transition policies, which could be structured for institutional investors.

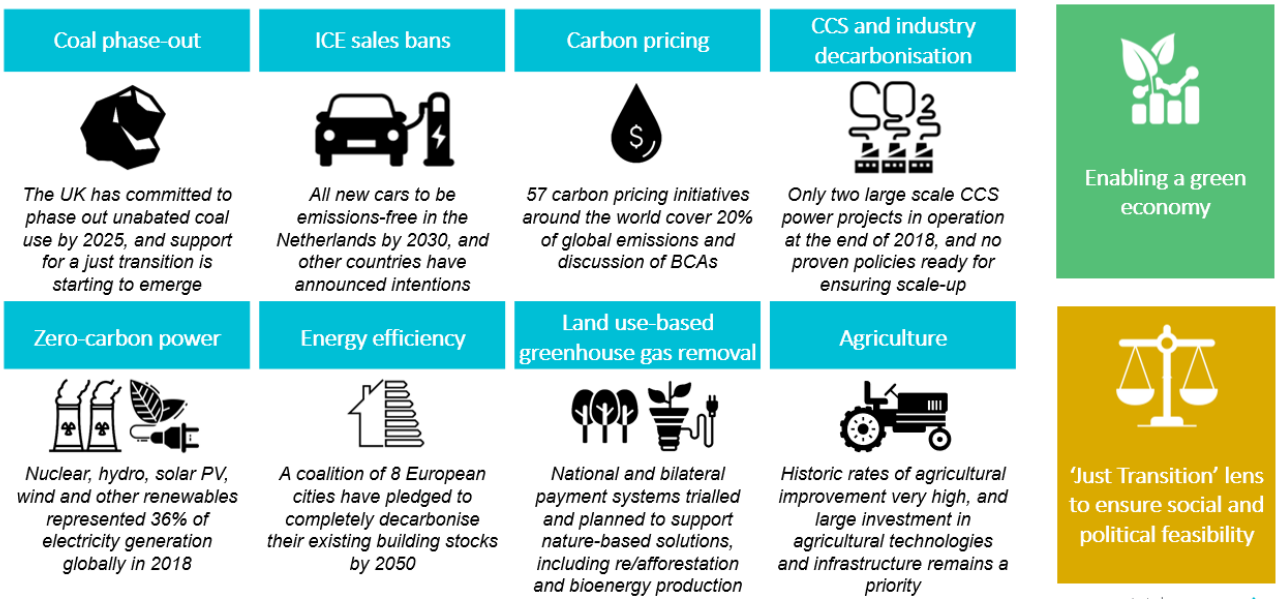
Ensuring an effective just transition under this forecast will be challenging, but the more successful just transition policies are, the less costly and disruptive a rapid transition will be, including fewer 'stranded workers' and 'stranded communities'. Poor policy that allows the permanent destruction of human and social capital can hurt productivity and growth and make transitions harder to achieve. This would lead to community resistance (unrest) and delay or even abandonment of the IPR. A typology of transition assistance policies is provided in Green and Gambhir (2018).

- An 'aspirational' strategy involves countries acting now with no further delay: While delivering a just transition will still be challenging, and involve many of the same just transition policies as the forecast, there would be less disruption and more time to plan and adjust. For example, SMEs will have more time to diversify revenue streams, and new low-carbon industries with new jobs could plan to locate in transition regions. Investors would engage at the international and country (national, regional, cities) levels, and also through active ownership and asset allocation, to ensure that government and corporate just transition policies are in place and are funded.

What the just transition means for different IPR policy levers

The IPR forecast contains policy levers (Figure 3), over which we apply a just transition filter. In addition, cross-cutting priorities for public finance are outlined.

Figure 3 Forceful policies needed in the IPR forecast*



Source: Vivid Economics, 2019. The Inevitable Policy Response (IPR): Policy Forecasts

Coal bans and carbon capture and storage (CCS) for energy and industry

Global bans on unabated coal combustion would have just transition implications, especially for fossil fuel-dependent economies, where both mines and power plants are likely to be forced to close. Coal bans would require targeted place-based policies to help coal workers, supply chain businesses and their employees, and coal communities. Options to ensure a just transition for coal workers include compensation, including adequate pensions and payouts, especially for workers near retirement; funding for retraining, including for low-carbon energy jobs; relocation packages; mental health support; and regional revitalisation (including enterprise promotion). Supply chain businesses will need access to capital for innovation and rapid restructuring around new revenue streams. Options can include public business banks, grants or concessional loans. Communities need assistance to revitalise and maintain hope in the future, especially for youth entering the workforce. Options include place-based sustainable economic development plans or industrial strategies, which can attract new low-carbon industries with more sustainable, high-quality jobs, especially for young workers. Decommissioning costs of coal mines and power stations also need to be funded. One option is for governments to take on this cost if it would otherwise deny workers their company entitlements.

Coal-mining and other communities are open to change if it is well-planned, they are adequately compensated (cash, pensions, etc.), there are opportunities for retraining, and good alternative jobs are available, especially for young workers. Communities resist change if there is no plan for their economic future. However, even with well-designed plans, policymakers often start from a place of mistrust as many communities have already been through poorly managed change in the past, for example coal communities in Wales and north-east England. What is needed are policies that deliver positive outcomes for workers and communities. Policies to promote renewable energy, batteries for storage and supply chain businesses (e.g. installation of solar systems) can all provide new opportunities for workers.

CCS, if it were to become commercially viable, could be just transition-positive as it would allow workers and communities in power-generation and industrial regions to be sustained for longer, reducing the impact from potential rapid shutdown. However, CCS is costly and unproven at scale, and it would require a permanent pricing incentive to get it off the ground, in particularly in hard to decarbonise industrial applications. This appears unlikely with subsidies not a sensible option in the long term. Still, CCS may become viable in the future and the most cost-competitive option for reaching some more expensive, hard to achieve abatement options such as cement. The Energy Transitions Commission Mission Impossible report shows that full decarbonisation of hard to abate sectors, including steel, plastics, trucking, shipping and aviation (around 30% of global energy emissions today) is technically feasible by 2050 with technologies that already exist, although several still need further investment before they are commercially viable. The total cost to the global economy would be less than 0.5% of GDP by mid-century and could be reduced even further by improving energy efficiency, by making better use of carbon-intensive materials (through greater materials efficiency and recycling) and by limiting demand growth for carbon-intensive transport (through greater logistics efficiency and modal shift) (Energy Transitions Commission, 2018).

The social implications of decarbonisation will also depend fundamentally on the technology pathway that a firm chooses. For example, Drax, the UK's largest coal-fired power plant has already shifted towards bio-energy and is exploring the transition to a fully net-zero facility using bio-energy with CCS (BECCS) as part of a wider regional industrial cluster. The latter option would enable Drax to support a just transition for its workforce, the surrounding community, and the wider economy in Yorkshire and the Humber. This 'net-zero cluster' would have the potential to protect existing jobs in high-carbon sectors as well as to act as a magnet for industries to the region attracted by the potential of a net-zero future (Robins, et al. 2019).

Internal combustion engine (ICE) bans

The ICE bans and the shift to electro-mobility will have profound employment impacts along the transport value chain. Supply chain firms in ICE OEM could be particularly exposed, while jobs growth in EVs could take place beyond centralised auto manufacture – for example, in electrical engineering for battery and charger manufacturing, installation, operation and maintenance of recharging points, grid connection and

reinforcement, and increased electricity generation.[13] Here, a strategic focus is needed to link the climate driver of change with wider processes of automation and digitisation to ensure that this does not result in a reduction in social standards (this also applies to coal bans). Options include new and/or stronger enforcement of existing employment laws and stronger unions to represent workers. Where just transition policies are needed, options include financial assistance, such as concessional loans or grants, to help SMEs shift their revenues away from ICE OEM, and incentives for retraining staff in-house.

ICE bans would have less impact on the major vehicle manufacturers than supply chain firms. Most major car manufacturers are already developing and offering EVs and are likely to be ready for a rapid transition. The ban would rapidly increase demand for EVs, helping vehicle manufacturers extract efficiencies through scale economies. This would bring down EV prices, benefiting consumers. At the same time this presents an opportunity for governments to invest in a modal shift towards public transport, cycling and walking, all of which are more inclusive. Increasing transport options in this way has other policy benefits too. For example, the availability of alternative reliable public transport modes increases the effectiveness of carbon prices and fuel taxes (Avner et al., 2014).

Zero-carbon power

The just transition priority around zero-carbon power is to realise the huge potential for the rapid expansion of renewables to deliver decent work and positive spill-overs in the community. For example, this will require a focus on developing the skills required to underpin clean energy growth, notably among women workers. At the heart of this opportunity lies the promotion and protection of human rights to deliver the full socio-economic benefits of zero-carbon growth. This is increasingly important, with renewable energy jobs rising to over 11 million worldwide in 2018 with 60% of these in Asia (IRENA, 2019).[14] Governments, business, labour unions, civil society and investors will need to work together to ensure that "transition is not only fast, but also fair" (BHRRC, 2019).

Each zero-carbon power option has different just transition implications. Construction of new dams for hydro-electric power, for example, can inundate and displace communities and natural habitats upstream and disrupt river flows impacting river health, farmer and community water supply downstream. Compensation mechanisms are likely to be required but extremely complex to construct. Safety concerns around dams are also relevant with hydro attracting the highest death toll for any energy source due to dam collapses (in non-OECD countries over the period 1969-2000 there were 10 hydro dam accidents with nearly 30,000 deaths, compared to coal with just over 100 accidents and less than 5,000 deaths) (OECD, 2010).

From a human rights perspective, the "task is urgent as allegations of human rights abuse grow globally, putting investments and the transition itself at risk", according to the Business and Human Rights Resource Centre (BHRRC, 2019). Since 2010, the Centre has identified 152 allegations of human rights abuses related to renewable energy projects and asked 103 companies to respond to these allegations. The frequency of allegations has increased in recent years with one third of these allegations having occurred between 2017-2019. Abuse allegations include: killings, threats, and intimidation; land grabs; dangerous working conditions and poverty wages; and harm to indigenous peoples' lives and livelihoods. Allegations have been made in every region and across each of the five sub-sectors of renewable energy development: wind, solar, bioenergy, geothermal, and hydropower. The regions with the highest numbers of allegations are Latin America (91 allegations since 2010, 60% of allegations globally) and Southeast Asia (38 allegations since 2010, 25% of allegations globally).

A number of companies leading the growth in renewable energy, such as Enel and Ørsted have made public commitments to a Just Transition and Decent Green Jobs (B Team, 2019). These and other initiatives will need to be scaled up in line with the expansion of zero-carbon power.

[13] https://download.dalicloud.com/fis/download/66a8abe211271fa0ec3e2b07/c62475b2-9ace-4eed-a001-a49afe9c65b1/AIE_EV_Jobs_Study_Press_Release.pdf
[14] https://www.irena.org/newsroom/pressreleases/2019/Jun/11-Million-People-Employed-in-Renewable-Energy-Worldwide-in-2018

Energy efficiency

Demand-side regulations, including energy efficiency standards, can be useful where carbon prices are not as effective (e.g. energy efficiency standards for buildings and appliances). Standards can provide clear signals and policy certainty for the private sector. If they are announced sufficiently in advance, they can drive private investments in R&D and innovation in low-carbon technologies. They can influence the design of new products and R&D strategies, as seen in the appliance industry, such as flat-screen televisions. They have also been found to positively affect consumer preferences and social norms. Furthermore, standards may have greater political acceptability compared with policies such as carbon pricing, for a variety of reasons:

1. In most sectors, standards do not immediately affect existing industries and equipment, only new investments, so incumbents are less likely to object to their introduction.

2. Many countries already have performance standards, and these may need only strengthening and better enforcement to reduce emissions further. Thus, governments can avoid having to create entirely new policy tools.

3. Performance standards achieve measurable results more rapidly than carbon prices, and their benefits can thus be observed over shorter timescales.

4. Performance standards convey a positive message and focus on achievements and progress – for example, contributing to development goals such as moving domestic manufacturing towards higher value-added products, rather than focusing on limits and constraints.

Therefore, on the surface it appears that standards could actually make the transition more manageable for firms and are a politically and economically acceptable complement to a carbon price. The criticism of standards, however, is around their cost-effectiveness, especially if they are used in the place of more efficient policy instruments. The literature evaluating Corporate Average Fuel Efficiency (CAFE) Standards in the US suggests that increased fuel duties and taxes would be a more cost-effective way of reducing emissions (Austin and Dinan, 2005; Parry et al., 2007).

While policies such as standards may, in certain cases, attract less political and public resistance than carbon pricing, this may be because the costs associated with these instruments are often diffused or hidden in the detail of income tax regulation, general fund expenditure, utility financial regulation, cost pass-through arrangements, and energy bill levies. As the costs become more obvious, their political acceptability may disappear. The result could then be a political backlash. Examples include the opposition to the costs of subsidising offshore wind farms in many EU countries, which were passed through to consumer bills. Therefore, it is important to calculate the implicit carbon price embedded in a standard and ensure that the costs are not unfairly concentrated on particular businesses or households.

Pure market-based solutions, which are designed to incentivise investment in energy efficiency by households and businesses, have so far proved to be less effective than hoped (e.g. the UK Green Deal). The multitude of barriers and market failures in this area appear too challenging for market-based policy approaches alone. This points to government policy focusing more directly on the delivery of energy efficiency programmes.

Inclusive energy efficiency improvements are likely to be achieved through a combination of strong standards and cost-effective public finance, particularly for building construction and retrofit. Estimates suggest that workers in the construction sector could be most exposed to the transition in terms of positive and negative implications for existing skill sets. Around 30% of UK construction worker jobs could require reskilling and another 30% could benefit from the transition (Robins et al., 2019). This implies that a focus on retraining and raising workplace standards in an often fragmented construction sector will be key.

In the case of buildings, recent experience informs us that the energy efficiency industry needs time to expand and train new workers. A multi-billion dollar energy efficiency stimulus scheme in Australia, in response to the global financial crisis of 2008, saw high uptake and initial community support and resulted in firms expanding too rapidly, including new inexperienced firms entering the market. Installers were poorly trained – several were electrocuted and lost their lives, and houses caught fire. This saw community support for the scheme collapse and the project was cancelled.

In addition, achieving net zero, high-performance buildings, as will be required to meet emissions targets, will require strong standards. Standards that support this goal are focused on indoor air quality, building heating and cooling, alternative building energy systems, and building controls and communications. This implies that construction workers will not only require better training on the basics, such as loft insulation, but also on the installation of advanced technologies to achieve net zero buildings.

Carbon pricing, including fossil fuel subsidies

Explicit carbon pricing is the preferred carbon reduction tool of economists as it is the most effective and efficient way to reduce emissions. Carbon pricing can be seen as a fiscal reform: the revenues raised from the carbon price can be used to lower the distortionary burden of existing taxes on labour and capital, fund investments and/or pay back debt. However, it can also be regressive and potentially unfair to certain sections of society and industry, including low-income households and emissions-intensive, trade-exposed industries. There are a range of options available to mitigate this cost. For households, options include using a share of carbon tax revenues (or permit sale revenues in an emissions trading scheme) to compensate for energy price rises. This can be in the form of direct discounts on bills or as lump sum per-capita rebates. Lessons from British Columbia in Canada suggest that its carbon price became more regressive as it increased, triggering the need for a revision of compensation levels.

For emissions-intensive, trade-exposed industries, one option to level the playing field is a border carbon tax adjustment (BCA). While research has shown that its practical implementation would be technically challenging and its legal status under free trade rules debatable, other evidence suggests that it may be possible, particularly at the sectoral level. For example, in the EU only a small number of sectors account for most of Europe's carbon imports (Helm and Hepburn, 2017). Encouragingly, evidence suggests that they are likely to have little impact on prices and consumers (Sager, 2019). However, other evidence shows that emissions leakage globally is likely to be minor and that BCAs would not have a very big impact on any leakage that did occur (New Climate Economy, 2014). In this case another policy option may be to cover all industries with a carbon price and return the revenues to trade-exposed, emissions-intensive firms whose competitiveness is genuinely impacted, but do this in a way that is transparent, temporary and avoids overcompensation and rent-seeking.

While it is difficult to distinguish firms that are genuinely impacted from those that are rent-seeking, a competitiveness study on the European chemicals industry found that there are significant opportunities to reduce emissions by 80–95% in the sector by 2050, while at the same time maintaining or enhancing competitiveness. Yet many in this industry continue to claim high competitiveness impacts from carbon pricing and demand high levels of compensation.

Carbon pricing could also be crucial for a just transition for farmers in developing nations. For many farmers a just transition *is* access to international carbon markets for compensatory payments to invest in their agriculture. Transfers of carbon market revenues could come from developed and key emerging countries, including China, which is already investing in developing countries, especially in Africa.

In addition to explicit carbon prices, many countries start from a position of negative carbon prices because of subsidies for fossil fuels. Not only are pollution externalities not priced, but environmentally degrading activities continue to be actively encouraged by policy. Baptist and Hepburn (2013) estimate that approximately US$1 trillion per year is spent on directly subsidising the consumption of resources, which includes approximately $400 billion on energy, around $200–300 billion of equivalent support on agriculture, and approximately$200–300 billion on water. The International Energy Agency (IEA) estimates that in 2015, subsidies to fossil fuels were twice as large as those to renewable energy (van Asselt and Kulovesi, 2017).

Coady et al. (2015) estimate that eliminating subsidies for fossil fuels would have reduced global carbon emissions in 2013 by 21% while boosting net public revenues by 4% and reducing deaths from local air pollution by 55%. A far more serious effort on sustainability is needed from governments across the world.

Countries subsidise fossil fuel consumption in various ways. Governments may keep local energy prices below international market prices, or provide grants or vouchers to make energy more affordable. The limitations and costs of fossil fuel subsidies are many, but among the most serious are their social consequences. Subsidies tend to favour well-off urban middle classes who can afford large cars, at the expense of the poor who would benefit more from targeted pro-poor spending. Subsidy reform, on the other hand, can also hurt the poor, such as through the impact of higher energy prices on vulnerable people. Various policy options are available to ensure a just transition for communities and consumers affected by subsidy reform, including cash transfer payments, funded by a share of the savings from reduced subsidies. However, in some developing countries, administrative weaknesses could prevent these payments being made effectively, suggesting that 'just' fossil fuel subsidy reform will also require institutional reform. Moreover, given the lack of trust in the political process in many countries, governance reforms that increase fiscal transparency and trust in government institutions will be a vital. To build trust, one option is to provide upfront financing for vulnerable people before implementation. Reductions in subsidies are unlikely to be supported if there is no expectation of receiving compensation, if revenue savings are expected to line the pockets of elite groups, or if they are simply returned to the public coffers.[15] Failure to plan carefully and implement subsidy reforms gradually to ensure a just transition can lead, as evident in the case of France over recent months, to social unrest.

Land use-based greenhouse gas removal - re/afforestation

Reforestation (repair of degraded forests) and afforestation (new forest cover on previously barren land) is a natural way to remove CO_2 from the atmosphere and store it in trees and soils. If rural and forest communities contribute to forest degradation and land clearing, as they do in many forest nations, significant institutional reforms and a social and economic transition will be needed to prevent this activity. The just transition story here would involve multiple stakeholders. Re/afforestation has the potential to deliver a boost to rural incomes, stimulate job creation and improve rural working practices – currently some of the worst in the world. Transparency, dialogue and information, key to all transition planning, will be crucial for overcoming barriers and making the transition process more positive for farmers and forest communities. Options for a just transition could involve education, in particular around the use of sustainable alternatives to wood for fuel and heat and around sustainable farming techniques; sound development policies that protect indigenous communities and encourage new sustainable industries and conservation; policies to reduce incentives to deforest and clear marginal land for cattle and crops; government compensation to leave or protect the land; stronger land rights; REDD+ frameworks that can be implemented and scaled up; and reforms to labour standards and conditions. The ILO states that the working lives of agricultural wage earners are characterised by casual forms of labour, precarious working conditions and little or no social protection (International Labour Organisation, 1996). These options would be possible only with strong institutions, including law enforcement in forest regions, to ensure effective policies and use of the funds.

In developed countries, such as across the EU, there are direct incentives (subsidies at the EU level) to keep land in a good state for agricultural production. Planting trees would see farmers lose their subsidies, which often equal the profit they make on their activities. If subsidies were reformed to remove this disincentive, a just transition could involve options such as compensation to farmers to leave the land or help to transition into agro-forestry businesses.

Land use-based greenhouse gas removal - bioenergy

Vast and rapid expansion of bioenergy will need to be carefully managed to avoid increased competition for arable land and water supply, and to avoid damage to forest carbon stocks. Using scarce arable land for

[15] The text in this paragraph was written by one of the authors of the New Climate Economy (2014) report.

biomass production, which was previously used for food crops, could lead to rising food prices, impacts on the poor and social unrest. The use of biomass in power plants as a renewable energy source is also controversial, with doubts over its environmental credibility and sustainability. There is a mismatch between burning biomass and the time it takes for CO_2 to be reabsorbed by forests, and it may damage forest carbon stocks as natural forests are converted to plantations (ShareAction, 2019). One option for scaling up this technology and ensuring a just transition is to promote innovation in bioenergy, such as rapid development of third-generation/advanced biofuels that can be grown in labs, or re-use of existing oils and fats. This would avoid many of these potential issues in a world of scarce arable land where agricultural productivity must increase at an unprecedented rate to feed future populations. The US Navy was a leader in this new generation of biofuels prior to curtailment of the scheme due to its cost and poor planning strategies. A new multi-country RD&D effort is warranted, involving key social institutions such as the military and the private sector.

Agriculture

Large improvements in agricultural productivity, through investing in technology and infrastructure, will displace agricultural workers. This has been the story of development. Agricultural employment in low-middle income countries is around 35 per cent of total employment in 2018, compared to 3 per cent in high income countries.[16] If workers are forced to change jobs, retrain and/or relocate, then governments should ensure they will have adequate working conditions and basic human rights respected. Strong labour institutions, labour laws and effective unions will be needed. This has not always been the case in past transitions, with workers forced to relocate to crowded urban areas and accept poor working conditions. Their former communities also experience disruptive restructuring through loss of population and incomes. There is a unique opportunity to invest in agricultural productivity while also ensuring the transition is just and fair for farmers and traditional communities.

Public finance

Public finance is critical to successful and inclusive transitions, not least in terms of the setting of taxes and incentives for managing the economy towards inclusive and sustainable growth (for example, carbon pricing in the case of the net zero transition), as well as through carefully targeted government spending and investment. The just transition will need to be incorporated into macroeconomic and financial policy, along with place- and regional-based policies, including industrial and regional planning, education and skills' strategies as well as welfare spending and social protection. By anticipating the shift to a net zero economy, much of this expenditure to ensure a just transition will be growth-enhancing through protection of human capital. Domestic and international development banks will also play a critical role in moving the economic frontier in favour of a just transition, stimulating the infrastructure and innovations required through smart use of public finance that crowds in private sector capital. Institutional investors will have a direct stake in these public finance strategies through their holdings in sovereign, municipal and other public sector bonds. This discussion has relevance for the 2009 UNFCCC COP 15 decision to secure US$100 billion of climate finance annually by 2020. Sources of finance, including developed country climate finance, multilateral development bank climate finance, leveraged private finance, and Oversea Development Assistance (ODA), will need to reflect a commitment to a just transition in developing countries.

[16] World Bank Data. Accessed: 13 September 2019. https://data.worldbank.org/

Conclusion

This discussion paper unpacks the just transition into its various elements and explores its implications for the IPR forecast. It provides recent examples of how weak or absent just transition policies can hinder climate progress, and draws out some key principles for sound just transition policy development, including anticipation, participation, formation, location and, crucially, mobilisation of capital.

The discussion is then broadened to the context of long-run economic transformation. In the context of the IPR, the just transition agenda needs to be understood as going far beyond helping displaced workers in high-carbon industries, although this is important. This is about managing a dynamic and, initially, policy-led economic transformation across all sectors and industries. Economic history can help us better understand the story of long-run transformation, providing valuable insights on managing change and fostering a more inclusive, just and sustainable growth model.

The evidence is clear that, from a macroeconomic perspective, the impact on jobs from the low-carbon transition is unlikely to be significant, but there will be acute employment implications for particular sectors and regions, both within and across generations. Case studies of recent transitions can be informative and provide high-level lessons for policymakers. Transition case studies are presented across different countries, which show how successful just transition strategies need to be integrated with economy-wide, low-carbon development strategies, and also need to be individually tailored to place.

Getting a just transition right hinges on the strength of institutions; they are key to maintaining human capital and growth. They will be particularly crucial given that other transformations, in particular in robotics and automation, are already intertwining with the net zero transition, potentially leading to a much larger impact on jobs and society. The paper concludes by applying a 'just transition filter' to the IPR policy levers and adding a cross-cutting public finance dimension. This highlights the policy, institutional and social challenge of ensuring an IPR forecast that is just and leaves nobody behind.

Looking back, the emergence of the just transition as a key pillar of climate strategy reflects the growing realisation that the scale and speed of the economic transformation that is needed requires an active social dimension. This is fully consistent with the integrated approach taken in the SDGs Agenda 2030 strategy. Nevertheless, the just transition agenda remains relatively new in climate policy circles and considerable effort is required to ensure that it is viewed as an essential element rather than an afterthought.

One critical area for further work is to develop the financial strategy for the just transition, encompassing the role of finance ministries and development banks, as well as commercial banks and institutional investors. As a key function of the financial system, institutional investors have a responsibility as stewards of capital and fiduciaries to ensure that governments and the companies they own adopt effective just transition policies. Reasons for investor action on the just transition, and specific measures that investors can take, are discussed in the Annex. A growing number of multilateral development banks are starting to set out their role in helping countries to achieve a just transition, not least the European Investment Bank, the European Bank for Reconstruction and Development and the World Bank.

The IPR forecast has underscored the scale of the economic shift that is coming in terms of policy, technology and market transformations. These all have profound social implications which could usher in a new era of inclusive growth and development if managed well. This is the prize of the just transition – a prize that lies at the heart of the task for investors to deliver resilient returns in an era of disruption.

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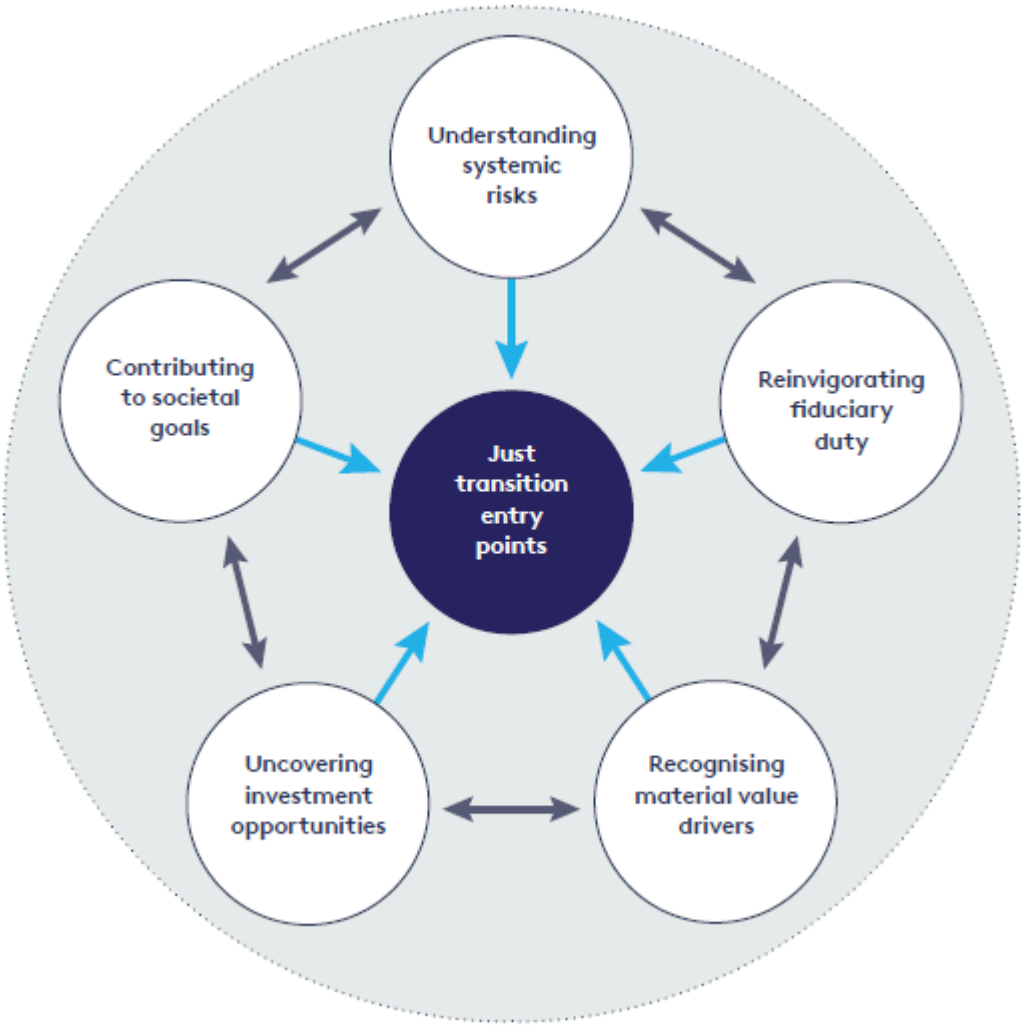
Annex: The case for investor action

The just transition agenda extends the materiality assessment of climate change to include the social dimension. This means that climate action can no longer be considered by investors as an environmental issue on its own. A collaborative project led by the London Schools of Economics' Grantham Research Institute and Harvard's Initiative on Responsible Investment, in partnership with the PRI and the ITUC, has produced a global guide for investor action that brings together Environmental and Social in ESG (LSE, GRI, IRI, PRI, ITUC, 2018).

The guide identified five compelling reasons why investors should take action to ensure that a just transition is central to all strategies and policies for managing change (Figure A1).

Figure A1 Reasons and entry points for investor action on the just transition



Source: LSE, GRI, IRI, PRI, ITUC (2018)

- First, systemic risk: Climate change is well understood by investors as a systemic risk to the global economy, undermining the ability of the financial system to deliver long-term returns. There is also growing realisation among investors that they need to be concerned about the systemic risks posed by inequality, not just climate change impacts. The just transition sits at the intersection of these environmental and social risks to the stability and functioning of the financial system. One systemic

concern is that failing to take account of the social dimension will generate pressures to delay, dilute or abandon climate policy.

- Second, reinvigorating fiduciary duty: The investments overseen by asset owners and asset managers represent beneficiaries, workers and communities, for whom the transition will have powerful effects. The just transition extends the core fiduciary case for action on climate change to include the social dimension. Fiduciaries will need to understand and consider the interests and sustainability preferences of savers and beneficiaries as they relate to both the environmental and social

- Third, recognising material value drivers: For investors, it will be essential that the assets they hold operate effective systems for human capital management and community relations at a time of transformational change in technologies, business models and market demand. To date, this has been absent from most corporate and investor approaches to climate change – for example, from the reporting recommendations of the Task Force on Climate-related Financial Disclosures (TCFD, 2017). Investors need to understand how companies are implementing the just transition in the workplace to drive productivity. Poor management of the transition could damage innovative capacity and employee engagement as well as reduce resilience in crisis situations. The way that companies manage the transition could also have important impacts on their relationship with business partners and other key stakeholders, including their social licence to operate in the wider community. Weak community relations could prompt operational, consumer, client and regulatory repercussions. Conversely, companies that manage this well could benefit from better reputations as well as reduced transaction costs.

- Fourth, uncovering investment opportunities: The just transition provides a lens through which investors can identify new investment opportunities across all asset classes: listed equity and fixed income, private equity, real estate and infrastructure, as well as cash. The just transition is a particularly powerful approach for investors seeking to generate positive environmental and social impacts, in both conventional asset classes and more innovative approaches such as community share and bond offers, along with digital finance mechanisms for crowdfunding investments.

- Finally, contributing to societal goals: Investors clearly need to manage the just transition as it relates to their own beneficiaries and portfolios. However, they are also social actors and supporting the just transition provides a way for investors to contribute to the delivery of the Paris Agreement, the SDGs, and international human rights and labour standards. At the core of the just transition is the intersection of often separate agendas: environmental, social and economic. As a result, it provides connective tissue that brings together different aspects of the SDGs, whose central premise is to ensure that 'no one is left behind'.[17]

The good news is that investors have a set of tried-and-tested tools that can be applied to the just transition. The guide sets out five areas for action through which investors can make the just transition part of their core operating practices (Figure A2).

1. Investment strategy: Assessing exposure to the social dimension (including employment impacts) of the transition, pursuing dialogue with workers and other key stakeholders, and integrating just transition factors into investment beliefs and policies.

2. Corporate engagement: Including just transition factors in investor expectations, requesting disclosure, benchmarking performance, and pressing for improvement. The guide provides an initial set of questions for corporate engagement.

3. Capital allocation: Incorporating the social dimension into strategies for climate investment across all asset classes, including listed equities, bonds, private equity and real assets.

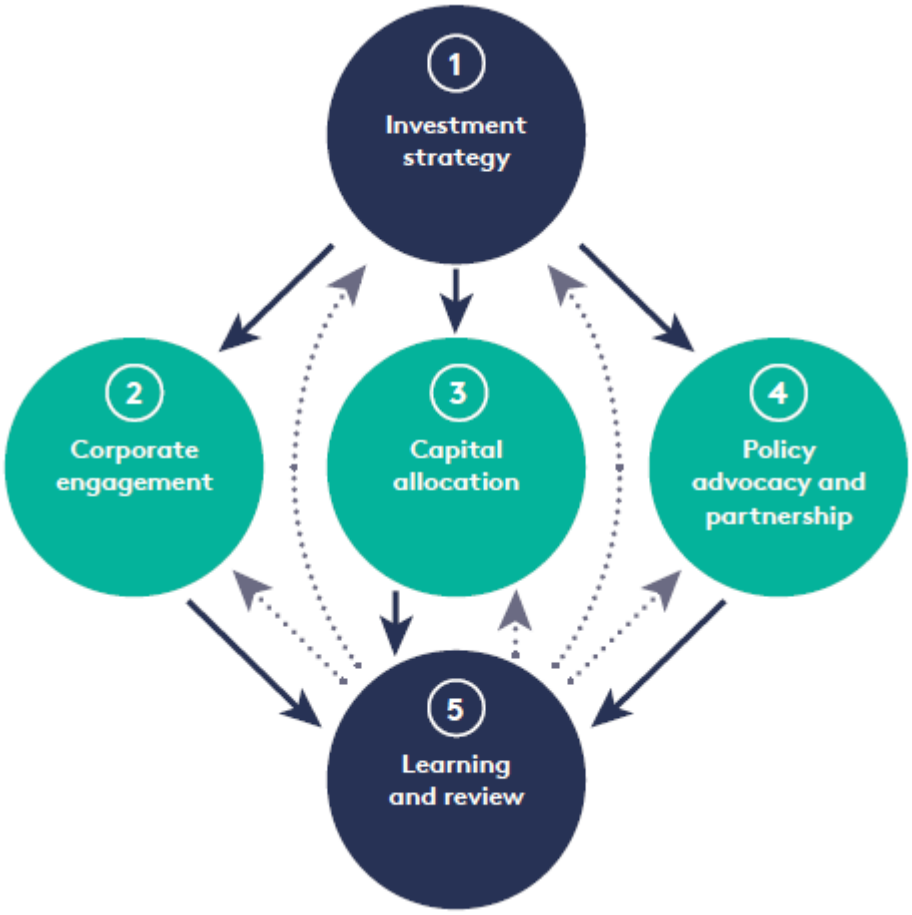
[17] These connections are closest between the goals on climate change (SDG 13) and decent work (SDG 8).

4. Policy advocacy and partnerships: Making the just transition a part of policy dialogue at sub-national, national and international levels, as well as taking part in place-based partnerships.

5. Learning and review: Understanding emerging lessons and disclosing results so that the efficiency and effectiveness of investor action on the just transition continues to improve (Robins, et al., 2018).

As institutional investors revise their strategies and start to act across these areas, they may consider allocating capital to government financing (e.g. purchasing municipal bonds, sovereign bonds, and development bank bonds) that has a social purpose.

Figure A2 The just transition: five action areas for investors



Source: LSE, GRI, IRI, PRI, ITUC (2018)

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