

Spotlight
on risk

Low-carbon transition risk

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As evidence of climate change mounts, the urgency increases of transitioning to a low-carbon economy and society. There is a need for greater attention on the countervailing “transition risks” to which the low-carbon transition is likely to give rise. This article defines transition risk and outlines seven categories of such risks. It concludes by calling for more work to assess, evaluate and mitigate these risks, and to develop the tools and methods needed to deal with the systemic interconnections between them.

The transition toward a low-carbon economy and society is at the heart of efforts to respond to the risks posed by climate change. Although there are signs that a growing number of countries are taking the challenge of transition seriously, progress remains slow. It is unsurprising, therefore, that more attention is paid to the need to ensure that the transition takes place (overcoming “implementation risks” that act as obstacles to the transition) than to preparing for the potential adverse consequences (“consequential risks”) it will entail.¹ Anticipating and addressing consequential risks will be crucial to ensuring a smooth transition, not least because if serious adverse impacts are allowed to crystallise, that could itself become an implementation risk, slowing or derailing the transition process.

There is an increasing amount of work being done on transition risk. Often, however, the various categories of transition risk are analysed independently of each other. This raises the danger that important interconnections will be overlooked. The low-carbon transition presents systemic risks, characterised by non-linearities

and unpredictable cascades within and between different risk categories. The purpose of this article is to define transition risk and to present a brief overview of seven important categories of such risks. This is a crucial first step in facilitating dialogue about the kind of governance arrangements that might be needed to deal with them effectively and holistically.

Defining transition and transition risk

Transition can be defined in broad terms as the process of change within a system from one state or regime to another. In the context of climate change policy, transition has come to refer more particularly to the changes that are required to meet the goal of limiting global temperature increases to well below 2°C and ideally to 1.5°C above pre-industrial levels. The energy system is central to this goal: at the heart of the transition is the need to reduce CO₂ and other greenhouse gas emissions by shifting from fossil fuels to low-carbon energy sources, notably renewables.

Transition is not just a matter of isolated changes in the energy system. A successful transition will entail very substantial changes across myriad aspects of national and international life. It is an open question how radical these changes will need to be. Some argue that technocratic adjustments will be sufficient to deliver the low-carbon transition, but others see this as an underestimation of the challenges ahead, and argue that transition will require “profound changes to many of the core values, dynamics and structures of contemporary society.”² As the scale of the climate challenge mounts, it is also becoming increasingly likely that emissions-reduction strategies will need to be complemented with the reduction of atmospheric greenhouse-gas concentrations through carbon-dioxide removal (CDR), a strategy that may entail its own ancillary impacts, such as large energy requirements for direct air capture.

For the purposes of this paper, “transition risk” refers primarily to the potential adverse impacts that the low-carbon transition will cause: consequential risks. In seeking to mitigate the damage caused by climate change, policymakers need to prepare for potential unintended effects that climate policies may trigger. This reflects a causal chain that the IRGC has noted before in

its work on systemic risk: “transitions that are designed to reduce known systemic risks can potentially also be the source of new systemic risks.”³ Consequential transition risks are therefore an example of “countervailing risk”: ancillary impacts to be considered alongside the targeted benefit of a given policy or course of action.⁴

There is not a clear and sharp distinction between consequential and implementation risks. Adverse impacts may create feedback effects that undermine support for the transition. Moreover, it is also worth noting that there are consequential benefits to consider. In addition to the target benefit of a more sustainable trajectory for the earth’s climate, there may be other co-benefits, such as more national independence from imported energy sources, reduced pollution or a more decentralised and resilient global energy network. (It is important to note that such ancillary impacts will not be viewed as benefits by all. For example, a more decentralised energy system may be viewed as a negative development by incumbent energy companies.)

The pace of transition is an important factor in the severity of the consequential risks that may be triggered. In simple terms, the more sudden the transition is, the more disruptive it is likely to be.⁵ In a benign scenario, the transition begins early and moves along a gradual and clearly signalled policy path. In an adverse scenario, transition begins late and follows an abrupt and unpredictable path, heightening the risk of adverse impacts.⁶ With global emissions continuing to increase, the likelihood of this adverse transition scenario is becoming stronger. If serious progress on cutting emissions had started in 2010, annual reductions of 0.7% or 3.3% would have been required to meet targets of 2°C and 1.5°C respectively. By 2019, the required cuts had increased to 2.7% and 7.6%. In view of this trend, it is increasingly imperative that we understand the broad range of transition risks that confront us.

Seven categories of transition risk

Without sufficient attention to the diversity of potential transition risks, there is a danger that important risks will be overlooked when policies and other responses are being drawn up. For example, the financial sector has made high-profile progress in grappling with transition risk, notably through the Task Force on Climate-Related

Financial Disclosures (TCFD), but this should not overshadow other potential risks, particularly in areas less amenable to quantification.⁷ Seven categories of transition risk are listed below. However, because transition risks are systemic “there are likely to be many non-linear and highly unpredictable consequences of changing the energy system.”⁸ It is thus important to note that the low-carbon transition is going to cause impacts that cannot currently be foreseen. Dealing with transition risk means being prepared to take decisions in the face of complexity, uncertainty, ambiguity, and possibly also emergency.⁹

Finance

The low-carbon transition will lead to stranded capital resulting from a “reassessment of the value of a large range of assets as costs and opportunities become apparent.”¹⁰ As investors take on board the implications of the low-carbon transition they will re-price various assets accordingly, including, but not restricted to, fossil fuel reserves. In principle this is a healthy and welcome process, reflecting a reallocation of capital in the direction required for climate change to be kept within safe limits. However, this requires an early and predictable policy path, allowing for prices to adjust smoothly. A late and sudden transition risks undermining the stability of the global financial system.¹¹ The proportion of fossil-fuel assets that will be affected by the transition is very large. As much as two-thirds of overall reserves may need to be written off – 80% of coal, 50% of natural gas and 33% of oil.¹² Sudden changes on this scale would not just cause turmoil for private-sector investors, but would also affect sovereign debt markets and the fiscal position of many countries.¹³ The OECD notes that half of resource-rich countries rely on fossil-fuel for 50% of their fiscal revenues, while in numerous OECD countries fossil-fuel consumption yields 5% of revenues.¹⁴

Another potential financial risk related to the low-carbon transition is that private investments in renewable energy may not yield the results that investors had hoped for, leading to a sudden divestment from renewable energy businesses. If this occurred, either public funds would be required to make up for the investment shortfall, or also politically determined targets would not be reached.

Economy

Beyond the financial markets, the low-carbon transition will also involve significant macroeconomic risks. One study of “cascading losses” suggests that a complete transition away from fossil fuels could wipe out not just the market valuations of fossil-fuel producers, but also between 0.6% and 8.2% of overall productive capital stock in the economies studied. “In a rapid low-carbon transition, a large amount of built infrastructure, industrial plants and machinery would have to be abandoned or entirely reconverted.”¹⁵ The flipside of this is a potential benefit if the transition is well managed: significant investment in low-carbon infrastructure, plants and machinery, with potential spillover benefits from a period of intense innovation.

In terms of labour market impacts, under an optimistic scenario the net impact of the transition on employment levels would be neutral or positive. However, there is no guarantee that new jobs will be created in the same places that old jobs were lost, or that new jobs will match the skills of those who held the old jobs. In the energy sector alone, up to an estimated 1.6 million people are at risk of losing their jobs in the period 2021–2027.¹⁶ In some places this will represent not just a macroeconomic shock, but a potential societal shock (see below). Mitigating this kind of socio-economic risk is at the heart of the “just transition” literature, which focuses on the distributional aspects of the transition, both within and between countries.

Business

Private sector actors are central to the process of transition. They will potentially be doing a lot of the actual transition work in practice, and are therefore likely to be highly exposed to the adverse impacts it entails. This is at the heart of the work of the TCFD, which aims to make companies’ transition risk exposures more transparent through a regime of systematic disclosures. In addition to financial-sector businesses, these disclosures are recommended in particular for four non-financial sectors that are particularly exposed: energy; transport; materials and buildings; and agriculture, food and forestry. The final TCFD report highlights the following five key transition risks that companies might face. First is policy risk, which arises when a business is exposed to the impact of policies taken to drive the low-carbon transition.

Litigation risk relates to legal action being taken against companies accused of failing to mitigate or adapt to climate change. Technology risk involves the impact of new technologies that are introduced as part of the low-carbon transition – this will affect the competitiveness of different sectors and companies. Market risk relates to the emergence of new winners and losers as supply and demand for various goods and services shifts during the transition. And finally, reputation risk arises if businesses are re-evaluated by customers and communities on the basis of their perceived contribution to (or obstruction of) the transition.¹⁷

Energy

If the transition away from the global energy system's reliance on fossil fuels is poorly planned and/or implemented, it risks leading to interruptions in energy supply, for example due to loss of flexibility and resilience, or to imbalances between supply and demand if fossil-fuel plants are hurriedly taken offline.¹⁸ Technical risks to the energy system include potential failures in facilities such as wind power plants, or cybersecurity vulnerabilities in smart energy grids or virtual power stations. In addition, renewable sources of energy are more prone to interruption than fossil fuels. In Latin America, for example, the comparatively high share of hydropower in the energy mix already increases the vulnerability of the electricity system to loss of snow pack and annual variations in rainfall.¹⁹ If significant energy supply interruptions were to crystallise during the low-carbon transition, it could lead to significant spillover effects. The macroeconomic risks discussed above would be greatly exacerbated in a scenario in which businesses could not rely on the continuity of energy supply.

However, there are also potential benefits for the energy system. The low-carbon transition is likely to result in a more decentralised energy network, with a greater proportion of energy being produced domestically and with energy trade being conducted via regional interconnections rather than via asymmetric reliance on a small number of global suppliers. This shift to a more decentralised and symmetrical energy system – “the internet of energy”²⁰ – should be a source of increased resilience in the energy system.²¹

Society and politics

Energy systems are central to the way societies are structured, and so the changes entailed by the low-carbon transition have the potential to trigger significant social and political disruption.²² Within countries, the low-carbon transition involves distributional effects, which, if poorly handled, may lead to a political backlash among those who are adversely affected. Those on low incomes are likely to be disproportionately affected by the transition, for example because of higher energy prices. The *gilets jaunes* movement in France is an example of the social unrest and the political backlash against transition policies that such price changes can trigger. Managing the transition effectively will mean answering highly political questions of distributive justice or fairness within and between countries: who bears the risks and who reaps the benefits?²³ There may be lessons to be learned here from the digital transformation, where policymakers failed to anticipate the extent to which there would be societal winners and losers.²⁴ The evidence from the shift away from coal that took place in the 20th century points to the potential for significant subnational impacts, including employment losses and the erosion of municipal budgets and community wellbeing.^{25,26} A study of four low-carbon transition policies in Europe (nuclear power in France, smart meters in Great Britain, electric vehicles in Norway, and solar energy in Germany) documented nineteen “commonly recurring injustices”, a plurality of which related to adverse impacts on vulnerable groups.²⁷

A potential benefit in the societal category relates to the opportunity to rethink various aspects of how societies function. For example, the need for a wave of investment in new-generation infrastructure could facilitate altered patterns of urban planning, transport networks and work-life balance. The Covid-19 outbreak has already disrupted the status quo in many of these areas.

International

Internationally, the low-carbon transition will have uneven effects.²⁸ In the same way that low-income households will be most affected within countries (largely due to the impact of higher energy prices), so the transition will create particular challenges for low-income countries. The risk of severe socio-political disruption is greatest in those countries that are most economically reliant on fossil fuels. In

some of these countries, there is a risk not just of localised community decline as discussed above, but of the entire social contract breaking down.²⁹

More generally, the process of transition will entail international winners and losers, and this re-shuffling of status or prestige brings with it the potential for increased international tensions.^{30,31} This in turn militates against the kind of international collaboration that will be needed to negotiate and sustain a smooth transition process. In addition, the low-carbon transition will inevitably lead to transboundary carbon movements, but managing such movements is complicated by the absence of internationally agreed accounting, reporting and verification systems.

Environment

There are very large benefits for the environment from the low-carbon transition, perhaps much larger than the consequential risks to which the transition may lead. The most obvious of these, and the “target benefit” of the transition, is the prevention or reduction of the adverse environmental impacts that climate change will otherwise cause. The transition will also lead to ancillary environmental benefits (co-benefits).³² For example, a shift to low-carbon energy sources will generate positive human health effects by reducing PM2.5 air pollution.^{33,34} As noted above, it also has the potential to deliver improvements in the built environment, such as the construction of more “liveable” cities.³⁵

However, the transition may also lead to environmental damage. There are no simple policy solutions in this area, and decision-making is complicated by numerous risk-risk trade-offs. The scaling up of renewable energy technologies is likely to have adverse environmental impacts, for example through the extraction and disposal of new critical materials such as lithium.³⁶ The scaling up of renewable energy can also lead to damaging land-use changes. Wind and solar power require lots of land and so result in habitat disruption. Similarly, the use of biofuels as an alternative to oil may contribute to slowing climate change, but when scaled it can lead to biodiversity loss as well as to increased emissions of carbon dioxide (from deforestation) and nitrous oxide (from nitrogen fertilizer). The requisitioning of agricultural land for biofuel cultivation can also disrupt food security and supply, potentially leading to spillover risks

in the societal category.³⁷ There are numerous other environmental countervailing risks to be considered, including: the risk of increased methane emissions when natural gas is used; the risk of nuclear contamination from waste and accidents if nuclear energy is used; and the risk that large wind turbine farms may adversely affect wild life.^{38,39}

Conclusion

Transition risk warrants greater policy attention. The primary focus remains ensuring that the low-carbon transition takes place, in order to avoid the great risks that would be entailed by climate tipping points being crossed. Prudence requires looking ahead to anticipate and mitigate the adverse impacts that may follow the transition. This paper has set out seven categories of transition risk. Policymakers should make it a priority to assess, evaluate and mitigate these risks. Some of this mitigation work is already under way, for example in compensatory initiatives like the EU’s Just Transition Fund. Much more will need to be done, including providing clarity and leadership in relation to the institutional arrangements needed to tackle an issue as broad as transition risk. Close attention should also be paid to the systemic interconnections among transition risks, which create the risk of unpredictable spillovers and non-linearities. This may require the use of narratives, scenarios and other tools of “systemic risk governance” to broaden the boundaries of the system and acknowledge that traditional methods or models for risk analysis are not sufficient.⁴⁰ One particular challenge will be to make decisions about trade-offs under conditions of uncertainty and ambiguity. What methods can be used to identify compromises that will balance desirable but incompatible objectives in this area, and arrive at “risk-superior” outcomes?⁴¹ These questions and challenges are becoming increasingly urgent as climate change materialises.

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