Many commenters on the pandemic response have noted the supposed silver lining that as travel, commerce, other economic activity have dropped, so too have the associated burdens on the environment. The air is clean, wild animals are roaming in cities – and there have been substantial, not huge, reductions in the emissions of CO_2 and other greenhouse gases that are driving climate change. The data come in slowly, but various early estimates have found emissions down by roughly 5 to 20 percent from last year. If year-to-year reductions that large could be sustained for the next 20 or 30 years, the world would be much closer to an emissions trajectory consistent with the Paris targets of limiting global heating to 1.5°C or 2°C above pre-industrial levels.

Unfortunately, it doesn't work that way – and much of this commentary, no doubt looking to find some positive message from the pandemic, has spread confusion on this point.

The problem is two-fold. First, what matters for climate change is not emissions in any single year, but cumulative emissions – over the entire century, or until whenever emissions drop to zero and cease. Human emissions must go to zero to stop further climate heating, and must go below zero – net negative – to reverse any prior heating. While a single-year decrease of course reduces the cumulative total, all other things equal, a one-time drop only represents progress if it makes future drops more likely, or reveals previously unavailable ways to achieve them. In the present pandemic response, that is mostly not what is happening.

To see this, it is helpful to break emissions down into their constituent factors. For any given time and place (e.g., California in April, or the United States in the 2020 year to date), you can decompose total emissions into the product of two things ("product," as in multiplying them together: there are more detailed ways to break down emissions into three or four factors, but considering just two makes the point): the total level of economic activity over the relevant time and place, and the "emissions intensity," or level of emissions per unit of economic activity. Dollars of economic output multiplied by tons of emissions per dollar of output gives tons of emissions.

The first of these factors reflects how many people there are in the place you're looking at, and how much (and what) they are doing – producing and consuming, traveling, buying and selling, etc. It goes up when people's and business's activities, outputs, and incomes increase, down when these decrease – as they have, sharply, during the current closures. The second factor combines a couple of things: First,

the mix of economic activity – how much output is in high-emissions products like steel or concrete, how much in low-emissions goods like tax preparation services, teaching, musical performances, and back massages; and second, the installed technology and capital stock, and mix of higher and lower-emitting energy sources, with which this particular mix of outputs is produced.

In pursuing the steep cuts in emissions needed to limit climate change, most attention and effort has focused on transitioning to lower and non-emitting capital stock, technology, and energy sources: more efficient use of energy; switching to non-emitting energy sources like solar, wind, and nuclear; corresponding changes in other activity sectors such as agriculture, forestry, and industrial processes; and developing technologies for “carbon capture and sequestration” (CCS), which allow some continued use of fossil fuels without emitting CO_2, by separating it before being emitted. (A separate but related set of technical options, “carbon dioxide removal” (CDR) re-captures CO_2 from the atmosphere after it is emitted: watch for another post coming on that.)

These technological changes can achieve a huge amount of what is needed to limit climate change, at moderate cost if phased in with support from sensible policies. But governments have been stalling serious action for decades, and the longer this continues the more acute the mitigation challenge becomes. The limits of how fast and how far emissions can feasibly be reduced by technological innovations that uncouple economic value from emissions and related flows of materials and energy are uncertain. But if the cuts needed to hold climate-change risks to acceptable levels far outstrip these, then mitigation must increasingly shift to include the much more difficult and conflictual challenge of reducing total economic output. No jurisdiction has ever intentionally pursued reduced consumption for environmental purposes, and – given the intense modern focus of government aims on continued economic growth – it is hard to imagine how any democratic jurisdiction ever could.

Which brings us back to the pandemic. The sharp reductions in emissions experienced over the past two months are almost all due to contraction of economic activity, as businesses have shrunk or closed down, workers have been laid off, and familiar patterns of production, exchange, and consumption have been disrupted and contracted.

This has reduced emissions, sure – but at the cost of extraordinary disruption and suffering, which is mounting with each passing week. The disruptions to limit spread of COVID are more sustainable in countries more competent and less corrupt

national governments, less extreme inequality, and less everyone-for-themselves political cultures, who are marshalling both more effective public health response and more effective emergency relief measures to reduce the ancillary harms. But they are unlikely to be sustainable for more than a few months, at least in their strongest forms, even in those lucky countries.

Moreover, the way these emissions reductions have occurred has little overlap with the changes in technology, capital stock, and management practices needed to achieve more durable reductions. Replacing old capital and technology with new, climate-safe forms requires huge programs of RD&D and capital investment sustained over decades. Mobilizing such new investments is far more difficult during flat or declining economic output than in times of growth – and the needed investments have slowed along with everything else during the present crisis.

There are a few exceptions to this rather sobering picture. Among responses to the pandemic are some changes that may foretell more durable change, notably the large reductions in travel associated with the shift of so many activities to remote interactions via online video. This experience may carry demonstration and critical-mass effects that lead to durable changes that reduce emissions. There may also be broader and more indirect effects that represent helpful changes in political conditions to facilitate effective action on climate change. It is surely helpful, for example, to have a few basic realities forcefully affirmed: e.g., that decent societies need functioning governments, that expert knowledge is a better guide to action on some threats than political spin or media-packaged common sense; and that some shared threats are severe enough to warrant substantial economic losses or even suspension of normal operations of the economy. Perhaps, if we’re lucky, lessons such as these will hit hard enough that people remember them in other contexts like climate change – even though climate change moves more slowly than an epidemic, so nay-sayers rejections of the reality of the threat only get proven wrong after a few decades, not a few weeks. Such lessons might helpfully expand the space of the politically feasible when (if) the world turns attention back to climate change.

Unfortunately, however, the more concrete and direct effects of the pandemic are unlikely to facilitate the big emissions cuts and associated economic and technological transformation needed to deal with climate change. Moreover, to the extent the pandemic response leaves a huge burden of public and private debt – regardless of how well justified by the extremity of the risk – that will represent an additional hindrance to the future investments needed to fight climate change.