

Justice and Climate Transitions

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Abstract

Plans for transitioning to a low carbon society often focus on the most efficient and effective methods of reducing GHG emissions. While emissions reduction is obviously key to avoiding dangerous climate change, it is by no means all a transition should aim to achieve. We will argue that a climate transition should also aim to achieve broader social justice goals. In particular, a climate transition should aim to reduce inequality. Further, a reduction in inequality should not simply be a ‘co-benefit’, but a central goal guiding the allocation of resources and the shape of any transition. We will outline a framework that balances social justice and mitigation goals through a focus on inequality in the Australian context. We will also discuss how such a framework can address our global obligations.

Keywords

Climate Change Mitigation; Climate Transitions; Distributed Energy; Inequality; Justice

I INTRODUCTION: MOTIVATING MITIGATION

A Why Justice?

There is widespread agreement that our transition to a low carbon society ought to be just and fair. Indeed, it would be surprising to find anyone who was prepared to argue explicitly that our transition should be *unjust* or *unfair*. However, despite widespread agreement on the need for a just transition, there has been little systematic attention paid to what principles at a general level ought to guide a just transition, once the extent of the transition has been determined.¹ Many responses to climate change

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¹ Steve Vanderheiden, *Atmospheric Justice: A Political Theory of Climate Change* (Oxford University Press, 2008); John Broome, *Climate Matters: Ethics in a Warming World* (W W

acknowledge the need for normative principles yet focus mostly on mitigation issues.² Others acknowledge the importance of justice but claim that it makes mitigation too difficult.³

Part of the issue here is that a commitment to ‘justice’ or ‘fairness’ at a very abstract level does not, on its own, get us very far. It does not give us much guidance about what circumstances are really just or fair, or what justice consists of. What is needed is a conception of justice or fairness that tells us something concrete about what justice means in the context of a climate transition: for example, whether a just transition involves simply reducing emissions, or also assisting the disadvantaged; and, if the latter, what kind of assistance is called for? Should we focus on making people more equal, prioritising the needs of the disadvantaged, or something else? What if pursuing the goal of making people more equal makes our transition more costly or slow? Similarly, decisions about the speed and scope of a transition will also require us to consider our fundamental motivations for undergoing that transition.

Here we argue that a fair approach to the distribution of a climate transition’s benefits and burdens must be the focal point of any transition strategy. This fair distribution cannot be considered solely in terms of ‘co-benefits’ that are an afterthought to the development of such strategies. We argue that any climate transition should take a unified approach that balances mitigation goals with broader goals relating to justice. The arguments here are necessarily preliminary. However, we also develop a framework that translates these broader goals to a specific context, by focusing particularly on the goal of reducing inequality and on Australia as a case study. While our case study is only one example of the application of these broad normative goals, it does provide an indication of how and why such goals are important.

We also suggest that including justice considerations from the start may in fact be a better way to guarantee the success of a climate transition. Adopting goals other than the simple reduction of emissions may be a way of making a climate transition more acceptable as well as fairer. So not only will ignoring the importance of justice rob us of an ability to appropriately consider other benefits of a climate transition, it might also lessen the likelihood of that transition’s success. Justice considerations

Norton, 2012). For a survey see Dominic Roser and Christian Seidle, *Climate Justice* (Routledge, 2017).

² See Craig Morris and Martin Pehnt, ‘Energy Transition: The German Energiewende’ (November 2012) Energy Transition: The Global Energiewende <<https://book.energytransition.org/>>. Sonja Klinsky et al, ‘Building Climate Equity: Creating a New Approach from the Ground Up’ (Report, 2015) <<https://www.wri.org/sites/default/files/building-climate-equity-072014.pdf>>.

³ For a discussion (though not endorsement) of this point see Simon Caney, ‘Just Emissions’ (2013) 40 *Philosophy and Public Affairs* 255.

are also central to establishing and motivating the extent and speed of a country's transition. In Section I we begin by discussing how justice can motivate a transition. In Section II we argue that justice goals are unavoidable for a climate transition and that they must be combined with mitigation goals. In Section III we focus on why reducing inequality in particular ought to be a goal of a transition. In Section IV we apply this insight to through a case study of distributed energy.

B Transitions and the Carbon Budget

Principles of justice are of relevance to climate transitions in a number of ways. Climate change itself matters because of its impact on human society and the environment, which is fundamentally a moral issue. Further, a focus on justice is required to understand how to share the benefits and burdens of a transition. Without a framework for fairly allocating benefits and burdens we risk creating further injustices. A good illustration of these issues is how countries decide on domestic and global 'carbon budgets'.

To avoid dangerous climate change the world must transition from emitting high amounts of greenhouse gases (GHGs) to emitting very low amounts. The transition has already begun but needs to speed up considerably if the world is to meet its global emission targets. By signing the Paris Agreement, the majority of the world's countries have accordingly endorsed the common goal of keeping global temperature rise below 2°C. The global carbon budget is the total amount of GHGs we can emit globally from now on, if we are to have a good chance of meeting this goal.⁴ Local carbon budgets, then, are the share of this global carbon budget allocated to different individual countries. However, the world's current combined domestic emissions targets, even if they are all met, are unlikely to be consistent with the achievement of the 2°C goal. We need to aim higher, and transition faster.⁵

A fast and efficient transition is particularly urgent for countries, like Australia, that have very high current levels of GHG emissions. Australia's Nationally Determined Contribution (NDC), following the Paris Agreement, includes a target of reducing GHG emissions, including land use, land use change and forestry (LULUCF), by 26–28% below 2005 levels by 2030.⁶ This translates into a range of 445–458 MtCO₂-e

⁴ Malte Meinshausen et al, 'Greenhouse-Gas Emission Targets for Limiting Global Warming to 2°C' (2009) 458 *Nature* 1158.

⁵ Rogeli et al, 'Paris Agreement Climate Proposals Need a Boost to Keep Warming Well Below 2 °C' (2016) 534 *Nature* 631.

⁶ Australian Government, 'Australia's 2030 Emissions Reduction Target: Strong, Credible, Responsible' (Fact Sheet, 2015) 4
<<http://www.environment.gov.au/system/files/resources/f52d7587-8103-49a3-aeb6-651885fa6095/files/summary-australias-2030-emissions-reduction-target.pdf>>.

allowed emissions in 2030 (including LULUCF).⁷ Current Australian Government projections have Australia producing about 1000MtCO₂-e more between 2021 and 2030 than would be consistent with this target.⁸

Australia's obligation to transition away from a high-emitting way of life derives, in part, from its international commitments. On the basis of the targets we agreed to in Paris, we have an obligation to reduce our domestic emissions. Australia has also agreed in its Paris commitments to contribute to other countries' mitigation efforts via various mechanisms, including the Green Climate Fund, which was set up to address the pressing mitigation and adaptation needs of developing countries. Australia has pledged to contribute USD \$200 million to the Fund between 2015 and 2018.⁹ However, existing agreements are only part of the story. The commitments we have made so far do not, in all likelihood, go far enough.

1 *Further Responsibilities*

Australia's current emissions reduction target is most likely well below both what would accord with our fair share relative to other countries, and what would align fairly with global carbon budget targets. Most other industrialised countries, except Canada and New Zealand, have proposed 2025 or 2030 goals significantly below 1990 levels.¹⁰ For example, the European Union has pledged a reduction in domestic emissions of 30-39% below 1990 levels.¹¹ Australia's goal of reducing emissions by 26-28% below 2005 levels equates to a reduction of only 13-15% below 1990 emissions levels.¹² Based on this comparison alone, we seem not to be doing our fair share.

The view that Australia is required to follow a much steeper emissions reduction trajectory is widespread. The Climate Council states that:

Australia must cut its greenhouse gas emissions much more deeply and rapidly to contribute its fair share in meeting the climate change challenge. A 2030 target of a 40-60 per cent reduction below 2000

⁷ Marcia Rocha et al, 'Australia Set to Overshoot its 2030 Target by Large Margin' (Report, Climate Action Tracker, 27 August 2015) <http://climateactiontracker.org/assets/publications/briefing_papers/Australia.pdf>.

⁸ Department of the Environment and Energy (Cth), 'Australia's Emissions Projections 2016', (Report, December 2016) iii <<https://www.environment.gov.au/system/files/resources/9437fe27-64f4-4d16-b3f1-4e03c2f7b0d7/files/aust-emissions-projections-2016.pdf>>.

⁹ Julie Bishop (Minister for Foreign Affairs), 'Australia to Lead Green Climate Fund Board in 2017' (Media Release, 16 December 2016) <https://foreignminister.gov.au/releases/Pages/2016/jb_mr_161216.aspx>.

¹⁰ Climate Action Tracker, 'Australia' (Assessment, Climate Action Tracker, 27 August 2015) <https://climateactiontracker.org/media/documents/2018/4/CAT_2015-08-27_CountryAssessment_Australia.pdf>.

¹¹ Climate Action Tracker, *EU* (2017) <<http://climateactiontracker.org/countries/eu.html>>.

¹² Rocha, above n 7.

levels (or a range of approximately 45 to 65 per cent below 2005 levels) is the bare minimum for Australia to be both in line with the science and the rest of the world.¹³

We arguably also have a duty to make more significant reductions in GHG emissions, both domestically and as a proportion of global emissions, for two further reasons: because we have emitted more than our share in the past, and because we contribute heavily to global emissions by exporting large quantities of fossil fuels.

2 Historical Responsibility

One important principle of justice that is often applied in this context is the principle of *historical responsibility*. According to this principle, historically high-emitting countries should be allocated a smaller amount of the remaining global carbon budget than historically low-emitting countries.¹⁴

Australia has emitted a disproportionately high share of GHG emissions in the past. This has been the case particularly in the more recent past, since the harmful consequences of GHG emissions have been well established. While there is no universally agreed upon formula for allocating responsibility for historical emissions, it is safe to say that Australia has far exceeded any quota it might reasonably have been allocated in the past.¹⁵

In 1990, Australia's per capita emissions were 28.02 tCO₂ (excluding LULUCF). In contrast, per capita emissions for the world, the EU, and

¹³ Gerry Hueston et al, *Halfway to Paris: How the World is Tracking on Climate Change* (13 July 2015) Climate Council <<https://www.climatecouncil.org.au/halfway-to-paris-how-the-world-is-tracking-on-climate-change>>. Climate Action Tracker rates Australia's pledges as 'inadequate', indicating that Australia's commitment is not in line with most interpretations of a 'fair' approach to reach a 2°C pathway. See Rocha, above n 7, 2.

¹⁴ Other terminology associated with historical responsibility in this context includes 'polluter pays', 'accountability/sensitivity', 'contribution to problem' and 'Brazilian proposal' (the latter after a proposal along these lines made by the Brazilian delegation to the Kyoto Protocol negotiations in 1997 (included in annex I to the United Nations Framework Convention on Climate Change, opened for signature 3 June 1992, 1771 UNTS 107 (entered into force 21 March 1994)). See Simon Caney, 'Justice and the Distribution of Greenhouse Gas Emissions' (2009) 5(2) *Journal of Global Ethics* 125, 133; Eric Neumayer, 'In Defence of Historical Accountability for Greenhouse Gas Emissions' (2000) 33(2) *Ecological Economics* 185; Edward Page, 'Climate Change Justice' in Robert Falkner (ed), *The Handbook of Global Climate and Environmental Policy* (John Wiley and Sons, 2013) 231, 237; David R Morrow, 'Climate Sins of Our Fathers? Historical Accountability in Distributing Emissions Rights' (2016) 19(3) *Ethics, Policy and Environment* 335; Lukas H Meyer and Dominic Roser, 'Climate Justice and Historical Emissions' (2010) 13(1) *Critical Review of International Social and Political Philosophy* 229; Benito Müller et al, 'Differentiating (Historic) Responsibilities for Climate Change' (2009) 9(6) *Climate Policy* 593.

¹⁵ J Moss and R Kath, 'Historical Emissions and the Carbon Budget' (2018) *Journal of Applied Philosophy* (forthcoming).

China for the same year were 5.67 tCO₂, 9.82 tCO₂, and 2.78 tCO₂, respectively. These figures are less than one-third of Australia's per capita emissions. As of 2013, Australia's per capita emissions were 25.09 tCO₂. Despite this small decrease, Australia's per capita emissions remained much higher than world, EU, and China figures for the same year (at 6.31 tCO₂, 8.32 tCO₂, and 8.65 tCO₂, respectively). Australia's 2013 per capita figure is still approximately three times higher than those of the EU and China.¹⁶

For decades now, we have continued to emit GHGs at these high rates, despite convincing evidence that we are thereby contributing to the risk of dangerous climate change. This, of course, affects everyone on the planet. A warming climate is bad for Australians; it is bad for those in other countries, and often worst for the poorest people in the world. By over-emitting we not only contribute to the risk of dangerous climate change; we also place more pressure on others to reduce their emissions more rapidly than would otherwise be required. By emitting more than our fair share we place a demand on others to 'take up the slack' in emissions reductions, which creates further difficulties and hardships.

Our responsibility for excessive historical emissions (in particular those produced in full knowledge of modern climate science) is one justice-based reason we have to make more significant cuts in our domestic emissions than we have so far committed to.¹⁷ A principle of historical responsibility is thus one issue of justice that should motivate and inform our climate transition strategy.

3 Exports

Australia is not only a heavy domestic emissions producer. We also export a huge quantity of coal and gas, which both contribute significantly to global emissions. As shown in the table below, the amount of emissions produced from Australia's exports of fossil fuels is double our domestic emissions. Arguably, we are partly causally responsible for those further emissions, though they do not currently count in our domestic emissions budget.

To see why we ought to take some responsibility for these export-based emissions, consider the following analogy. Suppose that a country exported tobacco to a developing country. Given what we know about the links between smoking and death and disease, the exporting country

¹⁶ World Resources Institute, *Introducing Climate Watch*, CAIT Climate Data Explorer <<http://cait2.wri.org>>.

¹⁷Göran Duus-Otterström, 'The Problem of Past Emissions and Intergenerational Debts' (2014) 17(4) *Critical Review of International Social and Political Philosophy* 448; Meyer and Roser, above n 14.

would plausibly be implicated in the harm caused by tobacco smoking in the developing country, and morally responsible for at least some of that harm. Another example concerns uranium exports. Most countries place restrictions on the destination of their uranium exports. The risks of uranium falling into the wrong hands, accidents, storage issues, and so on, are just too great with some countries to countenance an export program. Should one country knowingly export uranium to another country where these issues are present, we could rightly hold it liable for any resultant harms. If this is true, we ought to take some responsibility for those emissions produced by the burning of our fossil fuels, from which we profit significantly. For the same reasons that a country ought to share the blame when they knowingly contribute to harm via their exports of, say, uranium, a country ought also to share the blame for producing and selling commodities such as coal or gas. This is not to say that Australia ought to be responsible for *all* of those emissions, as well as its own domestic emissions. It is merely to say that Australia ought to bear *some* level of responsibility for these emissions, either by setting higher reductions targets to offset them, or by significantly downsizing its fossil fuel exports.

| | Total Australian emissions with exports excluded | Total Australian emissions from coal exports | Total Australian emissions from natural gas exports | Total actual emissions | Total Australian emissions 2020 target |
|---------|--------------------------------------------------|----------------------------------------------|-----------------------------------------------------|------------------------|----------------------------------------|
| Unit | Mt CO ₂ -e | Mt CO ₂ -e | Mt CO ₂ -e | Mt CO ₂ -e | Mt CO ₂ -e |
| 2014-15 | 565.6 | 1016.36 | 67 | 1648.96 | |
| 2015-16 | 594.4 | 1011.92 | 95.95 | 1702.27 | |
| 2016-17 | 617.3 | 1012.52 | 135.88 | 1765.7 | |
| 2017-18 | 638.2 | 1032.68 | 182.51 | 1853.39 | |
| 2018-19 | 652.7 | 1048.6 | 198.32 | 1899.62 | |
| 2019-20 | 655.6 | 1063.69 | 199.13 | 1918.42 | |
| 2020-21 | 659.8 | 1074.44 | 201.54 | 1935.78 | 532 |

Table 1: Summary of past, present and projected figures for Australian CO₂-e emissions. Data from the Department of the Environment's 'Australia's Emission Projections 2029-2030' (March 2015) 32, and the Office of the Chief Economist, 'Resources and Energy Quarterly' (March 2016).

If we consider the consensus view about the inadequacy of the commitment Australia has already set through the Paris Agreement, its historical responsibility for past emissions, and its status as a heavy exporter of fossil fuels, Australia is doing much less than its fair share in enabling a swift and efficient global climate transition. To meet its justice-based obligations it would appear, then, that Australia ought to set more stringent reductions targets.

4 International Obligations

Establishing the source and strength of the motivations we have to reduce our emissions raises a further justice-related question: how much should we focus on our domestic transition, and how much on assisting other countries to transition? Given that our emissions have contributed to harming others, should we direct some of our efforts and resources toward their climate transitions? Or should we focus on making our own reductions as significant as possible? If Australia were to further reduce its domestic emissions (beyond its current Paris target, and beyond what would be required once historical responsibility and exports were taken into account) this would lessen the burden on other countries to cut their emissions. This might allow other countries to make a smoother climate transition. However, some action in addition to domestic emissions reductions might also be required. Many developing countries will have difficulty implementing the changes to lifestyles and infrastructure required by any robust climate transition.¹⁸ They will mostly likely need practical assistance with the transition process.

Moreover, Australia simply increasing its emissions reductions targets may not be enough to achieve justice. We should also assist other countries to implement their own plans to transition. This could be achieved in a number of ways, such as by shifting resources from a domestic transition to the Green Climate Fund or a similar fund. It might also mean sharing developments in renewable energy technologies. Helping other countries in this manner is a way to take seriously Australia's obligation to mitigate the harms that have been and are being caused by its high historical emissions and exports.

II JUSTLY DISTRIBUTING THE BENEFITS OF CLIMATE TRANSITIONS

A Dual Goals

We have suggested that Australia ought to adopt a more ambitious emissions reduction target, and embrace a faster climate transition, than it

¹⁸ Organisation for Economic Co-operation and Development (OECD), 'Green Growth and Developing Countries: A Summary for Policymakers' (June 2012) 8 <<https://www.oecd.org/dac/50526354.pdf>>.

has done so far. Regardless of the final details of our climate change mitigation targets, however, Australia's transition will require that resources be directed towards two goals.

The first is ensuring that the emissions reduction target is met. Transitioning to a low-GHG society will of course involve many different processes, from transforming our electricity supply by investing in renewable energy, to increasing public transport, changing consumption habits, and so on. The challenges and costs here are considerable. For instance, a recent report from the Australian Energy Market Operator (AEMO) indicated that the cost of building a 100 per cent renewable power system is estimated to be at least \$219 to \$332 billion (by 2030 or 2050 respectively), depending on the transition scenario adopted.¹⁹

The second goal is making sure that the resources employed in transition are fairly distributed to achieve the best social justice outcomes. Evaluating this goal is the second key focus of this article.

B Justice is Everywhere

One reason we should put distributive justice at the heart of Australia's transition planning is because the effects of any climate transition on the wellbeing of many in society will be significant and widespread. In this sense, distributive justice is inescapable. Installing new renewable energy capacity, cutting subsidies for the fossil fuel industry, building extensive public transport, and so on: all of these measures will inevitably involve significant costs, and confer significant benefits. The costs might include restrictions on the types of choices that individuals can make and the imposition of additional forms of taxation. The benefits will include not only a fair contribution to mitigating climate change, but also cleaner air, reduced congestion, and many other kinds of benefit.

No matter what technologies we choose or policy mechanisms we adopt to achieve a climate transition, those technologies and mechanisms will generate benefits and burdens, and those benefits and burdens (particularly the burdens) will have to be paid for and shared by individuals or groups within society. Sharing benefits and burdens within (and between) societies is a question of distributive justice. In the broadest sense, distributive justice concerns the distribution of all the relevant benefits and burdens in a society, and often between societies as well. In relation to climate transitions, it concerns the sharing of the

¹⁹ Australian Energy Market Operator, '100 Per Cent Renewables Study: Modelling Outcomes' (July 2013) 34
<<https://www.environment.gov.au/system/files/resources/d67797b7-d563-427f-84eb-c3bb69e34073/files/100-percent-renewables-study-modelling-outcomes-report.pdf>>.

benefits and burdens that result from transitioning from a high- to a low-GHG society. Ultimately, it concerns making society a more equal place.

Of course, a focus on deploying the best technology to reduce emissions is paramount. But technology alone is not sufficient to achieve the best kind of climate transition. We must also incorporate justice-type goals and we need to be aware of why this is the case. It is well understood that a range of factors influence which technological and policy approach will reduce emissions most effectively in a given country or case. These factors include things like cost constraints, governance, research capacity, hostile environmental conditions, degree of urban sprawl, and so on. What is less widely acknowledged is that these factors, and perhaps others, also influence the distribution of benefits and burdens. That is, they influence which technological or policy approach will be most just in a given country or case. As we pursue the necessary goal of reducing our GHG emissions, we must also pay attention to our justice goals, which will be affected in myriad ways by our choice of transition path.

Moreover, the impacts of distributing burdens in the wrong way might be severe. If we are not careful, we might adopt an emissions reduction strategy that means the already disadvantaged bear more of the costs, for instance because of punitive tax arrangements. The impacts of our transition might also be felt more keenly by specific groups: for example, those who lose their jobs in fossil fuel intensive industries, or those whose health conditions require more electricity. We must pay attention to the distribution of the significant burdens that we will share (somehow) in the transition process. We must also pay attention to the distribution of the benefits. Some might unfairly miss out on the benefits of transitioning, for example if benefits such as jobs or energy subsidies are misdirected.

This kind of consideration is of course not unique to climate transitions. Various industries and professions regularly shut down or move to other countries, resulting in economic and wellbeing impacts for large numbers of people. However, it is likely that the transformation required in a robust climate transition will be more widespread than, say, the ceasing of logging in old growth forests. Because of changes to people's lifestyles as well as costly new infrastructure, a climate transition will potentially involve a more profound and broader societal adjustment. But it also offers a more profound opportunity: if we can replace high carbon societies with ones that are not only low carbon but also less unequal, that is a better outcome. All these considerations increase the need to focus on ensuring that the climate transitions are informed by issues of distributive justice.

Considering the justice-related implications of our transition plans is an important first step. But awareness of these consequences, when considering which technologies to deploy or what kind of taxes to adopt, will not by itself lead to the best possible outcome. Considerations of distributive justice are relevant in a broader sense than discussed above. Societies are interested in improving numerous aspects of their citizens' lives, including their health, education, access to the environment, mobility, and a number of other matters. What is important is that individuals have access to a range of goods that will enable them to live a better life.

It is the provision of this *package of goods* that ought to be the goal of any government. We care about health and education because each of these goods is in general necessary for individuals in a society to have a good life, even though various individuals will need such goods to different degrees. Moreover, we care about whether *all* the relevant goods are available to individuals. Ultimately, it is whether these goods are present that will determine whether the distributive arrangements in a society are fair. Moreover, we have broader moral obligations that are conceivably relevant. We have obligations to make society a more equal place, to improve the lives of those worst off, to compensate others for any harm we cause them, to prevent persecution and discrimination, to meet people's basic needs where possible, to fulfil our commitments, to protect the vulnerable and voiceless, to avoid wars, and so on. Ultimately, it is a combination of some of these broader goals that we should expect to be reflected in a justice-focused climate transition plan. It is the integration of these broader goals with the narrower goal of mitigating climate change that we are calling a 'unified' approach to a climate transition.

Contrast this unified approach with standard approaches to climate transition. One typical approach is to say that the main (if not the sole) aim of a climate transition is to reduce emissions as quickly and efficiently as possible. This is what we might call the 'isolationist' approach.²⁰ It is isolated because the main goal is morally simple and minimal: reduce emissions (even though there may be some attention paid to other kinds of issues along the way). It is one thing to say that we ought not to forget the moral consequences of our transition, but quite another to hold that we ought to have broader justice considerations at the heart of our transition, in conjunction with emission reduction goals.

According to the isolationist approach, we ought to set all of these other moral goals aside (or at least consider them of secondary importance) as we pursue the goal of minimising GHG emissions. According to the

²⁰ Simon Caney, 'Just Emissions' (2013) 40(4) *Philosophy and Public Affairs* 255.

unified approach, on the other hand, we ought to pursue our other moral goals *in conjunction with* our emission reduction goal. This means that a transition ought to combine a concern for justice with a concern for mitigation. Ultimately, we will have to balance the demands of these two sets of goals. But it is important that we keep them both at the heart of our decision-making process.

1 *Does a Unified Approach Make the Transition Harder or Easier?*

One might worry that bringing these broader justice-based goals into our climate transition decision-making framework will over-complicate an already difficult task, and hamper progress towards mitigation. For example, requiring that a climate transition address health or education goals might be considered controversial, or practically infeasible. Some might argue that we should not complicate the climate transition planning process with the array of difficult disagreements over which further justice-based goals a society ought to pursue. This is an important point.

But, as the philosopher Simon Caney points out, much will depend on what kind of values or goals are at stake.²¹ What he calls a ‘maximal’ approach to justice will have very specific and perhaps controversial commitments; for example, it might entail a radical political program. No doubt some maximal ideas of distributive justice are like this and would drastically complicate the climate transition process. In contrast, we can find elements of distributive justice that are more minimal and less controversial, where disagreement would not be so great. In the rest of this article we focus on one such element: reducing inequality.²² We explore some of the implications of adopting inequality reduction as a goal which, alongside GHG emissions reduction, should guide a climate transition. Reducing inequality is thus an answer to the question posed at the start of the article: how we should understand what it means for a climate transition to be just.

There is a further response to the objection that picking a more substantive set of goals will just invite controversy and stymie mitigation efforts: that it may be the case that *not* considering justice-based goals as

²¹ Ibid.

²² While by no means uncontroversial, the importance of reducing inequality has been discussed extensively within philosophy. For key discussions see Martin O’Neill ‘What Should Egalitarians Believe?’ (2008) 36 *Philosophy and Public Affairs* 119; Tim Scanlon, ‘The Diversity of Objections to Inequality’ in Matthew Clayton and Andrew Williams (eds), *The Ideal of Equality* (Palgrave Macmillan, 2002) 46. Reducing inequality has also been an influential idea in other disciplines and in broader debates. See eg Thomas Piketty, *Capital in the Twenty-First Century* (Harvard University Press, 2014).

fundamental will make things worse. Failure to address people's concerns about who obtains the benefits and who bears the costs of a wide-ranging and expensive climate transition seems likely to make such a transition unworkable.

The transformation of the stationary energy sector is a case in point. As some Australian states transition to a greater reliance on renewable energy, there is fierce debate concerning the effects of this on power prices (particularly for poor households), whether energy companies are profiting excessively, and whether a switch to renewables will allow reliable and secure electricity supply. Add in questions concerning whether there should be more 'distributed' energy²³ (in part because it allows more independence), and we have a complex set of justice-related goals that are (rightly) being considered as part of the switch to renewables. Failure to take considerations of this nature into account will plausibly make the acceptance of an ambitious climate transition, and thus the associated potential benefits, less likely.

2 Analogies (Justice in Other Contexts)

It should really come as no surprise that climate transitions ought to be planned with reference to a broader package of goods and values, and distributive justice generally. Numerous other public problems have this structure. Consider education, for example. More education (at least up to a point) improves people's lives – it increases the work and lifestyle opportunities available to people, and leads to better health and financial outcomes. Very often, less wealthy individuals have more limited access to education. These facts, together with a minimal concern for justice, mean that we (either as governments or as individuals) ought to improve education in poor communities.

But we shouldn't pursue this goal in an isolated fashion. We ought to bear in mind other moral goals that might intersect with the goal of improving education. For example, where low education levels in a community coincide with social inequality – along gendered or racial lines, say – we ought to consider whether we might be able to encourage social equality while improving education levels in that community. As a simplistic example, imagine we have funding sufficient for ten university scholarships for Australians from poor rural backgrounds. We ought at least to consider whether we might stipulate that some proportion of the scholarships go to eligible Indigenous Australians. We ought to consider doing this even if it would (for whatever reason) be more costly and thus mean that we can only provide nine scholarships.

²³ Distributed energy or generation is where generation is provided by smaller-scale technologies such as solar PV or wind turbines connected to the grid.

Similarly, broad justice-based considerations influenced Australia's response to the global financial crisis in 2008. The response of the Australian government of the day (under Prime Minister Kevin Rudd) was to provide a 'stimulus package', including various forms of financial support delivered in various ways.²⁴ The primary goal of the government in providing the stimulus package was to avoid or minimise economic recession.²⁵

However, the details of the package reveal concern for additional moral goals (a unified approach), and in particular concern for addressing inequality. Thus, for example, a tax bonus was paid to individuals earning less than \$100 000 in the 2007/2008 financial year. Cash bonuses were also provided to various groups of people considered to be in particular need of financial assistance: single income families, families with school-age children, carers, students, and farmers. While injecting liquid funds into the economy, these measures clearly also aimed to mitigate existing financial inequality (as well as inequality in other, fundamentally important goods or capacities such as education and health).

Likewise, a significant proportion of the package's infrastructure component was directed to building school infrastructure, social and defence housing, and local infrastructure and roads. As well as stimulating the economy, these measures seem to reveal a concern with other issues of justice: promoting good quality education throughout Australia, assisting the poor, and redressing rural infrastructure shortfalls.

3 Conflict and Agreement

Sometimes we can make progress on another moral goal (such as increasing wellbeing or reducing inequality, improving education or preventing armed conflict) without compromising our climate goals, and at no or very little extra cost. In this kind of case support for unified justice is intuitive: if we can achieve these further moral goals at no or very little extra cost and without impacting our GHG emissions reduction efficacy, then we ought to do so. For example, where a government decides to subsidise solar power it might prioritise projects that achieve these goals by providing subsidies to poorer households instead of wealthier households, or subsidise schools in needy areas instead of directing subsidies to larger businesses. In this way, wealth inequality can be reduced (or at least not exacerbated). If the overall cost and emissions

²⁴ Quoc Ngu Vu and Robert Tanton, 'The Distributional and Regional Impact of the Australian Government's Household Stimulus Package' (2010) 16(1) *Australasian Journal of Regional Studies* 127; Shuyun May Li and Adam Hal Spencer, 'Effectiveness of the Australian Fiscal Stimulus Package: A DSGE Analysis' (2016) 92(296) *Economic Record* 94.

²⁵ Kevin Rudd, 'The Global Financial Crisis' *Monthly* (online), February 2009 <<https://www.themonthly.com.au/issue/2009/february/1319602475/kevin-rudd/global-financial-crisis>>.

reductions are the same, then there is a strong reason to fund the poorer households. The fact that there may be cases in which we can achieve other moral goals without (much) sacrifice also gives us a reason to *look* for those cases.

Of course, not all climate change mitigation policies will be this easy to repurpose. Sometimes we may have to trade values off against one another and, for example, decide whether to reduce emissions in a slower but more equitable way, or in a faster but less equitable way. These decisions will be difficult. This is too broad a topic to address here. Yet we should note that the weighing exercise will in part depend on the context. It is hard to argue in the abstract that justice considerations will *always* outweigh considerations not concerned with justice. However, avoiding the problem and making decisions on the basis of climate change mitigation exclusively may well lead to very unjust outcomes, and is therefore not an acceptable way to proceed.

III INEQUALITY

A Focusing on Inequality

How then are we to incorporate broader considerations of justice into the development of plans for a climate transition? One difficulty is that even when we confine ourselves to relatively uncontroversial goals, there are potentially many such goals that might be used to guide a climate transition. For now, we will focus on one particularly important goal – the reduction of inequality. We will argue that an important way of assessing the justice of climate transition schemes is by reference to the extent to which they minimise significant inequalities. By focusing on inequality we do not mean to exclude other justice-related goals. Rather, we aim to show how justice-related goals can be incorporated into the climate transition planning process, using inequality as just one example.

Inequality has become one of the most important topics in contemporary debates concerning justice. The rise of inequality, particularly of income and wealth, has been extensively discussed. French economist Thomas Piketty has detailed the rise in inequality of income and wealth in many countries over the second half of the 20th century. Others have explored the relationships between high levels of inequality and harms such as violence in society or lack of trust.²⁶ Suffice to say that reducing inequality ought to be one of the central goals of contemporary society.

Yet whether or not people agree that we ought to reduce inequality will depend on what kind of inequality is being discussed. Overwhelmingly, the inequalities that have dominated recent debate have focused on

²⁶ Richard Wilkinson and Kate Pickett, *The Spirit Level: Why Greater Equality Makes Societies Stronger* (Penguin, 2010).

income and wealth.²⁷ But there are many kinds of inequality that ought to concern us, ranging from inequality in access to affordable housing, healthcare, and education, to important civil rights such as marriage equality or equal recognition of one's culture or sexual identity. Balancing these different kinds of inequality so as to maximise good outcomes is not a straightforward matter. However, one useful balancing approach is the capability approach developed by Amartya Sen, amongst others.²⁸ Capability theorists focus on whether people have the freedom (capability) to achieve the different valuable things or states of affairs that a person can be or do (functionings): that is, whether they can be educated, housed, access health care, have mobility, and so on.

B Human Development Index

Exactly which capabilities are relevant for assessing transition plans is not straightforward. There are all sorts of capabilities that might be considered important to people. Here, we focus on the Human Development Index (HDI) used in the 2016 Human Development Report (HDR).²⁹ Based on the capability approach, the HDI is a widely influential measure of human development that commands substantial endorsement from governments and institutions.³⁰

The HDI provides a metric for how we can measure inequality. It is not meant to be a complete index of everything that is important for inequality or for wellbeing more generally. Instead it focuses on three key measures that are essential for human development: a long and healthy life, being knowledgeable, and having a decent standard of living. Each of these three measures expresses something central to the ability to live a good life. How countries score on these measures determines their overall HDI score. We will focus here on inequalities in these three important measures or capabilities.

These three measures provide a plausible set of important inequalities to avoid and a good guide to whether a climate transition is increasing inequality or making society more equal. Measuring climate transition strategies against these criteria of inequality allows us to assess the justice implications of climate transitions. But we should also note that these are substantive measures of inequality: that is, they, in part, measure actual

²⁷ Piketty, above n 21.

²⁸ Amartya Sen, *Development as Freedom* (Oxford University Press, 1999). See also Martha Nussbaum, *Creating Capabilities: The Human Development Approach* (Harvard, 2011).

²⁹ Selim Jahan et al, 'Human Development Report 2016: Human Development for Everyone' (Development Report, United Nations Development Program, 2016) <http://hdr.undp.org/sites/default/files/2016_human_development_report.pdf>.

³⁰ United Nations Development Programme, *Human Development Index (HDI)* <<http://hdr.undp.org/en/content/human-development-index-hdi>>.

achievements and not just the opportunity to achieve something, important though opportunities are.

While acknowledging that these measures of inequality are not all that ought to matter when assessing the justice of a transition, we note that these inequalities are important because minimising them leads to an overall increase in important freedoms. For example, through greater investment in public transport and neighbourhoods, people could have their freedom increased *overall* because those changes would allow them to choose different jobs, neighbourhoods or ways to spend their time. Here we need to note two other important justice-related goals. Reducing the above inequalities could also add to the *control* that people have in respect of key goods such as energy generation. Providing the opportunity for distributed energy, for instance, might be valued because it allows control over individual energy needs, including governments or companies.

A good way to evaluate a climate transition, then, is to test whether it decreases the three important inequalities just described (in health, education and standard of living), and whether, as a consequence, it affords individuals greater control over their own lives, not just in Australia but internationally. This framework gives substance to the general claim that a climate transition ought to be just. It is important to note that increasing equality is a different goal to giving agents greater control. A transition could conceivably do one without doing the other. We will focus below primarily on increasing equality as that is the more substantive value.

IV CASE STUDY

Adding a concern for inequality to the framework that ought to guide a climate transition will allow us to achieve a fairer transition. But in what specifically will this fairness consist? To illustrate the impact of a unified framework for transition, we will consider a key ingredient of any transition: distributed energy. With the cost of solar photovoltaic (solar PV) and other renewable energy technologies rapidly decreasing and their uptake increasing, distributed energy has become a key factor in climate transitions. There is also significant scope for harnessing distributed energy to reduce, or at least prevent the increase of, existing inequalities in Australian society.

Distributed energy is of course not the only important ingredient of a successful transition. Community energy, transport more generally, removal of fossil fuel subsidies, change in building regulations, and reduction of waste are just a few of the many other important elements of a successful climate transition. But distributed energy is crucial, and provides a valuable way of illustrating the kind of difference that social

justice can make to the design of a climate transition. The goal here is not to provide a comprehensive assessment of distributed energy, but rather to illustrate the kinds of consideration that should be taken into account in designing a climate transition with a concern for inequality at its core.

A Case Study: Distributed Energy

1 Renewables and Distributed Energy

Electricity generation accounted for 187MtCO₂-e, or 35 per cent, of Australia's greenhouse gas emissions in 2015.³¹ Department of the Environment and Energy projections indicate that this level of electricity-related emissions will remain roughly constant until 2030.³² These projections have Australia producing about 1000MtCO₂-e more between 2021 and 2030 than would be consistent with our 2030 target of 26-28% below 2005 levels.³³ Clearly, Australia needs to do more, including by changing our behaviour to consume electricity minimally and responsibly; by developing and adopting more efficient technologies; and by reducing the emissions-intensity of the electricity we use by replacing fossil fuel generation with renewable generation: wind, solar, hydro and others.

In 2016 renewables generated 17 per cent of Australia's electricity. The costs of renewables have been steadily declining with increased uptake, and according to some assessments it is already cheaper to install renewable electricity generating capacity than fossil fuel capacity in Australia.³⁴ The share of electricity generated by renewables in Australia will undoubtedly continue to increase.

Renewable electricity generation has so far tended to be implemented in a more distributed fashion than traditional fossil fuel generation. In place of one large coal electricity plant we might have dozens of medium-scale wind farms and a million small-scale residential PV solar panels, distributed over a wide area. Thus, as the share of renewable electricity generation has increased, electricity generation has tended to become more distributed.³⁵

³¹ Department of the Environment and Energy, above n 8, 6.

³² *Ibid* 9-11. The rate will decrease slightly to 176 in 2020, then rise again to 186 in 2030. Electricity use will increase over this time, due to population growth and an increase in electric vehicles.

³³ *Ibid* iii.

³⁴ Clean Energy Council, 'Clean Energy Australia: Report 2016' (Report, 2016) 19 <<http://gccn.org.au/wp-content/uploads/2018/01/Clean-Energy-Australia-Report-2016.pdf>>; Petra Stock, Andrew Stock and Greg Bourne, 'State of Solar 2016: Globally and in Australia' (Report, Climate Council of Australia, 2017) ii <<https://www.climatecouncil.org.au/uploads/4127a8c364c1f9fa8ab096b04cd93f78.pdf>>.

³⁵ A community microgrid is 'a self-contained and self-sufficient local electricity supply system, either standalone or connected to a centralised grid of regional or national scale,

2 *Distributed Energy and Inequality*

Using a unified emissions reduction approach, Australia should not only increase the use of renewable electricity technologies in whichever way will minimise greenhouse gas emissions, it should consider how its use of distributed renewable technologies will affect the distribution of important capabilities such as health, education, standard of living, and independence and control. It may be that the most emissions-effective strategy is not the strategy that maximises the distribution of these capabilities. This is because there are possible interactions between distributed energy (in particular, distributed renewable electricity generation) and important inequalities in Australia.

First, it may be that the capacity to generate electricity in a more distributed system will allow us to reduce some of the stubborn and unjust inequalities in Australia (or internationally). Some of the possible benefits of community microgrids that we might be able to harness to this end, for example, are ‘energy autonomy and self-sufficiency; promotion of cleaner and more sustainable electricity; more reliability; retained economic benefits in the community; job creation in the community; provision of alternative competitive electricity supply’.³⁶ Clearly, many of these benefits will have an effect on those elements of the good life that are the focus of the HDI: health, education, and standard of living. Many also concern independence or autonomy. In some cases we should be able to use these effects to reduce inequalities in each dimension. Second, though, it might also be the case that some ways of implementing or encouraging distributed renewable electricity generation *exacerbate* existing inequalities. We need to be aware of both the possible opportunities and the possible pitfalls. We will examine some examples of each below.

It should also be noted that while reducing inequality is a desirable goal that should be part of a transition strategy, we are of course not suggesting that it must be the only goal. Considerations of efficiency for example will also be relevant, as will more general mitigation goals. But as we have argued, we have strong reasons to favour transition plans that incorporate egalitarian goals.

3 *Remote Indigenous Communities*

Australia’s greatest inequality challenges concern our Aboriginal and Torres Strait Islander peoples, and this is one area where distributed

comprising residential and other electric loads, and can be supported by high penetrations of local distributed renewables, other distributed energy and demand-side resources’. Emi Minghui Gui et al, ‘Distributed Energy Infrastructure Paradigm: Community Microgrids in a New Institutional Economics Context’ (2017) 72 *Renewable and Sustainable Energy Reviews* 1355, 1356.

³⁶ Ibid 1365.

renewable electricity generation may be able to help. Gross inequalities between Indigenous and non-Indigenous Australians persist. These inequalities concern all of our target goods: health, education, wealth, and independence. One factor in some of these inequalities is remote living. For example, remoteness is associated with disadvantages in health, and while less than two per cent of non-Indigenous Australians live in remote areas, 20 per cent of Indigenous Australians live remotely.³⁷ Remoteness is also more disadvantageous for Indigenous Australians than for non-Indigenous Australians, in its impact on health and many other areas. For example, income inequalities between Indigenous and non-Indigenous Australians (which exist in all areas) are at their greatest in remote areas.

As an aggravating element of this remote Indigenous financial inequality, remote communities sometimes pay outrageous amounts for electricity. In north-west New South Wales, for example, the average quarterly electricity bill for an Indigenous household is \$1200.³⁸ Remote Indigenous people's incomes are the lowest in the country, and so electricity bills on this scale are hardly manageable. There are several reasons for these prices, including poor housing, extreme temperatures, and reliance on diesel generators (which are expensive to run and unreliable).³⁹

A number of programs have already embraced the opportunity that distributed renewable electricity generation affords to address these inequalities. For example, the Federal and Northern Territory governments jointly funded a program to deliver solar power to more than 30 remote communities, and the First Nations Renewable Energy Alliance works to promote renewable energy installation in First Nations communities throughout the country.⁴⁰ In addition to the much-needed financial benefits that distributed renewable electricity generation affords to remote Indigenous communities, distributed energy may help to

³⁷ Australian Institute of Health and Welfare, 'Australia's Health 2014' (Australia's Health Series No 14, 2014), 7.7.

³⁸ Linda Hoang, *Backchat Discusses: Renewable Energy and Electricity Cost in Remote Communities w/ Murrwarri Elder Fred Hooper* (21 March 2017) FBi Radio <<https://fbiradio.com/backchat-discusses-renewable-energy-and-electricity-cost-in-remote-communities-w-murrwarri-elder-fred-hooper/>>.

³⁹ Ivor Frischknecht, 'Increasing Renewables in Remote, Off-Grid Areas' (Speech delivered at the Remote Area Power Supply Conference, 17 March 2014) <<https://arena.gov.au/news/remote-area-power-supply-conference-2/>>; Geoffrey Craggs, *Power to the People in Remote Communities* (17 May 2017) Future Directions International <<http://www.futuredirections.org.au/publication/power-people-remote-communities/>>.

⁴⁰ Australian Renewable Energy Agency, 'Solar Power to More than 30 Remote NT Communities' (Media Release, 12 October 2014) <<https://arena.gov.au/news/solar-to-power-more-than-30-remote-nt-communities/>>; First Nations Renewable Energy Alliance, 'Formation of First Nations Renewable Energy Alliance' (Media Release, February 2017) <<http://nationalunitygovernment.org/content/formation-first-nations-renewable-energy-alliance#renewable>>.

alleviate inequalities on other dimensions. This may happen independently – distributed generation may facilitate the development of better school or health clinic infrastructure, for example – or as a consequence of general wealth and wellbeing increases. One possible further advantage of distributed electricity generation in this context is that it increases the independence of the generator (in this case remote communities), and mitigates the impact of markets.

Increasing renewable electricity generation in remote Indigenous communities may not be the most efficient emissions reduction strategy, but because it is likely to help to reduce some of Australia's most unjust inequalities, it ought to be pursued. That this strategy has been embraced in some cases already is an indication that at some level it is recognised that the isolated approach to climate transition represents a goal that is overly narrow, and that justice-based considerations are essential to climate transition planning.

4 Solar PV Subsidies

A major contributing factor to the uptake of solar PV in Australia has been government support in the form of various subsidies provided to households and businesses. In most states in Australia, this support has included point of sale rebates such as Renewable Energy Certificates (RECs) and Feed-in-Tariffs (FITs) – tariffs, sometimes very generous, paid to solar producers for electricity they feed into the grid. These incentives, particularly FITs, were partly responsible for a massive increase in solar PV in Australia. On an emissions reduction assessment they might therefore be considered a success (although whether they were the most cost-effective approach even there is questionable).⁴¹ They may also have increased political support for action on climate change, and spurred the growth of a durable industry with significant long-term local jobs.⁴²

The distribution of subsidies such as these is also a prime candidate for concern if we are interested in inequality. Subsidies are of course a kind of financial redistribution. When we consider subsidising something – whether it is fossil fuels, renewables, or healthcare – we need to ask: how are the benefits and burdens being distributed? Does the subsidy lessen

⁴¹ Wood and Blowers claimed in 2015 that the solar boom had been subsidised by the public to the tune of almost \$10 billion. However, this report has been widely criticised as vastly overestimating the costs. Tony Wood and David Blowers 'Sundown, Sunrise: How Australia can Finally Get Solar Power Right' (Grattan Institute, 2015).

⁴² Australian PV Association, 'APVA Response to PV Costs and Abatement in the Productivity Commission Research Report: Carbon Emission Policies in Key Countries, May 2011' (June 2011)
<<http://apvi.org.au/sites/default/files/documents/Releases/APVA%20-%20Response%20to%20Productivity%20Commission%20Carbon%20Emission%20Policies%20Report%20June%202011.pdf>>.

inequality? In the history of residential solar PV subsidies in Australia, we have examples of both positive and negative effects on inequality.

First, many of the Australian residential solar subsidies have been structured in such a way as to financially favour homeowners with access to a certain amount of capital, at the expense of all grid electricity users, including renters and the very poor.⁴³ This is because it has often been the case that in order to take advantage of the schemes, one has needed to purchase and install a solar panel at home. This requires a significant up-front outlay of cash (even taking into account point of sale rebates), as well as the stability of residence largely only available through homeownership in Australia.

These are clearly obstacles that exclude poorer people and renters from participating and thus receiving the relevant subsidies. Further, it has often been the case that those unable to receive the subsidies partially pay for them. This is because most of the FITs have been paid for by across the board increases to the price of retail electricity. Thus the poorest Australians have partially subsidised the solar investments of wealthier Australian homeowners. For example, according to one analysis of FITs in New South Wales in 2010, ‘the implied rate of taxation is 2.6 times higher for households in the lowest income bracket (0.089%) than the higher income bracket (0.034 per cent)’.⁴⁴ This is an example of a negative effect on inequality: a regressive subsidy system that exacerbates existing financial inequalities.

We do not mean to say that residential solar PV should not have been subsidised, nor that subsidies should not be used in other ways to accelerate Australia's climate transition. On the contrary, we find it quite likely that residential solar PV subsidies *were* justified by their benefits, in terms of emissions reduction as well as industry stimulation and social outreach, and that further subsidies *will* be required. We merely wish to

⁴³ Tim Nelson et al, ‘Australian Residential Solar Feed-In Tariffs: Industry Stimulus or Regressive Form of Taxation?’ (2011) 41(2) *Economic Analysis and Policy* 113; Andrew J Chapman et al, ‘Residential Solar PV Policy: An Analysis of Impacts, Successes and Failures in the Australian Case’ (2016) 86 *Renewable Energy* 1265; Genevieve Simpson and Julian Clifton, ‘Subsidies for Residential Solar Photovoltaic Energy Systems in Western Australia: Distributional, Procedural and Outcome Justice’ (2016) 65 *Renewable and Sustainable Energy Reviews* 262. This is the case for similar subsidy schemes in many other countries too. The home-owner/renter divide may become more significant as the proportion of Australians renting increases. See Wendy Stone et al, *Home Ownership Remains Strong in Australia but it Masks Other Problems: Census Data*, (27 June 2017) Conversation <<http://theconversation.com/home-ownership-remains-strong-in-australia-but-it-masks-other-problems-census-data-80068>>.

⁴⁴ Nelson et al, above n 43. This finding is controversial; see eg Warwick Johnston, *Solar Tariffs and the Merit Order Effect: A Response to AGL*, (5 April 2012) *RenewEconomy* 5 <<https://reneweconomy.com.au/solar-tariffs-and-the-merit-order-effect-a-response-to-agl-22812/>>. However, the general point stands: we must pay careful attention to potential financial inequality effects of climate transition mechanisms and policies.

draw attention to some possible improvements to the ways in which subsidy schemes are planned and structured; improvements that might lead to better outcomes with respect to inequality in the future.

Some evidence for the improbability of solar subsidy programs with respect to inequality is the fact that such programs have already begun to be improved in just this respect. Schemes have been introduced to make the subsidies more accessible for renters and those in public housing. For example, solar power purchase agreements (SPPAs) are now available in some areas of Queensland.⁴⁵ These agreements overcome the up-front cost barrier to solar installation – a provider installs, owns, and operates a PV system at the participant's home, selling the participant the produced power at a price lower than the usual retail price. In some cases home ownership is still a barrier to participation, although the Queensland government, for example, also launched a solar for public housing trial in 2017.⁴⁶ This trial will test an SPPA program for public housing, as well as a rooftop solar farm in the remote Indigenous diesel powered community of Lockhart River.

As in the example of remote Indigenous communities, subsidies for solar PV and other distributed renewable electricity generation technology can be harnessed to reduce inequalities. Subsidies might be an effective way to promote renewables while also reducing inequalities of health, education, and independence, as well as obvious financial inequalities. Funding solar PV installation in public schools is another likely way of doing this which has already been embraced around the country.⁴⁷ Installing solar panels in public schools benefits all public school system users. While reducing GHG emissions, it also relieves schools' financial burden, allowing them to use money that would otherwise be spent on electricity in the improvement of education. Having a concern for inequality at the heart of our climate transition planning process means actively *looking* for opportunities to decrease inequality, as well as evaluating our past actions with the benefit of hindsight to learn how we might do better in the future.

⁴⁵ Queensland Government, *How Solar Power Purchase Agreements Work* (10 September 2018) <<https://www.qld.gov.au/housing/buying-owning-home/solar-power-purchase-agreements>>.

⁴⁶ Queensland Government, *Solar Panel Trial* (13 December 2018) <<https://www.dews.qld.gov.au/electricity/solar/solar-future/public-housing>>. Similarly, the California Solar Initiative dedicates some funding to installations on low-income housing: Department of Energy (USA), *California Solar Initiative – Single-Family Affordable Solar Housing (SASH) Program* <<https://energy.gov/savings/california-solar-initiative-single-family-affordable-solar-housing-sash-program>>.

⁴⁷ See eg Anastacia Palaszczuk and Grace Grace, 'Solar Panels on School Roofs to Save More than \$10 million a Year' (Media Statement, 13 March 2018) <<http://statements.qld.gov.au/Statement/2018/3/13/solar-panels-on-school-roofs-to-save-more-than-10-million-a-year>>.

A final concern about distributed energy and inequality is the effects of a possible exodus from the national electricity grid. The maintenance, operation and expansion of the large grids currently needed to transmit electricity from concentrated generation sources to consumers is expensive. Having more distributed electricity generation may enable us to reduce the overall costs of electricity provision. However, the ability to generate and store electricity at the household or community level might affect different groups of people differently. Again, if only some people can afford to generate and store their own electricity (because of the home ownership and up-front costs involved), and these people then leave the communal distribution grid, electricity may become much more expensive for those still using the grid, as they will be required to bear the full costs of grid upkeep and transmission.

Though there may be advantages to distributed energy programs for the individuals who are able to generate and store their own electricity, these must be weighed against the costs that will be borne by others. Particularly where existing inequalities would be exacerbated by the implementation of such programs, we have cause to pause. The grid exodus problem may not arise, and will depend on the relative costs of grid and off-grid (or microgrid) electricity in the future, among other things. However, it is the kind of potential problem of inequality that we need to think about in advance, either to ensure that it does not occur, or to work out how to respond if it does.

This distributed energy case study shows that climate transitions need what we have been calling a unified approach that incorporates justice-based concerns from the outset. Not taking account of the likely justice-related impacts may both lessen the chance of a successful rollout and cause us to miss opportunities. The case study also shows that taking into account considerations of inequality alters the kind of decisions that might be made concerning where to allocate resources and which technologies ought to be deployed.

V CONCLUSION

We have argued that justice considerations ought to play a central role in shaping a climate transition strategy. Justice goals not only determine how quickly we ought to transition, they can also be used to guide the manner in which benefits and burdens of a climate transition are distributed. Focusing on justice in these two respects is desirable for two reasons: first, because it offers the opportunity to achieve other important moral goals (such as the reduction of inequality upon which we have focused); and second, because without a concern for justice, individuals might be less likely to endorse a robust climate transition.

Incorporating justice-based reasons for transitions does not, of course, mean that a transition will not be burdensome. Given the scale of the required climate transition and the technological, social, economic, and political restructuring entailed, it will harness a huge range of resources. It will also force us to confront the possibility of severe disruption and disadvantage in affected industries through job losses and community decline.⁴⁸ Adopting a justice-based approach to climate transitions introduces some further complexity and difficulty to the decision-making process. However, it also allows us to appreciate the *opportunities* inherent in a climate transition. Cities will be less polluted and roads less congested as a result of our transition. Eventually, our energy needs will be met renewably, avoiding the environmental damage that results from fossil fuels, such as air and water pollution. There will be many benefits of this kind.

But even beyond this kind of benefit, the need to significantly restructure and reshape our societies provides an opportunity to make our societies better in *further* ways, ‘while we’re at it’, as it were. We have the opportunity to make other things better while we fix the problem of looming dangerous climate change. This focus on the benefits and opportunities afforded by the necessity of implementing a climate transition means we can see transition as a great opportunity and not simply a challenge. Taking the unified approach outlined here helps to bring this latter view into focus. Rather than doing the bare minimum along a single dimension (climate mitigation) to avoid a looming threat, we should take the opportunity to create a substantially more equal society.

⁴⁸ See T Spencer et al, ‘The 1.5°C Target and Coal Sector Transition: at the Limits of Societal Feasibility’ (2018) 18 *Climate Policy* 335–51.