



Responsibility for Increasing Mitigation Ambition in Light of the Right to Sustainable Development

Darrel Moellendorf¹

Received: 20 June 2018 / Accepted: 20 February 2020 / Published online: 9 March 2020
© The Author(s) 2020

Abstract

The international community is currently in the midst of a facilitative dialogue about how to increase mitigation ambition under the terms of Paris Agreement. This dialogue concerns centrally considerations of equity, which includes matters of both justice and responsibility. I defend the importance of the right to sustainable development in this regard. I argue that if the right of states to pursue poverty eradicating human development is to be respected, then there is plausible interpretation of responsibility for mitigation in which a state's ability to pay is the central consideration, where that ability is measured by its human development level. That conception of responsibility should be applied to considerations of how increase mitigation ambition.

Keywords Ability to pay · Mitigation · Paris Agreement · Responsibility · Right to sustainable development

1 Introduction

The Paris Agreement was an historic breakthrough in international climate change negotiations.¹ For the first time, a comprehensive treaty framework was agreed upon in which highly developed, developing, and least developed countries accepted responsibility for pursuing mitigation policies. The agreement was made possible because it allowed parties to make mitigation pledges according to their own lights. These pledges, nationally determined contributions (NDCs), were not the result of

¹ Much of the material here is drawn from my forthcoming book tentatively entitled, *Mobilizing Hope: Climate Change and Global Poverty in the 21st Century* (Oxford: Oxford University Press).

✉ Darrel Moellendorf
darrel.moellendorf@normativeorders.net

¹ Goethe University, Frankfurt, Germany

international bargaining involving threats and concession, but rather arose from domestic processes and were brought to the international forum. This decentralized pledging process could not and did not ensure that there would be sufficient overall ambition in the initial round of pledges. But it served two important goals. First, the latitude given to states to make proposals consistent with their perceived national interests enabled wide acceptance of the agreement. And second, for developing and least developed countries such latitude ensured that they would not be coerced or induced into an agreement that would require adopting comparatively more expensive forms of energy production that would set back their development aims. Thus, the decentralized pledge process amounted to a procedural safeguard to the right to sustainable development.

The Paris Agreement aims to “strengthen the global response to the threat climate change, in context of sustainable development and efforts to eradicate poverty.” (Art. 2, para. 1). Its goal is to limit warming to well below 2 °C, and it endorses pursuit of limiting it to 1.5 °C. The architects of the Agreement did not expect that the initial NDCs would suffice to meet the stated goal of the agreement. And they do not. Because this failure was expected, the Agreement includes recognition that efforts to mitigate “represent a progression over time” (Article 3). Calculation of the initial pledges by the United Nations Environmental Programme and certain NGOs reveal that if both the initial conditional and unconditional pledges were honored, the sum of the emissions reductions would yield average temperature increase of about 3 °C.² This is, of course, at best a rough estimate. Due to epistemic uncertainty regarding the relationship between greenhouse gas concentrations and warming, precision is not possible. The state of the scientific art currently holds that doubling the concentration of CO₂ that existed in the atmosphere at the beginning of the industrial revolution would likely lead to warming of between 1.5 and 4.5 °C.³ Most estimates of warming take a midpoint in that range, 3 °C. What the fact of the matter is makes a difference to what the ultimate warming will be for any given concentration of greenhouse gases. But policy and moral argumentation about policy has to be made without full access to the facts.

Parties to the Agreement are required to update their NDCs every 5 years. As noted, the result of the update should be an increase in ambition. And the Agreement asserts that the core normative principles of the UNFCCC should guide a party’s deliberation about the level of ambition it will assume. Renewed pledges should “reflect the highest possible ambition, reflecting its common but differentiated responsibilities and respective capacities, in light of different national circumstances.” (Art. 4, para. 3). This clause is a focal point for discussions of equity in pledges. The subsequent two paragraphs draw the following implications from the clause: “Developed countries should take the lead in assuming economy-wide overall absolute emission reductions targets”; (Art 4, para 4) and, “Support shall be provided to developing country Parties for the implementation of this Article.” (Art. 4, para 5).

² United Nations Environmental, *Emissions Gap 2017 Report*, p. 18. https://wedocs.unep.org/bitstream/handle/20.500.11822/22104/EGR_2017_ch_3.pdf?sequence=1&isAllowed=y.

³ Intergovernmental Panel on Climate Change, *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report* (Cambridge and New York: Cambridge University Press, 2013), p. 16.

At the same time that Parties agreed to the Paris Agreement, they also decided that a “facilitative dialogue” should take place in 2018 halfway till the first 5-year renewal.⁴ That dialogue has come to be called “the Talanoa Dialogue.” Equity in the allocation of responsibility for climate change mitigation has taken on increased importance in the discussion of which parties should be making more ambitious pledges. This paper takes up the theme of equity in climate change mitigation. At issue are considerations of both justice and responsibility. Intergenerational justice requires that we rapidly move to a net zero carbon global economy within just a few decades. That is taken as a given. At issue are what the entitlements of states vis-à-vis others in that major transformation and on what grounds some states bear a greater burden of responsibility for mitigation than others. This paper argues that due to the importance of the right to sustainable development, the most plausible interpretation of responsibility for mitigation is a conception of ability to pay in which a state’s capacity is measured by its human development level. This conception of responsibility is favored primarily on the moral ground that it fits best with the right to sustainable development. Additionally, however, it avoids some of the moral problems of backward-looking principles, and it has the pragmatic virtue of offering fewer grounds for diplomatic wrangling than some other more complicated multi-valent conceptions of responsibility.

2 Poverty and Energy Poverty

Hundreds of millions of deaths due to disease, malnutrition, and physical assault are preventable by eradicating poverty. Respect for human dignity requires doing so. Indeed, overcoming the desperate poverty that shackles billions of people is widely regarded as a fundamental moral duty, and one of highest importance. But recent experience suggests that effective national development strategies, which reduce poverty significantly, also result in significant increases in energy consumption. In 1990, China still had a low level of human development with an HDI of 0.499. By 2015, China’s HDI had improved to a high level of 0.738.⁵ The transformation that occurred involved an eightfold increase in per capita electricity consumption from 0.51 MWh/person to 4.05 MWh/person.⁶ A similar story can be told for most other countries that have made significant human development gains. In 1991, Thailand’s HDI was 0.574; by 2015, it had risen to 0.740, a less dramatic rise than China’s, but still impressive.⁷ Fueling the HDI improvement was an over threefold increase in electricity consumption from 0.71 MWh/person to 2.62 MWh/person.⁸ The evidence

⁴ UNFCCC, COP 21 Addendum Part two, Decisions Adopted by the Conference of the Parties, para. 20, 2015. <https://unfccc.int/resource/docs/2015/cop21/eng/10a01.pdf#page=2>.

⁵ UNDP, Human Development Data (1990–2015), <http://hdr.undp.org/en/data>.

⁶ International Energy Agency, China Indicators, <https://www.iea.org/statistics/statisticssearch/report/?country=CHINA&product=indicators&year=2015>.

⁷ UNDP, Human Development Data (1990–2015). <http://hdr.undp.org/en/data>.

⁸ IEA, Thailand Indicators. <https://www.iea.org/statistics/statisticssearch/report/?country=THAILAND&product=indicators&year=2015>.

is compelling that overcoming energy poverty is an important part of the effort to eradicate poverty.

An emphasis on development has sometimes been criticized as part of an imperialist agenda, but liberation movements have also stressed its importance.⁹ In 1920, in speech that stressed the importance of economic development to development of Russian revolution, Lenin famously quipped that, “Communism is Soviet power plus the electrification of the whole country.”¹⁰ Like Marx, Lenin looked forward to a communist era characterized by such a high volume of overall production that generalized human prosperity would be achieved. Abundance would render obsolete the need to divide society into classes in order ensure that the majority were disciplined so as produce a surplus to be enjoyed by the ruling class. Whatever one thinks of the possibility or desirability of such a society, the key to prosperity, Lenin rightly saw back in 1920, is electrification. That has been borne out by the countries that have had a measure of success with human development during the twentieth century.

Human development uses electricity, and the main means by which electricity was generated throughout the twentieth century was by burning fossil fuels. The standard of living enjoyed, wherever it has been high enough to be enjoyed, was won by blood, sweat, and fossil fuels. At the dawn of the twentieth century, total global fossil fuel consumption was 5972.23 TWh. In comparison, total global fossil fuel consumption in 2016 was 132,051.53 TWh.¹¹ The unit of measurement here TWh stands for terawatt hour, and a unit of energy equivalent to a trillion kilowatts sustained for an hour. A terawatt is what would be consumed if ten billion 100 W light bulbs were illuminated for an hour. One way to imagine the difference in consumption suggested by these numbers is that the world is 22 times brighter in 2016 than it was in 1900. What was all that fuel used for? Transportation, goods production, heat generation, and electricity generation have been some of the main activities. Nearly 40 percent of all electricity currently produced in the world still comes by way of burning coal, around, 15 percent by natural gas, and about 5 percent by oil.

So, it should come as no surprise that the countries making significant human development gains in the last several decades have also seen a significant increase in fossil fuel consumption and, of course, CO₂ emissions. China’s per capita CO₂ emissions rose from 1.83 tons in 1990 to 6.59 tons in 2015.¹² In Thailand over that same time period, emissions rose from 1.43 tons per person to 3.64. Due to their

⁹ See the criticism made in Thomas McCarthy, *Race, Empire, and the Idea of Human Development* (Cambridge: Cambridge University Press, 2009), chp. 6.

¹⁰ Vladimir Lenin, “Report on the Work of the Council of People’s Commissars.” December 22, 1920. <http://soviethistory.msu.edu/1921-2/electrification-campaign/communism-is-soviet-power-electrification-of-the-whole-country/>.

¹¹ Max Roser, “Fossil Fuels,” Our World in Data. <https://ourworldindata.org/fossil-fuels>.

¹² IEA, China Indicators.

comparatively low cost, for countries seeking to make poverty eradicating developmental gains the use of fossil fuels has been especially attractive.

3 The Right to Sustainable Development

When the United Nations Framework Convention on Climate Change (UNFCCC) was agreed upon at the Rio Earth Summit in 1992, developing and least developed countries were well aware of the key link between energy consumption and economic development. There was a worry that the aims of environmentalism might be used to limit their consumption of energy and thereby retard development growth. Hence, the pre-ambles to the document is replete with assurances to developing countries that their development ambitions are legitimate and that their energy consumption should not be limited in order to protect against climate change. For example, the pre-ambles affirms that “responses to climate change should be coordinated with social and economic development in an integrated manner with a view to avoiding adverse impacts on the latter, taking into full account the legitimate priority needs of developing countries for the achievement of sustained economic growth and the eradication of poverty...”¹³ And even more pointedly, the pre-ambles recognizes that “all countries, especially developing countries, need access to resources required to achieve sustainable social and economic development and that, in order for developing countries to progress toward that goal, their energy consumption will need to grow.”¹⁴

Article 3 paragraph 4 of the UNFCCC affirms a right to promote sustainable development. “The Parties have a right to, and should, promote sustainable development. Policies and measures to protect the climate system against human-induced change should be appropriate for the specific conditions of each Party and should be integrated with national development programs, taking into account that economic development is essential for adopting measures to address climate change.”¹⁵ The requirement that measures “be appropriate for the specific conditions of each Party” was echoed in the Paris Agreement at Article 4 Paragraph 5 when noting the pledges should reflect the “different national circumstances” of countries.

The interpretation that I think makes the best moral sense of invoking the right to promote sustainable development, national development programs, and differing national circumstances in the context of climate change policy is that the right is in the first instance a collective right of states protecting their liberty to pursue energy intensive national development programs. As the evidence suggests, it is well established that development is tremendously energy intensive. And one threat the mitigation project poses is that by putting a price on carbon, the costs of development

¹³ United Nations Framework Convention on Climate Change (UNFCCC), United Nations, 1992. http://unfccc.int/files/essential_background/background_publications_htmlpdf/application/pdf/conveng.pdf.

¹⁴ *Ibid.*

¹⁵ *Ibid.*

will increase, and therefore, the rate of development will slow. The right offers protection against such slowing.

The moral importance of such a liberty can be supported by three arguments. First, the liberty of states to pursue energy intensive national development programs serves the aim of poverty eradication. The history poverty eradicating national development strategies in the twentieth century, as exemplified in the cases of China and Thailand, give reason to believe that poverty eradication is tremendously energy intensive. In order not to interfere with poverty eradication efforts, the liberty of states to increase their energy usage must be respected. In other words, the duty not to constrain countries' efforts to eradicate poverty requires that the right to sustainable development be honored.

Second, fairness in the cooperative international project of rapidly transforming the global economy to net zero emissions requires recognizing the right. Ensuring a stable climate system by capping warming at a low level would be a benefit to all states, not the least the development prospects of developing and least developed countries. But if producing the collective benefit of a stable climate system requires assuming some short-term costs, such as increased energy costs, it would be unfair to distribute such costs in such a way as to threaten to outweigh the benefits gained by the cooperative enterprise. Slowing poverty eradicating human development would threaten to do that for developing and least developed countries. No state should be made to unnecessarily sacrifice development for climate change mitigation.

Third, respect for the right to sustainable development is a promissory obligation deriving from the ratification the UNFCCC. Because the right is recognized in the treaty document, any state ratifying the treaty, without specifically exempting itself from the obligation, is obliged to respect the right. A state proposing international climate measures within the UNFCCC context that failed to respect the liberty of states to pursue poverty eradicating human development would be showing contempt for the treaty framework and the parties who take it seriously.¹⁶

Neither the moral importance nor the urgency of poverty eradication has changed since the early 1990s. Today, the United Nations recognizes 17 Sustainable Development Goals and the first among these is to "End poverty in all its forms everywhere."¹⁷ The seventh goal is to "ensure access to affordable, reliable, sustainable, and modern energy for all."¹⁸ In describing the importance of this goal, the UN says, "Energy is central to nearly every major challenge and opportunity the world faces today. Be it for jobs, security, climate change, food production, or increasing incomes, access to energy for all is essential." Hence, the importance of the right to sustainable development remains undiminished.

¹⁶ See my "Treaty Norms" and "Taking UNFCCC Norms Seriously."

¹⁷ United Nations, Sustainable Development Goals. <http://www.un.org/sustainabledevelopment/poverty/>.

¹⁸ *Ibid.* <http://www.un.org/sustainabledevelopment/energy/>.

4 Responsibility for Mitigation

If the right to sustainable development secures a liberty for states to pursue poverty eradicating human development within a broader aim of rapidly transitioning to a net zero global economy, then the responsibility to ensure that the aim is satisfied must fall largely on those states that have already achieved a high level of development. In other words, the central features of a conception of responsibility can be derived from the requirement to take the right to sustainable development seriously. Responsibility to ensure the mitigation of climate change in the UNFCCC context must fall firstly and mainly on states with a greater capacity to carry the burden without incurring poverty eradication losses. This is an ability-to-pay conception of responsibility. The argument is then that such a conception makes sound moral sense of the language of the UNFCCC, which at Article 3 paragraph 1 that affirms that burdens climate change policy should be assigned “on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities.”¹⁹

The present argument regarding responsibility in a climate change regime involves an interpretation of the treaty language of “common but differentiated responsibilities and respective capacities.” I have argued that we make good moral sense of the idea of “differentiated responsibilities” and “respective capacities” by tying it closely to the aim of protecting poverty eradicating human development. And I defend the right to sustainable development, understood as the liberty of states to pursue energy intensive national development programs, on grounds of its service to the poverty eradication, fair burden-sharing in mitigation, and the promissory obligation undertaken by states that ratified the UNFCCC. The conception of responsibility is importantly derived from the right to sustainable development. Development is, of course, an ongoing and forward-looking process. And, hence, the conception of responsibility is forward-looking, aiming also to safeguard human development.

Other conceptions of responsibility for an international climate change regime are backwards looking or at least partially backwards looking. Sometimes, these accounts understand the phrase “differentiated responsibility” to refer responsibility arising from historic emissions.²⁰ This is in line with the polluter pays principle that is commonly used in environmental legislation in many jurisdictions. In many

¹⁹ UNFCCC.

²⁰ The most important representative of this view in diplomatic negotiations is The Brazilian Proposal. See UNFCCC ad hoc Group on the Belin Mandate, Seventh Session, Bonn, July 31–August 7, 1997, Implementation of the Belin Mandate, Addendum, Note by Secretariat, pp. 3–37. <http://unfccc.int/cop4/resource/agbm97.html>. In the literature, there are many defenders of this approach broadly construed. Influential accounts include (but are not limited to) Stephen M. Gardiner, “Ethics and Climate Change: Ant Introduction,” *WIREs* 54 (2010): 54–66, Eric Neumayer, “In Defense of Historical Accountability for Greenhouse Gas Emissions,” *Ecological Economics* 33 (2000): 185–192., and J. Timmons Roberts and Bradley Parks, *A Climate of Injustice: Global Inequality, North–South Politics* (Cambridge, MA: MIT Press, 2006).

contexts in which environmental problems arise, polluter pays is a perfectly reasonable principle for assigning responsibility. I do not think that this is such a context.

I have two reasons for rejecting the backward-looking reading of “differentiated responsibility.” First, both the UNFCCC and Paris Agreement give prominent place to the right to sustainable development and poverty eradication. My point is not simply that these are aspirational forward-looking ideas, although they surely are that. More than that, any account of responsibility that is tied to historic emissions will be only contingently related to the central moral constraint of the treaties to respect sustainable development and the pursuit of poverty eradication. Importantly, there is no necessary connection between assigning mitigation responsibilities on the basis of historic emissions and respecting development. A historically high emitter might be a developing country. Indeed, if one counts greenhouse gas emissions only since 1990 for purposes of assigning responsibility that is likely to be the case. Most of the growth in global emissions since 1990 has been in countries that the World Bank refers to as *Upper Middle Income Countries*.²¹ A backward-looking conception of responsibility that tracks recent emissions growth would have to lay responsibility on countries have produced recent development success. That is in tension with the right to sustainable development.

The second reason for rejecting the backward-looking account of responsibility is that it is difficult to make sense of such a conception applying to historic emissions before the broad dissemination of knowledge of the dangers of climate change caused by CO₂ emissions. As argued in the previous paragraph, assigning responsibility on the basis of recent past emissions would seem to be in tension with the right to sustainable development. This problem could be avoided by a conception of historic responsibility that extends much further back, say, to the advent of the Industrial Revolution. But the moral defensibility of doing so is doubtful. The justification of the polluter pays principle standardly rests either on attributions of fault or strict liability. But neither could be applied to emissions at, say, the dawn of the twentieth century. Attribution fault to a party requires among other things that the party satisfies a knowledge condition. The agent either knew or should have known about the danger she was creating. But agents emitting greenhouse gases before the dangers of doing so were known, could not satisfy that condition.

The alternative would seem to be to attribute historic responsibility on the basis of strict liability. But that would be controversial on both fairness and pragmatic grounds. Strict liability is sometimes criticized on grounds that it is unfair to assign responsibility to people who are not at fault. Either they could not have known about the danger they are creating or they took due care in light of the known danger. The best answer to the charge of unfairness is that there is no such unfairness as long as parties are put on notice before they act that they will be held liable for harm if they act. In that case, they assume the responsibility by choosing to act. An argument supporting strict liability appeals to consequences. Putting people on notice that they will be held responsible, even if they fulfill a duty of ordinary care, increases

²¹ World Bank, “Atlas of Sustainable Development Goals 2018 From World Development Indicators,” “13 Climate Action.” <http://datatopics.worldbank.org/sdcatlas/SDG-13-climate-action.html>.

care-taking and reduces accidents. The important thing to notice is that both the defense against unfairness and the support for strict liability rely on the practice of prior notice. But that is precisely what cannot be offered in the case of historic emissions. It is not possible to retroactively put people on prior notice. Hence, the attribution of strict liability now for emissions during first half of the twentieth century is vulnerable to the charge of unfairness and cannot be justified on grounds of creating incentives for greater care.

Although the above two criticisms of historic responsibility for emissions are distinct, they can be combined to strengthen the case against assigning responsibility on the basis of historic emissions. The upshot of the second criticism of historic responsibility is that states cannot be held responsible for emissions prior to there being general knowledge of the relationship between burning fossil fuels and the climate change, at which point fault might apply. That might be thought to license holding states responsible for emissions at some point toward the end of the latter half of the twentieth century. The date 1990 is sometimes used for this purpose since that was the date of the first report of the Intergovernmental Panel on Climate Change. But if responsibility is incurred only for emissions subsequent to 1990, the weight of responsibility will fall far more heavily on newly industrializing Asian countries, China in particular, and much less on Europe and the USA. Indeed by 2007, non-Annex 1 countries were emitting more CO₂ than Annex 1 countries.²² Doing so would penalize states pursuing poverty eradicating development. It is not simply that assigning responsibility on the basis of historic emissions would only be contingently supportive of the right to sustainable development. Rather, in the only case in which it might survive independent moral scrutiny, the case of recent emissions, it is in tension with the right to sustainable development.

In contrast to either a pure historic responsibility or a pure-ability-to-pay conception of responsibility, there have been efforts in the literature to develop multi-valent conceptions of responsibility and to give each value in the rubric a precise weight.²³ Sometimes, the values used seem doubtful, as in the case of rewarding previous emissions by calling for equal percentage emissions reductions, also known as “grandfathering.”²⁴ Any principle calling for equal percentage emissions is morally dubious because it amounts to an entitlement to emit on the basis of past emissions. But the fact that a country emitted a certain amount in the past tells us nothing about what its entitlement to emit is. One defense of this idea sees past emissions as establishing a kind of property right to a certain percent of global emissions.²⁵ Previous possession does not necessarily secure a right to possession, however, as the requirement to return stolen goods makes clear. And in the case of climate change

²² Johannes Friedrich and Thomas Damassa, “The History of Carbon Dioxide Emissions,” *World Resources Institute*, May 21, 2014. <http://www.wri.org/blog/2014/05/history-carbon-dioxide-emissions>.

²³ See Rubiou Dupont, Y et al., *Nature Climate Change* 7 (2017): 38–43.

²⁴ A criticism of Rubiou Dupont (2017) for the grandfathering it employs is developed in Kartha, S et al., *Nature Climate Change* (2018).

²⁵ For a defense of grandfathering, see Luc Bovens, “A Lockean Defense of Grandfathering Emissions Rights,” in Denis G. Arnold ed. *The Ethics of Global Climate Change* (Cambridge: Cambridge University Press, 2011), pp. 124–144.

mitigation, each country's emissions must converge to zero in any case in order to halt warming. So, no country can claim an entitlement to a fixed percentage. At the limit, no country is entitled to any emissions.

Even when multi-valent accounts do not include grandfathering they are still problematic. One problem is a fundamental moral one. Insofar as they distribute the weight of responsibility assignment away from ability or capacity, measured by human development success, the constraining character of the right to sustainable development on mitigation policy is weakened. A state with a lower level of human development than another may be assigned more responsibility as a result of the weight of the other values in the multi-valent composite. Another problem is pragmatic. It is doubtful that there is non-arbitrary assignment of the weights for the various values of any multi-valent index. As a consequence, any employment of multi-valent conception of responsibility would be fraught with controversy, creating additional diplomatic problems.

When it comes to assigning responsibility for mitigation, the treaty language suggests that we should safeguard the right to sustainable development. I have argued that such language makes good moral sense. The best moral interpretation of responsibility assignment in light of that is on the basis of a state's human development level.²⁶ The practical implication of this argument is that most highly human developed states must take the greatest proportion of responsibility for climate change mitigation, at least so long as doing so is necessary to preserve the human development ambitions of developing and least developed states.

5 From Costs to Opportunities?

Although over the past several decades the burdens of mitigation have loomed large in discussions, it is less and less the case that mitigation should be looked at as burden. Energy efficiency, a major part of any mitigation strategy, is a cost-saver after the initial investment has been recouped. And in countries investing in new capacity, rather than retiring still operational generating systems, renewable energy is increasingly competitive with coal. According to the International Energy Association (IEA), the cost of generating electricity by means solar photovoltaic cells has dropped 70% since 2010, and wind energy has dropped by 25%.²⁷ IEA foresees one possible scenario, its Sustainable Development Scenario, in which power generation is nearly completely decarbonized by 2040. Over 60% of all power is generated by renewable energy, 15% by nuclear energy, and leaving 15% from fossil fuels, with nearly a third of the emissions from that removed by carbon capture and storage technology. Full access to clean cooking energy and electricity is provided by means of highly efficient appliances and decentralized renewable energy generation.²⁸

²⁶ See chp. 6 of my *The Moral Challenge of Dangerous Climate Change; Poverty, Policy, and Values* (Cambridge: Cambridge University Press, 2014).

²⁷ International Energy Association (IEA), *World Energy Outlook 2017 Executive Summary*. <https://www.iea.org/Textbase/npsum/weo2017SUM.pdf>.

²⁸ *Ibid.*

It is not only the case that the renewable energy is becoming more attractive because its absolute costs are falling. It is also becoming more attractive because the full costs of fossil fuels, the costs even to those living now, are better appreciated. A report by the Union of Concerned Scientists argues that, “Costs accrue at every point of the fossil fuel supply chain. Extraction processes can generate air and water pollution, and harm local communities. Transporting fuels from the mine or well can cause air pollution and lead to serious accidents and spills. When the fuels are burned, they emit toxins and global warming emissions. Even the waste products are hazardous to public health and the environment.”²⁹ But the immediate negative health effects of the pollution caused by the burning of fossil fuels stand out in particular. The most prestigious US scientific body, the National Academy of Sciences, issued a report that finds that in 2005 alone, the negative health effects of the particulate matter, sulfur dioxide, and oxides of nitrogen produced from 406 coal-fired electricity plants in the continental USA resulted in monetarized costs of \$62 billion. More than 90% of the damages resulted from premature mortality.³⁰ And recent study of the effects of burning coal in China found that in 2013, it was cause of 366,000 premature deaths.³¹ In short, coal kills. And of course, nothing remotely similar can be said of solar energy.

The amount of official public financial support that the coal industry still receives is remarkable. In 2016, fossil fuels subsidies amounted to about \$260 billion.³² According to the IEA that was almost double, the amount going to subsidize renewable fuels.³³ In light of the short-term health effects and long-term climatic effects of fossil fuels, subsidizing their use is morally unjustified, but it is also very likely economically irrational. Once the subsidies were dropped, a costly industry would find it increasingly hard to compete with renewable energy. The cost savings could be used to finance training and re-education efforts for workers in the fossil fuel industry. But if fuel subsidies are justified on grounds of ensuring consumer access, that aim could be achieved by increasing subsidies to renewable energy.

The falling costs of renewable energy and the increased appreciation of the costs of fossil fuels narrow the gap in the comparative costs of renewable and fossil fuels. If fossil fuel subsidies were removed, their costs in comparison with renewable would increase even more. In short, the transition to renewable energy, apart from the short-term costs of technology transition, is likely to be beneficial rather than burdensome. Over time changes in the energy market may turn to safeguard the right to sustainable development better than enforced political agreement.

If there are net zero costs at least with respect to new investments, much of the objective basis for the most difficult coordination problem vanishes. One common way to describe the problem of making progress in mitigation appeals to a collective

²⁹ The Union of Concerned Scientists, “The Hidden Costs of Fossil Fuels.” <https://www.ucsusa.org/clean-energy/coal-and-other-fossil-fuels/hidden-cost-of-fossils#.Wo7up3yDPX4>.

³⁰ National Academies of Science, Engineering, and Medicine, *Hidden Costs of Energy: Unpriced Consequence of Energy Production and Use*, p. 340. <https://www.nap.edu/catalog/12794/hidden-costs-of-energy-unpriced-consequences-of-energy-production-and>.

³¹ Edward Wong, “Coal Burning Causes the Most Pollution Deaths in China, Study Finds,” *New York Times*, Aug. 17, 2016. <https://www.nytimes.com/2016/08/18/world/asia/china-coal-health-smog-pollution.html>.

³² IEA, “Energy Subsidies.” <https://www.iea.org/statistics/resources/energysubsidies/>.

³³ IEA, *World Energy Outlook 2017*.

action problem. Although every state has an interest in climate change mitigation occurring, if the transition is costly, and no state's contribution is necessary, then no state has interest in affecting the transition no matter what other states do. Take the costs, out the picture, and the collective action problem disappears. Reduce the costs and it becomes less severe. Even if there were net zero costs for new energy investments, a transition that takes out of service existing generating capacity has transition costs. And the production of machines and systems that consume new forms of energy entails transition costs. Still, there would be greater reason to hope that robust climate change mitigation is politically feasible.

6 Concluding Remarks

The voluntary determination of NDCs of the Paris Agreement safeguards the right to sustainable development. It ensures that states cannot be compelled to adopt mitigation targets that would compromise their development aims. Nothing about the voluntary process of assuming responsibilities, however, ensures that highly developed states will assume sufficient responsibility to make it likely that warming will be limited to 2 °C, let alone 1.5 °C. Hence, there is need for additional discussion about increasing ambition. The same dynamic exists in the current dialogue about increasing ambition. The development aims of developing and least developed countries are protected by the voluntary nature in which ambition must be amped up. I have argued that there are compelling reasons to take the right to sustainable development seriously, and that a conception of responsibility based on ability to pay, measured in terms of states human development level, fits best with that right. If these arguments are sound, developing and least developed countries have good reason to use the protection that the Paris Agreement processes create to ensure that, if mitigation aims are to be met, the burden will be carried by the most highly developed countries.

Acknowledgements Open access funding provided by Projekt DEAL.

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

Darrel Moellendorf is Professor of International Political Theory and Professor of Philosophy at Johann Wolfgang Universität Frankfurt am Main. He is also Distinguished Visiting Professor at the University of Johannesburg. And he has been a member of the School of Social Sciences at the Institute for Advanced Study (Princeton). He is the author of *Cosmopolitan Justice* (2002), *Global Inequality Matters* (2009), and *The Moral Challenge of Dangerous Climate Change: Values, Poverty, and Policy* (2014). His book *Mobilizing Hope: Climate Change and Global Poverty in the 21st Century* is forthcoming. He co-edited (with Christopher J. Roederer) *Jurisprudence* (2004), (with Gillian Brock) *Current Debates in Global Justice* (2005), (with Thomas Pogge) *Global Justice: Seminal Essays* (2008), and (with Heather Widdows) *The Routledge Handbook of Global Ethics* (2015).