Response to Todd, De Groot, Mose, McCauley and Heffron's critique of "Examining energy sufficiency and energy mobility in the global south through the energy justice framework"

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Abstract

We thank Todd et al. (2019) for providing their thoughts on Monyei et al. (2018) and for opening a debate around the notion of "energy bullying". However, as we argue in this correspondence, Todd et al. (2019) have arguably adopted an unbalanced approach in their criticisms and offer an ambiguous solution. We reinforce our earlier position by providing empirically backed arguments that motivate for more resilient electrification systems and a paced approach to electrifying the global south. We conclude by stressing the need for more tangible contributions that seek to pursue climate protection, electrification of the global south *and* justice progress side-by-side.

Keywords: electricity sufficiency; electricity mobility; energy justice; constructive debate; global south and sequential decarbonization strategy.

1.0 Introduction

Provoked by the term "energy bullying" in our article—a term that we use to signify that the global north has engaged in the consistent promotion of renewable energy in the global south whilst itself continuing to utilise fossil fuels—, Todd et al. (2019) respond to four key areas of our argument in Monyei et al. (2018). This includes: (1) the continued use of fossil fuels by the global north, (2) the increased use of coal in OECD countries between 1980 and 2014, (3) motivations to secure economic advantage, and (4) shortcomings of the South African Solar Home System project. Alongside their own, supplementary, considerations of the cost of renewable energy, the advantages of renewable energy, the challenge of "grow first, clean up later?" discourses, and the linear connection between energy poverty and

socio-economic development, they position these as reason to be cautious of the "energy bullying" term and to focus on the "just transition".

First and foremost, we want to thank Todd et al. (2019) for presenting these critiques to what is undoubtedly an internationally provocative issue; electrification in the global south (and in particular, in South Africa). Second, we want to acknowledge that by provoking these discussions with our original article, we have achieved a first step in the coordinated approach to climate change issues and international relations they claim we lack. We refer here to the tenet of procedural justice, where energy justice outcomes are formed through a process of respectful debate. Nonetheless, while we will always welcome scholarly dialogue and continue to be appreciative of criticisms, we wish to respectfully defend our position, as well as open the door for new contributions that extend these discussions further. Throughout this response, we focus primarily on substantiating the notion of "energy bullying" as this is where Todd et al.'s (2019) exception seemed to lie. To conclude, we then look towards a constructive path ahead.

2.0 **Unpacking the motivations behind Monyei et al. (2018)**

When we set out to write Monyei et al. (2018) we were motivated by the following compelling reasons. First, there was the urgent need to critically challenge what can be positioned as an uncritical ideology that renewable energy technologies (RETs) like individual solar home systems (SHSs) were solely capable of addressing the issue of energy access for off-grid households in the global south. The need for opposing this notion was predisposed on Monyei et al. (2018a)[1], which methodologically evidenced the negative fall-outs of the Non-Grid Electrification Policy Guidelines of South Africa (here-in-after referred to as "the scheme"), especially in failing to guarantee electricity access when benchmarked with the energy justice framework by Sovacool and Dworkin (2015). This rationale is also partially set out in Monyei et al. (2019), which although entirely supportive of the renewables transition, signals that global planners must be cautious, pragmatic and realistic when attempting to decarbonize if they aren't to enhance some aspects of vulnerability.

Second, and incumbent on the first reason, was the need to advocate for the integral issues of electricity sufficiency and electricity mobility within approaches to solving electricity access for off-grid households. Following from Monyei et al. (2018a), it was evident that households benefitting from the scheme were often unable to scale up the capacity of the solar home systems (SHSs) owing to their capital-intensive nature, especially when matched with the purchasing power of the households. Beside our empirical evidence of this necessity, these conceptual contributions also go far beyond a particular case to challenge the core principles of energy justice itself. Indeed, we note praise from Todd et al. (2019) in drawing attention to these less-defined areas of scholarship.

Thirdly, we sought to intellectually challenge the role of clean development mechanism (CDM) projects and their encouragement of improved energization schemes (for instance, improved cookstoves) instead of electrification schemes in the global south. Particularly, (and intentionally provocatively) we highlight: (1) their inability to offer comparable quality of service back in the Annex I country of origin and (2) their inability to completely transition

[1] Then under review.

households to utilising electricity for high-energy dependent activities (cooking, water/space heating). This argument was primarily boosted by the findings from Global Alliance for Clean Cookstoves (2015) which reports that irrespective of the type of cookstove (traditional or improved), the responsibility of wood fetching falls to women 57% of the time. This implies that on average, women will spend over 305 hours (216 for men) or 377 hours (286 for men) each year fetching firewood for improved or traditional cookstoves respectively. Additionally, Monyei et al. (2018a) evidenced that besides paying their counterpart funding for the distributed individual SHS (under the scheme), households also often had to source for alternative fuels to meet their energy needs due to the inability of the distributed SHS to offer them any utility. Counter-intuitively for these households then, this resulted in an increasing energy burden, meaning the SHS was invariably exacerbating poverty. Thus, in agreement with Munro and Bartlett (2019), we note that small-scale solar systems may not be *the* solution to energy issues given that access to these technologies is uneven, they are relatively expensive and vary greatly in terms of reliability, durability and performance, all of which signifies their embroilment with a range of energy justice concerns beyond a binary of grid access/non-access.

Additionally, there was the need to highlight that owing to the current short falls in the ability of the global north to successfully and significantly decarbonize its own electricity grid (as evidenced by the growing decarbonization paradoxes[2]), it would be unjust to demand that the global south adopt full renewable energy systems immediately. Here we acknowledge prevailing and extremely well-cited limitations of renewables including the intermittent and variable nature of generating renewable electricity and at present, the lack of available transmission networks to carry generated electricity from sources of generation to points of demand). This argument is not unique to our article, but as McCauley and Heffron (2018) have acknowledged in their own work, represents decades of work and debate on climate justice in particular (e.g. Chatterton et al. 2013). We return to this argument later.

Furthermore, we were also motivated to oppose the growing discourse that renewables were (always) cheap when compared to the conventional means of electricity generation, and thus a better option in electrifying the global south. As is commonly promoted, even by Todd et al. (2019), there has been a consistent apples and oranges comparison between levelized cost of energy (LCOE) and grid electricity cost (so-called grid parity). This, according to Joskow (2011: pg. 1) "*fail(s) to take into account differences in the production profiles of intermittent and dispatchable generating technologies and the associated large variations in the market value of the electricity they supply.*" Here then, we again refer to well-cited evidence in making our claim.

Lastly, we were further motivated by the absence of tangible benchmarks and policies guiding the roll-out of electrification projects (and especially off-grid ones) in the global south. The implication of this absence was further shown in Monyei et al. (2019a), where it

[2] See Monyei et al. (2019). We must disclose that Monyei et al. (2019) was not yet drafted as at the time Monyei et al. (2018) was reviewed and published.

is argued that the attempt by South Africa to energize[3] indigent households resulted in the trilateral energization approach (TEA)[4] that exacerbated instances of injustice and marginalization. This occurred as an outcome of the differing quality and quantity of energization households can receive based on their proximity to the grid.

Having outlined our rationale behind the piece, let us take a minute to signify what these intended contributions culminate in. Quite simply, we strive towards an attempt to promote energy justice outcomes and fairness in international energy policies as part of an on-going and very necessary low-carbon transition. In writing this response, and in the context of Todd et al.'s (2019) dislike of the "energy bullying" term, we therefore display our concern that the authors undermine the core message of Monyei et al. (2018), suggesting that "[our arguments] are underpinned by a fear of the transition to renewables and a desire to retain the fossil fuel driven status quo". This warrants a robust defence; especially as they seem to imply that protecting energy justice outcomes and achieving global south rural electrification are at odds with climate change agendas.

2.0 In defence of Monyei et al. (2018)

Our response to Todd et al. (2019) will engage with two major themes that run throughout their article; statistics and limited knowledge of the dynamics of sustainably electrifying off-grid communities in the global south, elements which they suggest undercut the "energy bullying" claim.

2.1 On statistics and the need for critical analysis

In Todd et al.'s (2019) response, they significantly detract from the original direction of our article, which centred on the electrification of off-grid households (using South Africa as a case study) and inferred a range of supplementary arguments. While we agree that limited references were made to coal generation (for South Africa and Nigeria), the mention was primarily to justify the propensity for energy bullying by the global north on the global south. Indeed, to clarify, we introduced evidence that the global north continues to use coal whilst its development in Nigeria has been restricted and in South Africa, it has faced heavy critique from a number of OECD countries. In response, Todd et al. (2019) claim that, "…Monyei et al. (2018) might usefully have differentiated between the continued use of existing generation capacity and the commissioning capacity." Whilst arguably useful, this distinction does not prevent our original argument – the mass deployment of renewables does not directly translate to a significant increment[5] in the amount of usable electricity for consumption owing to reasons outlined in Monyei et al. (2019). Nonetheless, now raised, we wish to point to the continued development of coal fire plants in Turkey, for example,

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[3] The use of the term energize encompasses all forms of energy and not necessarily electricity alone. Thus, while the Free Basic Electricity (FBE) programme (offering grid-connected indigent households 50kWh/month free) and the Non-Grid Electrification Policy Guidelines (estimated to offer off-grid and indigent households subsidized SHS that can provide 7.5kWh/month) are electricity based, the Free Basic Alternative Energy Policy (offering other off-grid and indigent households subsidized rations of energy fuels) is energy fuel based.

[4] See Monyei et al. (2019a) for further explication on TEA.

[5] Or significant displacement of fossil-based generation sources.

with the most recent infrastructure coming on line in 2018. We can also use a case study of Germany. In 2018, non-renewable sources represented less than 40% of installed capacity yet generated over 46% of electricity. Renewables, on the other hand, represented about 55% of installed capacity yet produced 37% of electricity (Fraunhofer ISE, 2019; 2019a). Beyond new infrastructure, this represents the sustained utilisation of fossil fuel (especially natural gas in recent times) *within* existing generation systems. Alongside arguments that increasing renewable energy capacity must be matched with large fossil-fuelled reserve capacity (Smil 2016) or the possibility of using storage to back-up the variable renewable energy (VRE), this validates our concern that global north fossil fuel use continues, in some cases, to grow.

Furthermore, a major unacknowledged fact by Todd et al. (2019) is the important role of fossil fuel and nuclear power generation sources in offering resilience to the electricity grids of countries making huge investments in renewable energy technologies (RETs). Countries such as China, USA, Germany, France, Australia, the United Kingdom, amongst others, have huge installed capacities of these conventional generation sources for either firming RETs during intermittent supply or augmenting supply shortfalls during periods of low/or no renewables electricity supply. Indeed, Monyei et al. (2019, 2019a) show that global decarbonization strategies often follow either a sequential displacement model for low-carbon transition or a hybridization model.

Similarly, Todd et al. (2019) argue that "the existing infrastructure (grid) [in Europe] is based on fossil fuels and will take time to adapt and that energy demand in Europe is driven by industry (hence baseload) …," Whilst we agree to some extent, this represents a lack of ambition. For instance, drawing from the transitions sphere, Sovacool (2016), Kern and Rogge (2016) and Bromley (2016) all argue that low-carbon transitions could be potentially faster than historical transitions due to emergent political will and a sense of urgency. Todd et al. (2019) must also neglect the growing scale of industries now sourcing a greater portion of their electricity from renewables. For instance, IRENA (2018) reports that AkzoNobel, Holmen, Norsk Hydro and Rio Tinto (all headquartered in Europe) now have renewables electricity share of 62%, 68%, 39% and 47% respectively. Furthermore, there are also myriad examples of increased investment into energy efficiency. We note too that the authors only reference Europe, narrowing the scope of their evidence.

Additionally, when Todd et al. (2019) argue that the principal reason for the increase in OECD coal usage between 1980 and 2014 was due to the addition of 10 new countries to the collective, then we respectfully disagree. For instance, considering the percentage contribution of coal to electricity generation for the OECD countries between 1994-2014[6], the average contribution of the 10 additional countries is 9.8%, which pales when compared to 53.9% for the USA and 8% for Germany (OECD 2019). In this respect, the 10 new countries made a minority contribution.

Todd et al. (2019) also misrepresent our reasons for identifying shortcomings of the scheme in South Africa. First, they state that we "cite multiple shortcomings in the South African SHS (Solar Home System) project … These include manufacturing defects, installation defects,

[6] Data from 1984-1994 is excluded since the earliest member (Mexico) joined in 1994.

(and) a lack of maintenance instruction". None of these terms or critiques are mentioned in our article. To the contrary, the major arguments put forward in Monyei et al. (2018) centred on: (1) the inability of the scheme to guarantee sufficiency (electricity sufficiency) and mobility (electricity mobility) and (2) the possibility of the scheme to exacerbate instances of energy poverty for households. Second, Todd et al. (2019) express concern with our proposals for a solar-diesel hybrid system, yet go on to say that the "the relative costs, benefits and practicalities of … solar-diesel hybrid will play out in the near-future, and funders will take account of this experience in their plans" (pg. 45). We thank Todd et al. for this statement and hope our article is positioned as part of such evaluations.

Extending the diesel based argument, Todd et al. (2019: 45) also state that "the promotion of diesel is controversial; the authors seem intent on encouraging fossil fuel use in their article". We acknowledged this controversy within the original piece but cite evidence from Monyei et al. (2018a) which showed over a 70% reduction in CO_2 emissions and over 25% reduction in the energy costs of households from a community that utilised the hybrid system (centralised solar panels and diesel generators) along with the use of artificial intelligence (AI) in scheduling heavy electricity demand loads for households compared to each household adopting individual SHS. Moreover, in justifying the use of diesel generators (as an intervention and only for limited hours daily), our argument was premised on the fact that the inability of the scheme to displace coal and firewood usage for cooking and water heating predisposed households to Chronic Obstructive Pulmonary Disease (COPD) and poor quality of life (QoL). Thus, this scheme was presented as part of a staged, pro-justice transition. Here, we would have welcomed a more substantive critique and a tangible contribution to a cleaner, cheaper and more resilient alternative, which, as our suggestion did, aimed to improve QoL, empower women, reduce the risk of COPD, reduce energy poverty *and* mitigate emissions.

2.2 On sustainable electrification and the need for benchmarks

Todd et al. (2019) elaborate extensively on renewable energy and its numerous advantages, especially for the global south. This includes their role in health benefits, greater industrial efficiency, economic advantage of green products, increased energy security and employment opportunities, amongst others. Their mention of these advantages is valid and yet not necessary given that we did not seek to deride renewables, only to promote their staged, sensitive, and appropriate deployment. Therefore, in this response, we refer to our real area of concern, the wholesale promotion of renewables for the global south when it might enhance energy justice-based vulnerabilities. To further evidence some of these dangers, we draw on an analysis from Monyei et al. (2019) which shows that in the global north, despite a more organized electricity grid, supporting legislations and growing societal support, the deployment of renewables has yielded some unintended negative consequences. These include increased electricity costs, growing curtailment, increased poverty and meagre climate change abatement across Germany, Australia and California, for instance. We subsequently outline robust clarifications on Todd et al. (2019) arguments with regards to the role of renewable energy in sustainably electrifying the global south.

2.2.1 Misconceptions about the affordability of renewable energy technologies

Todd et al. (2019) rely on the IEA statistics to defend their stance on the affordability of renewable energy, neglecting the differing roles and cost implications of renewable

technologies in electrifying grid and off-grid households. It is no misnomer that by utilizing the LCOE, RETs 'appear' cheaper than conventional generation sources (for grid/micro-grid connected households). Yet according to Procter (2018), we have been allowed to ignore how electricity is produced and delivered, including the associated costs of managing the stochasticity and intermittency of the VRE sources. The resultant lack of experience and knowledge of how to manage VREs in electricity systems institutes a barrier against our ability to make informed public policy on GHG. For instance, Njobeni (2018) affirms that despite the public support for the successes of the REIPPPP, Eskom has bemoaned the cost of connecting the independent power producers (IPPs). Njobeni (2018) further states that Eskom is reported to have spent R6.64 billion to purchase 3, 048 GWh of renewable energy at an average cost of R2.18/kWh. This is at variance with Eskom's LCOE for the Medupi and Kusile power plants of R0.71/kWh and R0.96/kWh respectively (DoE 2017).

There are other strands to our defence too. First, LCOE are merely estimates that guarantee a return of investments along with profits for the investors in the renewable energy projects (REPs). The declining LCOE does not represent declining costs that consumers of electricity would pay. Second, RETs are also not cheap for off-grid indigent households. For instance, the SHS distributed to off-grid households under the scheme were heavily financed by the government (up to 80%). Yet, despite incurring costs financing these SHS, households expended additional finance sourcing for alternative energy fuels to meet their energy needs due to the inability of the distributed SHS to offer significant utility and also displace the permanent usage of coal and firewood for cooking and water heating purposes (Monyei et al., 2018). To clarify again, then, what we seek to show is that renewables roll-out requires sensitivity and phasing if it is not to exacerbate vulnerabilities.

2.2.2 Advocating the need for a paced transition and poverty reduction

Similar to the growing role of natural gas in displacing coal in the energy mix of countries, we advocate for a sequential decarbonization strategy for electrifying off-grid households in the global south. Such decarbonization model would exploit hybrid configurations such as solar PV/batteries/diesel generators or solar PV/batteries/biomass generators and leverage the use of artificial intelligence (AI) in increasing its flexibility. The intended result is hybrid systems that will offer off-grid residents the opportunity to enjoy grid-comparable electricity that is stable (i.e. resilient), sufficient (to meet *all* their electricity needs including cooking and water heating), cheap, clean (since it totally eliminates the need for coal), smart (allows for localization of demand response) and scalable. This, we argue, is imperative for reducing – or at the very least not increasing – poverty.

Indeed, it is worth mentioning too that Todd et al. (2019) show concern over our suggested causative link between energy consumption and poverty. Here we see value in distinguishing between global north and global south experiences. In the global north, energy poverty is typically more of a problem of affordability (i.e. the ability of households to afford sufficient energy for adequate heating) while in the global south, energy poverty typically presents the dual problems of access and mobility (Monyei et al., 2019b). Of course, this is a complex juxtaposition of issues to explain in one short paragraph but nonetheless, we refer here to supporting evidence linking energy poverty (access and use/mobility) to socio-economic development in global south contexts. According to Heard et al. (2017), there is undeniable relationship between per-capita energy consumption and

the United Nations Human Development Index (UN HDI). In support, Aklin et al. (2016, 2017) evidences that for communities in India, the duration of electricity access and the significant role it plays in improving households' satisfaction and economic development. A more tangible grounding is provided in Aklin et al. (2016), where improved duration of grid access increased households non-agricultural income by more than 28% compared to 9% for just grid access. Finally, Gregory and Sovacool (2019: 146) also write that "there is often a direct or at least meaningful relationship between household economic poverty and energy burdens and energy poverty: the poorer households are, the higher their energy burden, yet poorer households tend to access cheaper energy options when tariffs are high". Given our argument is in agreement with a vast, contemporary literature on this topic (see also Bouzarovski and Petrova 2015; Samarakoon 2019, Khanna et al. 2019, Mastrucci et al. 2019, for further examples, amongst others), and indeed that electrification represents a Sustainable Development Goal strategy to reduce poverty, we find this concern easy to refute. We therefore also find that practical solutions for low-carbon transitions *and* poverty reduction are needed.

4.0 Conclusion

It would be easy in the midst of all of these discussions to lose focus on the reason this article exists: because of our use of the term "energy bullying". Thus, in concluding, and in addition to all presented above, we want to return to whether we can substantiate this claim, and how best we can proceed now. We say this as acknowledgment that whilst it is imperative that these forms of debate are played out within academic circles, they must also be reflected in practice.

First, we maintain that the term energy bullying is appropriate for two reasons: (1) it stimulates productive dialogue in keeping with climate and energy justice discourses and (2) we believe it can be substantiated. In an attempt to re-write the evolution of energy transitions in the global south, scholars and academics have created a trajectory that often emphasises the need for more renewable energy-based electrification schemes while downplaying the more important issues of availability, sufficiency and mobility of such projects. Secondly, in proposing a roadmap for sustainably electrifying the global south, most academic scholars treat the electrification aspect as a 'black box' without providing concrete justifications as to how their proposals make sense technically. Thirdly, it can be argued that most scholarly contributions and electrification projects in the global south have attempted to replicate electrification schemes without due considerations to inherent institutional, infrastructural, legal, and political limitations. Lastly, there has been no collective agreement on and coherence in policy benchmarks to guide the roll-out of electrification projects (Monyei et al, 2019a). The consequences of these flaws are fundamental. For instance, attempts at pushing for more renewables (like SHS and microgrids) in electrifying households and communities in the global south have resulted in a multitude of failed projects (Azimoh et al., 2016; Ikejemba et al., 2017). As we conclude, it has thus become pertinent to stress the necessity of the critical stages of peaking and plateauing of emissions to allow for stabilization, acclimatization and the development of supporting structures, policies and infrastructure that can facilitate consistent declining emissions.

Second, we look to a positive way ahead for this body of scholarship. Todd et al. (2019: 44) suggest that this lies in the "just transition", yet only use the term once in the body of the text, give it no meaning, and do not suggest how this fulfils their claim of a more "constructive approach of working together between global south and global north". This leaves us on a worrying note, where we fear critique is being given without substantive suggestions of improvement. The authors also seem to suggest that any attempts at securing more positive energy justice outcomes are to be seen negatively in the context of climate change pressures, or at least to be a secondary concern. This is alarming, especially when energy justice is couched in a concern for the already marginalized, for participation, recognition and due process. We return here to a well-used quote, that even a '"low-carbon" transition has the potential to distribute its costs and benefits just as unequally [as historical fossil-based transitions] without governance mindful of distributional justice' or, by extension, with concern for justice as recognition and procedural justice too (Eames and Hunt 2013: 58).

Time is certainly of the essence if we are to fight dangerous climate change, and yet we cannot steamroller progress at the expense of energy justice. With faith in both the credibility of our evidence and of our argument, and with thanks to Todd et al. (2019) for stimulating further debate, and as a path ahead, we welcome tangible contributions that seek to pursue climate protection, electrification of the global south *and* justice progress side-by-side.

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