

# Promoting Global Health and Equity through Climate Policies

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## **Executive Summary**

Climate change is a public health crisis with serious health impacts, requiring transformative and equitable solutions. This white paper identifies country-specific policies, rooted in health and equity, and which will reduce greenhouse gas emissions to help mitigate the climate crisis. Our policy roadmap presents recommended GHG mitigation policies across three sectors: energy, food & agriculture, and transportation. We also include discussion on climate policies related to women's health and education, nature-based solutions, and healthy and green cities. For each country, we explored a combination of legislation and agency/ministry policies for health impacts, equity impacts, and political feasibility. In total, we analyzed 66 policies across seven countries (see attached policy matrices).

## **Introduction**

The latest report of the United Nations Intergovernmental Panel on Climate Change (IPCC) concluded that: 1) climate change and the heating of the planet are caused by human activity and 2) climate impacts are here and happening now.<sup>1</sup> Climate change poses many risks to human health, and numerous climate-sensitive health risks are now scientifically well established.<sup>2</sup>

The urgent need for timely action against climate change became clear in 2018 in IPCC's "1.5°C" assessment report when climate scientists concluded that a 45% reduction in emissions would be required by 2030 to stabilize Earth's temperature to 1.5°C above pre-industrial levels.<sup>3</sup> To meet this target, greenhouse gas (GHG) emissions policies must be evaluated quickly and across all sectors and reduction targets set. In addition to mitigating climate change, these policies also have the potential to catalyze large near-term health benefits.

According to Dr. Tedros Ghebreyesus, Director General of the World Health Organization (WHO), "The Paris Agreement is potentially the most important public health agreement of the century." The health benefits of transitioning to clean energy, more sustainable food systems and less polluting transportation systems have potential to be massive. Low-carbon policies across these three sectors in the nine largest greenhouse-gas-emitting countries would avoid an estimated 10 million premature deaths every year, according to the 2021 Lancet Countdown report.<sup>4</sup>

Framing of the climate crisis as a threat to human health has potential to generate political support and to accelerate adoption of climate mitigation and adaptation policies. A recent survey in the United States found that health inspires an even higher level of support for climate solutions than job creation.<sup>5</sup> As renewable energy costs continue to drop relative to fossil fuels in many parts of the world, it has also become more economically viable to take actions to reduce the threat of climate change.

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<sup>1</sup> IPCC, 2021: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press. In Press.

<sup>2</sup> Patz JA, Campbell-Lendrum D, Holloway T, Foley, JA. Impact of Regional Climate Change on Human Health. *Nature*, 2005; 438: 310-317.

<sup>3</sup> IPCC, 2018: Summary for Policymakers. In: *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty* [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. *World Meteorological Organization, Geneva, Switzerland*, 32 pp.

<sup>4</sup> Hamilton, I., Kennard, H., McGushin, A., Höglund-Isaksson, L., Kiesewetter, G., Lott, M., Milner, J., Purohit, P., Rafaj, P., Sharma, R., Springmann, M., Woodcock, J., & Watts, N. (2021). The public health implications of the Paris Agreement: A modelling study. *The Lancet Planetary Health*, 5(2), e74–e83. [https://doi.org/10.1016/S2542-5196\(20\)30249-7](https://doi.org/10.1016/S2542-5196(20)30249-7)

<sup>5</sup> Speiser, M., Hill, A. (March 2021). American Climate Perspectives Survey 2021. Health Surpasses Jobs in Climate Action Support. *ecoAmerica*. Washington, DC. <https://ecoamerica.org/wp-content/uploads/2021/03/acps-2021-vol-ii-health-surpasses-jobs-in-climate-action-support.pdf>

Under the 2015 Paris Agreement, countries committed to limiting the global temperature rise to 1.5°C and outlined their plans for achieving this goal under their Nationally Determined Contributions (NDCs). Countries submitted their first NDCs after COP21 in 2015 with an expected updated NDC in 2020 before COP26, which was extended to 2021 due to the COVID-19 pandemic. Unfortunately, few countries have met their NDCs or have met their emission reduction requirements, and few mentioned health or equity in their commitments. The expectation that countries update their NDCs in 2021 offers a fresh opportunity to advocate for commitments and policies that incorporate ambitious greenhouse gas emission reduction targets and that are rooted in health and equity. In preparation for the upcoming COP26 and to guide development of countries' NDCs, the World Health Organization and public health, nursing and medical associations representing over 40 million health professionals worldwide are calling for a green and healthy COVID-19 recovery.<sup>6,7</sup>

Many countries have submitted their 2021 NDCs in advance of the upcoming 26<sup>th</sup> Conference of the Parties (COP26) of the United Nations Framework Convention on Climate Change (UNFCCC). In these new NDCs, more countries are beginning to link climate change targets with public health policies. The Healthy NDC Scorecard, developed by the Global Climate and Health Alliance, provides information on which governments have integrated health into their NDCs, and indicates whether their targets will protect human health.<sup>8</sup>

***This white paper outlines the process of identifying and designing policies that are country-specific, rooted in health and equity, and will reduce greenhouse gas emissions to help mitigate the climate crisis.*** Our policy roadmap presents recommended GHG mitigation policies across three sectors: energy, food & agriculture, and transportation. We also include discussion on climate policies related to women's health and education, nature-based solutions, and healthy and green cities. While adaptation measures are important and have the opportunity for health co-benefits, **the focus of this white paper is on climate change mitigation with immediate health and equity benefits**; every fraction of a degree of warming translates to added health harms, so this white paper focuses on the root problem of GHG emissions to prevent further irreversible damages.

The national climate policies that we present in this white paper were explicitly and intentionally designed to not only reduce GHG emissions but also to simultaneously benefit health and advance equity. To achieve this goal, we developed health and equity criteria. Each country was researched and evaluated by looking at the current NDC, cultural context, and GHG emissions by sector to help inform what policy levers could be used. Local organizations, universities, and news articles were researched and compiled to identify potential policies to evaluate using the health and equity criteria. Policy matrices were developed and given to local country-specific stakeholders to receive feedback and engagement. Once the policy matrix had feedback from local stakeholders, it was developed into policy briefs as was the case for the U.S., India, and South Africa.

## **Health Criteria**

Climate change has severe negative health impacts on all sectors of society. Fossil fuel combustion, the main source of the CO<sub>2</sub> and other GHGs that drive climate change, is also the

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<sup>6</sup> World Health Organization (2020). *WHO Manifesto for a healthy recovery from COVID-19: Prescriptions for a healthy and green recovery from COVID-19*. Retrieved March 31, 2021 from <https://www.who.int/news-room/feature-stories/detail/who-manifesto-for-a-healthy-recovery-from-covid-19>

<sup>7</sup> Global Climate and Health Alliance (2020). Over 40 million health professionals urge G20 leaders to put public health at the core of Covid-19 recovery. Retrieved March 31, 2021 from <https://climateandhealthalliance.org/press-releases/over-40-million-health-professionals-urge-g20-leaders-to-put-public-health-at-the-core-of-covid-19-recovery/>

<sup>8</sup> Global Climate and Health Alliance. (2021). Healthy NDCs. *The Global Climate and Health Alliance*. <https://climateandhealthalliance.org/initiatives/healthy-ndcs/>

main source of air pollution and generates multiple airborne pollutants, including SO<sub>2</sub>, NO<sub>2</sub>, and particulate matter, all of which damage air quality, water quality and human health. The health impacts of fossil fuel combustion and climate change will continue to worsen if nothing is done to mitigate and adapt to the climate crisis. Climate change will increase both weather disasters (floods, wildfires, and droughts), and the spread of disease in many regions, all of which are harmful to human health. For all these reasons, health must be a key criterion in the design of climate policies, and changes in current climate policy can lead to many health benefits. This white paper focuses on the near-term immediate health benefits of GHG reduction policies and also notes the risks of poorly designed policies.

The health grade we give to each climate policy is based on whether the policy will have a **positive impact on population health, as measured through various health indicators** such as air quality, incidences of illness and disease, physical health, and mental wellbeing. In addition, impacts to the social determinants of health are also considered such as education, employment, socioeconomic status, wealth, and the built environment. When policies address one or more of these indicators, the rating for the policy is positive. However, it is important to understand that if the policy is in any way negative to health, it will not have a positive designation. For example, while increasing the use of electric vehicles may be positive for health in reducing greenhouse gas emissions (GHG), it does not address the negative health impacts of road safety and congested roads as it does not take any cars off the road. Instead, electrifying and expanding public transportation is recommended as it reduces the need for personal vehicles improving road safety and congested roads while also reducing GHG emissions when electrified by renewable energy sources.

### **Equity Criteria**

Health and equity are inextricably linked, with each affecting the other. As climate change severely impacts human health, it also worsens and exacerbates inequities in all societies. Inequities can be embedded and perpetuated in societies through structures based on income inequality and on prejudices against race, ethnicity, class, sex and gender, faith, immigration status, and disability (and any intersection of these groups). The almost inevitable consequence of such policies is that poor and marginalized communities suffer the negative health impacts of climate change much more severely than other sectors of society. In addition, frontline communities, or those who experience the impacts of the climate crisis first and worst, are often ignored in conversations and excluded from interventions against climate change. For all these reasons, equity must be a second key criterion in grading climate policies.

The equity grade we award to each climate policy is based on whether the policy will have a **positive impact on equity through various equity indicators. Our equity criteria include:** community ownership, community engagement and input, reducing disparities, and improving the wellbeing of marginalized and underserved communities. When policies address one or more of these indicators, the rating of the policy is positive. However, if the policy is inequitable in any way even if it does address one of the indicators, it will not have the positive designation. For example, increasing renewable energy for all communities, especially those who are low-income and frontline, is important for electrifying the energy system. However, if it is not community owned and operated then it is not positive as it exacerbates the current power structure of the energy system.

## **Countries Included in this White Paper**

We analyzed seven countries across different regions of the world. We initially were approached by WHO and the Global Climate and Health Alliance (GCHA) to analyze countries that had yet to submit their NDCs for COP26 when we began our analysis. These included the United States, India, South Africa, South Korea, and Trinidad and Tobago. In anticipation for COP27, to be held in Africa, we added policy matrices for Nigeria and Ethiopia.

We also included two important comparisons between the United States and India, and Ethiopia and Nigeria, to highlight the importance of understanding the cultural context and available resources for each country when thinking about policy recommendations. We choose to compare the United States to India to show the stark contrast in available economic resources, with the U.S. having strong economic resources and market power while India has more limited resources. In addition, we compared the two most populated countries in Africa, Nigeria and Ethiopia, to highlight the difference in energy sources; Nigeria relies heavily on oil and natural gas, while Ethiopia uses hydropower and biofuels for its main sources of electricity and diverse energy needs.

## **Emissions Reduction Policies Across the Energy, Transportation, and Food & Agriculture Sectors**

This white paper focuses on three main sectors that contribute heavily to GHG emissions: energy, transportation, and food & agriculture, which combined account for an estimated 63% of global GHG emissions.<sup>9</sup> Within each sector, policies are listed that are relevant for multiple countries, despite differences in resources, culture, and motivation for change. These policies outline the health and equity impact as well as the current political landscape in each country that it is recommended in.

### **Energy**

#### **Community-Based Renewable Energy Projects**

Community-based renewable energy projects are designed to give communities more ownership over where and how they access their energy.<sup>10</sup> A community-led board must be required to manage and oversee the projects to ensure that community members are involved in the transition to a green economy. Policies must provide incentives for communities to invest in renewable energy projects, such as subsidies and grant programs. The long-term goal of community-based renewable energy projects is to be sustainable and completely citizen-run, with special attention to frontline and underserved communities.

Health and equity are at the forefront of community-based renewable energy projects. A transition to renewable energy will reduce harmful air pollution and GHGs that would otherwise be produced by burning fossil fuels. Improved air quality can lessen health care costs, sick days, and air pollution-related deaths and illnesses.<sup>11</sup> In addition, scaling up community-based renewable energy infrastructure can improve the built environment, create more local jobs, and reduce

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<sup>9</sup> US EPA, O. (2016, January 12). *Global Greenhouse Gas Emissions Data* [Overviews and Factsheets]. <https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data>

<sup>10</sup> *Consumer Advocacy – Public Utilities (DCA) | Community-Based Renewable Energy (CBRE)*. (n.d.). Retrieved August 24, 2021, from <https://cca.hawaii.gov/dca/community-based-renewable-energy/>

<sup>11</sup> Millstein, D., Wiser, R., Bolinger, M., & Barbose, G. (2017). The climate and air-quality benefits of wind and solar power in the United States. *Nature Energy*, 2. <https://doi.org/10.1038/nenergy.2017.134>

energy insecurity. When targeted at vulnerable and disadvantaged populations, these projects empower communities by allowing them to have more input and control over their electricity sources.<sup>12</sup>

We recommend community-based renewable energy projects to the U.S., India, Trinidad & Tobago, South Korea, Ethiopia, and Nigeria. In the U.S. and India, community-based renewable energy projects already exist. However, existing projects, such as Community Choice Aggregation (CCA) in the U.S., are inequitable because they currently target more wealthy communities.<sup>13</sup> To make these existing programs more equitable, we recommend a stronger focus on expanding community-based renewable energy infrastructure in low-income communities. Conversely, these projects are a newer concept in Trinidad & Tobago, so we recommend community solar projects that include education programs. When recommending community-based renewable energy projects to South Korea, the focus is on offshore wind power instead of solar power. We chose not to recommend solar projects for rural communities in South Korea due to strong opposition from locals and the harmful practice of cutting down forests by way of building solar facilities.<sup>14</sup> Consequently, we focus on community-based offshore wind power as a renewable energy alternative for South Korea. A community-based project provides the opportunity for fishermen, who have voiced their concerns about offshore wind, to be included in the conversation around renewable energy infrastructure that directly impacts their daily work.<sup>15</sup> In both Ethiopia and Nigeria, we recommend community-based renewable energy projects that also allow off-grid microgrids to ensure energy equity in rural communities.

### Fossil Fuel Phase-Out

Fossil fuel phase-out policies outline legislative action steps for countries to reduce and ultimately eliminate the use of fossil fuels in their energy infrastructure. It often includes gradually eliminating fuel subsidies while incentivizing accessible renewable energy, especially for low-income and frontline communities. These phase-out strategies must be developed in conjunction with a just transition that helps workers who were previously in the fossil fuel industry to be retrained in renewable energy.

The combustion of fossil fuels for energy has increased GHG emissions, and thus increased more adverse health effects such as cancer, lung-related illnesses, and cardiovascular disease. According to a study by The Lancet (2017), air pollution-related deaths are expected to increase 50% by 2050.<sup>16</sup> Ultimately forcing the phase-out of coal and natural gas would lower GHG emissions, leading to improved air quality and overall human health. Additionally, this phasing out would improve the built environment, especially for communities that live near power plants and are thus more vulnerable to the toxic pollutants emitted. In the interest of health and equity, there must be a just transition so that communities most at risk to the effects of climate change have affordable access to clean energy and fair job opportunities in a green economy.

We recommend Coal, Natural Gas, Oil, and Biofuel Phase-Out policies to the U.S., Trinidad & Tobago, Nigeria, India, South Korea, and Ethiopia, relative to each country's emissions. For

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<sup>12</sup> Community-led Program Brings Solar Energy to India's Poorest. (2016, June 17). *Aga Khan Foundation USA*. <https://www.akfusa.org/our-stories/community-led-program-brings-solar-energy-to-indias-poorest/>

<sup>13</sup> Bolon, C., Lanckton, T., & Baker, S. (n.d.). *Utilities 101: A guide to the basics of the electric utility industry with a focus on justice*. Initiative for Energy Justice. <https://iejusa.org/wp-content/uploads/2020/08/Utilities-101-Full-Guide-v3.pdf>

<sup>14</sup> Ji-hye, S. (2019, July 5). *[Going Renewable (5)] South Korea faces solar power dilemma*. The Korea Herald. <http://www.koreaherald.com/view.php?ud=20190705000587>

<sup>15</sup> *Blowing in the wind: Fishermen threaten South Korea carbon plans*. (2021, April 28). France 24. <https://www.france24.com/en/live-news/20210428-blowing-in-the-wind-fishermen-threaten-south-korea-carbon-plans>

<sup>16</sup> Landrigan, P. J., Fuller, R., Acosta, N. J. R., Adeyi, O., Arnold, R., Basu, N. (Nil), Baldé, A. B., Bertollini, R., Bose-O'Reilly, S., Boufford, J. I., Breyse, P. N., Chiles, T., Mahidol, C., Coll-Seck, A. M., Cropper, M. L., Fobil, J., Fuster, V., Greenstone, M., Haines, A., ... Zhong, M. (2018). The Lancet Commission on pollution and health. *The Lancet*, 391(10119), 462–512. [https://doi.org/10.1016/S0140-6736\(17\)32345-0](https://doi.org/10.1016/S0140-6736(17)32345-0)

example, the U.S. relies on natural gas for 32% of energy production<sup>17</sup> and is one of the world's largest natural gas exporters with demand projected to dramatically increase.<sup>18</sup> Thus, for the U.S., we recommend a Ban on the Expansion and Export of Natural Gas to put an end to fracking as well as the negative health and unjust consequences that result from it. The ban on expansion and exporting natural gas from the U.S. will reduce the harmful effects of methane leakage and human rights violations, especially for Indigenous populations. As the U.S. and other countries phase out coal, this natural gas expansion ban can also help avoid global overreliance on natural gas as opposed to sustainable alternatives. We also recommend a Natural Gas Phase-Out to Trinidad & Tobago in the form of phasing out fuel subsidies, because the country heavily relies on natural gas as an energy source. More specifically, we recommend phasing out fuel subsidies for natural gas, petroleum, and diesel that disproportionately help high-income households and create barriers for low-income households. For Nigeria, we recommend a combined Oil and Natural Gas Phase-Out Strategy as 80% of its power generation comes from natural gas with the remainder coming from oil.<sup>19</sup> In India, coal-based thermal power stations without pollution control technology are responsible for over 50% of sulfur dioxide emissions, 30% of nitrogen oxides emissions, and about 20% of particulate matter in India.<sup>20</sup> Thus, for India's policy brief we recommend a Coal Phase-Out Strategy with a strong emphasis on No New Coal Plants. Similarly, we recommend a Coal Phase-Out for South Korea because not only is burning coal harmful to the environment, but it is also expected to be unprofitable.<sup>21</sup> For Ethiopia, we recommend a Biofuel Phase-Out Strategy that helps reframe biofuels as an unsustainable fuel source that accounts for 92.4% of Ethiopia's emissions.<sup>22</sup> Instead, we recommend a transition to a diversified renewable energy mix through subsidies that would increase access to these sources for low-income and rural households.

## Transportation

### Complete Streets

Complete Streets is an urban design process that focuses on pedestrians, bikes, and public transportation as opposed to personal vehicles, by having spacious sidewalks, clearly marked biking lanes, safe crossings, curb extensions, priority lanes for public transit, and public transit stops. Shifting from a transportation infrastructure focused on personal vehicles to one centered around active transportation requires efforts at the national and local levels to maximize its health benefits.

Designing streets rooted in biking, walking, and public transit will reduce vehicular emissions, which are a major cause of air pollution. A recent study found that four million children develop asthma every year from NO<sub>2</sub>, a byproduct associated with burning fossil fuels emitted by cars and trucks.<sup>23</sup> In addition, using Complete Streets in urban planning reduces GHG emissions which will improve respiratory health outcomes. Complete streets also encourage physical activity by creating infrastructure that allows for easy walking or biking. Creating a built environment that

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<sup>17</sup> *Share of energy consumption by source*. (n.d.). Our World in Data. Retrieved March 23, 2021, from <https://ourworldindata.org/grapher/share-energy-source-sub>

<sup>18</sup> Demand for U.S. Natural Gas Exports to Surge Through 2021, EIA Says. (2021, August 16). *Natural Gas Intelligence*. <https://www.naturalgasintel.com/demand-for-u-s-natural-gas-exports-to-surge-through-2021-eia-says/>

<sup>19</sup> *Nigeria Energy Outlook – Analysis*. (n.d.). IEA. Retrieved October 22, 2021, from <https://www.iea.org/articles/nigeria-energy-outlook>

<sup>20</sup> Coal burning responsible for heavy air pollution in India: IEACCC study. (2021, February 18). ICSC. <https://www.sustainable-carbon.org/coal-burning-responsible-for-heavy-air-pollution-in-india-ieaccc-study/>

<sup>21</sup> *Coal phase-out in S. Korea by 2028 most economical choice, study shows*. (2021, April 21). Carbon Tracker Initiative. <https://carbontracker.org/coal-phase-out-in-s-korea-by-2028-most-economical-choice-study-shows/>

<sup>22</sup> *Ethiopia: Greenhouse gas emissions by sector*. (n.d.). Our World in Data. Retrieved October 22, 2021, from <https://ourworldindata.org/grapher/ghg-emissions-by-sector>

<sup>23</sup> Achakulwisut, P., Brauer, M., Hystad, P., & Anenberg, S. C. (2019). Global, national, and urban burdens of paediatric asthma incidence attributable to ambient NO<sub>2</sub> pollution: Estimates from Global Datasets. *The Lancet Planetary Health*, 3(4). [https://doi.org/10.1016/s2542-5196\(19\)30046-4](https://doi.org/10.1016/s2542-5196(19)30046-4)

helps increase physical activity will also reduce the risk of cardiovascular diseases, depression, and anxiety.<sup>24</sup> Along with numerous other health benefits, a well-designed street reduces the risk of motor accidents and crashes.<sup>25</sup> Improving access to public transit and cheaper modes of transport makes it easier and affordable for low-income and frontline communities to access essential resources around them, such as food, education, and health facilities.<sup>26</sup> The improvements in safety for pedestrians and increase in public transit also benefit disabled populations.<sup>27</sup>

This policy is recommended to the U.S., India, South Africa, Trinidad & Tobago, South Korea, Nigeria, and Ethiopia, with different avenues for implementation depending on resources, culture, and need. Several of these countries already have interest in complete streets design. In the U.S., there are bills in the Senate that emphasize complete streets in urban planning. When recommending this to India, we include it as a part of the Smart Cities Mission, launched by the Government of India in 2015, that aims to build better cities. The City of Johannesburg in South Africa implemented a complete streets program in 2013 but needs to be expanded to include all South Africa.

### Electrifying Public Transit with Renewable Energy

Public transport is an essential component in mitigating the climate crisis. According to Project Drawdown, public transit alone can reduce 7.51-23.36 gigatons of CO<sub>2</sub> worldwide, even without taking into account the additional benefits of fully electrifying public transport with renewable energy sources.<sup>28</sup> Countries must electrify and expand public transit like buses and trains using solar and wind power.

Gasoline-powered vehicles emit air pollutants such as fine particulate matter that negatively impact health. Ambient fine particulate matter (PM<sub>2.5</sub>) pollution is responsible for more than 4 million premature deaths each year,<sup>29</sup> though other analyses have suggested the toll is even greater. Two recent studies with updated and more national data put the total at nearly 9 million annual deaths from outdoor PM<sub>2.5</sub> pollution from fossil fuel combustion.<sup>30,31</sup>

Electrified public transport will improve the air quality by reducing GHG emissions and other associated air pollutants, including particulate matter, thereby improving respiratory and cardiac health of the community. Electrifying buses and trains will not only improve health outcomes but also reduce the healthcare cost incurred due to poor air quality. In addition, affordable and efficient public transit will decrease the need for personal vehicles, reducing traffic congestion and road accidents. An affordable transit system connected to neighborhoods, businesses, schools, and recreational facilities gives accessibility to low-income communities and reduces the need to own

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<sup>24</sup> CDC. (2021, January 22). *Benefits of Physical Activity*. Centers for Disease Control and Prevention. <https://www.cdc.gov/physicalactivity/basics/pa-health/index.htm>

<sup>25</sup> Complete Streets Improve Safety. (2018, August). Retrieved August 2021, from <https://smartgrowthamerica.org/wp-content/uploads/2016/08/cs-safety.pdf>.

<sup>26</sup> *Complete Streets Mean Equitable Streets*. Complete Streets Mean Equitable Streets. (2018, August). Retrieved August 2021, from <https://smartgrowthamerica.org/wp-content/uploads/2016/08/cs-equity.pdf>.

<sup>27</sup> *People with Disabilities: Benefits of Complete Streets*. (n.d.). Smart Growth America. Retrieved October 8, 2021, from <https://smartgrowthamerica.org/resources/people-with-disabilities-benefits-of-complete-streets/>

<sup>28</sup> *Public transit @projectdrawdown #climatesolutions*. Project Drawdown. (2021, August 26). Retrieved August 2021, from <https://drawdown.org/solutions/public-transit>.

<sup>29</sup> Murray CJL, Aravkin AY, Zheng P, Abbafati C, Abbas KM, Abbasi-Kangevari M, et al. Global burden of 87 risk factors in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. *The Lancet*. 2020 Oct;396(10258):1223–49.

<sup>30</sup> Lelieveld J, Klingmüller K, Pozzer A, Burnett RT, Haines A, Ramanathan V. Effects of fossil fuel and total anthropogenic emission removal on public health and climate. *Proc Natl Acad Sci USA*. 2019 Apr 9;116(15):7192–7.

<sup>31</sup> Vohra K, Vodonos A, Schwartz J, Marais EA, Sulprizio MP, Mickley LJ. Global mortality from outdoor fine particle pollution generated by fossil fuel combustion: Results from GEOS-Chem. *Environmental Research*. 2021 Apr;195:110754.

a personal vehicle, which can be expensive and contribute to GHG emissions. Accessible and electrified public transport improves health, sustainability, and mobility, especially in urban areas.

This policy is recommended to South Korea, Trinidad & Tobago, India, South Africa, the U.S., Ethiopia and Nigeria. For India, expansion of public transit by providing fare subsidies, along with electrification is recommended to make public transit more affordable and sustainable. Some of India's major states are working on electrifying a small part of their public transportation and as of 2019, 60% of Delhi Metro is solar powered. Cape Town, the capital of South Africa, led the way in Africa by becoming the first city to have electric public transportation, specifically using renewable sources. Transportation accounts for about 28% of U.S. greenhouse gas emissions, making it the largest source for emissions. The CLEAN Future Act, which was recently introduced in the House Committee on Energy and Commerce, also invests in transportation with specific attention to zero-emissions school buses.

## **Food & Agriculture**

### **Reducing Food Waste**

One-third of all food produced is wasted, accounting for 6-8% of all GHG emissions globally.<sup>32</sup> Reducing food waste is the third most impactful action in terms of emissions reduction and can lead to more than 90 gigatons of carbon reduction.<sup>33</sup> Food waste must be reduced with better storage infrastructure to avoid spoilage, improved processing facilities, efficient distribution facilities, clear labelling, and educating the public on food waste.

Squandering high amounts of food exhausts valuable resources like seeds, water, labor, land, energy, and financial capital while producing GHG at every stage of production. In developing countries, food waste occurs due to poor storage infrastructure across the supply chain, and a lack of manufacturing and processing facilities. In developed countries, food is wasted as a result of unclear labels, overbuying, and spoilage at home. Reducing food waste by improving storage infrastructure and intervening at the retail level will improve air quality by reducing GHG emissions. Investing in food storage infrastructure helps allocate healthy and safe food to people experiencing food insecurity and living in food deserts. Food waste infrastructure can also incentivize a more plant-based diet to further improve physical and mental health.

The food waste reduction policy for the U.S. focused on stringent waste and landfill management practices while incentivizing a state and local ban on disposing organic waste in landfills. Additionally, adequate funding must be provided to food donation initiatives and infrastructure, so the food reaches those who need it. The U.S. is already trying to reduce its food waste through national and state level programs. The Zeroing Excess, Reducing Organic Waste, and Sustaining Technical Expertise (ZERO WASTE) Act, introduced in 2019, requires the EPA to establish grant programs for projects that reinforce zero-waste practices, including source reduction and waste prevention. On the other hand, in India most food is wasted in the supply chain due to poor storage thus the policy recommendation is to improve food storage infrastructure and temperature-controlled food distribution infrastructure without chlorofluorocarbons (CFCs) and hydrofluorocarbons (HFCs). Redistribution of food to marginalized communities must be prioritized in India where the government is combating the problem of malnutrition. In Trinidad & Tobago, we combine food waste with additional emphasis on reducing plastic waste. In all of our recommendations, we encourage composting and anaerobic digestion as key ways to manage

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<sup>32</sup> World Wildlife Fund. (n.d.). *Fight climate change by preventing food waste*. WWF. Retrieved September 10, 2021, from <https://www.worldwildlife.org/stories/fight-climate-change-by-preventing-food-waste>.

<sup>33</sup> *Reduced food waste @projectdrawdown #climatesolutions*. Project Drawdown. (2021, August 26). Retrieved August 2021, from <https://drawdown.org/solutions/reduced-food-waste>.

food waste. Focusing on food waste reduction is one of the most impactful actions to mitigate climate change and promote health.

### Sustainable Agriculture (e.g., Urban & Community Agriculture)

Sustainable agriculture ensures access to locally sourced, healthy foods by promoting community-based food systems using agricultural practices that mitigate the effects of climate change. While sustainable agriculture promotes the transition to plant-based diets by increasing the availability and accessibility of fruits and vegetables, sustainable livestock is also a focus of sustainable agriculture, especially when meat consumption is an essential part of a country's culture. Urban and community agriculture is a form of sustainable agriculture, in which local farmers and other community members grow crops on small, vacant public land. Governments must incentivize sustainable agriculture by investing in programs, grants, or taxes with a specific focus on frontline and low-income communities.

Sustainable agriculture has valuable health co-benefits while also maximizing justice and equity for disadvantaged communities. Developing a sustainable agriculture system can help reduce GHG emissions, reduce air pollution, and improve the built environment. Urban and community agriculture, in particular, can help promote both community building and resilient food systems. According to the Thomson Reuters Foundation, urban farms could supply almost the entire recommended consumption of vegetables for city dwellers, thus reducing food waste and emissions from transportation of agricultural products.<sup>34</sup> Therefore, increasing the availability of healthy foods can help reduce food insecurity while promoting healthier diets. In addition, sustaining small-scale urban farms increases green space in cities, which has been shown to improve mental and physical health.<sup>35</sup> Low-income and frontline communities would benefit the most from having ownership over locally sourced food, because it offers a greater variety of foods that otherwise would be less available.

Sustainable agriculture is recommended to many countries, most commonly in the form of incentivizing urban and community agriculture. When recommending the policy to South Africa and Trinidad & Tobago, it is critical to highlight that urban and community agriculture can help reduce the urban heat island effect and thus decrease the risk of floods by increasing vegetation in cities.<sup>36</sup> Sustainable agriculture is also recommended to the U.S., which would be especially beneficial to marginalized Black, Indigenous, and People of Color (BIPOC) communities that disproportionately experience food deserts.<sup>37</sup>

### **Societal and Nature-based Solutions**

Though this white paper focuses on three main sectors (energy, transportation, and food & agriculture), there are other important sectors to consider mitigating the climate crisis. These sectors include women's health and education, nature-based solutions, and healthy and green cities. Key policies are listed under each sector with positive impacts to both health and equity. While this is not an exhaustive list of potential policies, it is a starting point for future analysis.

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<sup>34</sup> Foundation, T. R. (n.d.). *Urban farms "critical" to combat hunger, adapt to climate change*. News.Trust.Org. Retrieved September 1, 2021, from <https://news.trust.org/item/20180111102522-tb51m/>

<sup>35</sup> World Health Organization. (n.d.). *Urban green spaces and health—A review of evidence (2016)*. Retrieved April 29, 2021, from <https://www.euro.who.int/en/health-topics/environment-and-health/urban-health/publications/2016/urban-green-spaces-and-health-a-review-of-evidence-2016>

<sup>36</sup> Foundation, T. R. (n.d.). *Urban farms "critical" to combat hunger, adapt to climate change*. News.Trust.Org. Retrieved September 1, 2021, from <https://news.trust.org/item/20180111102522-tb51m/>

<sup>37</sup> Hagey, A., Rice, S., & Flournoy, R. (2012). *Growing Urban Agriculture: Equitable Strategies and Policies for Improving Access to Healthy Food and Revitalizing Communities*. PolicyLink. [https://www.policylink.org/sites/default/files/URBAN\\_AG\\_FULLREPORT.PDF](https://www.policylink.org/sites/default/files/URBAN_AG_FULLREPORT.PDF)

## **Women's Health and Education**

### Mandate Equal Rights for All Genders

Women will be more vulnerable to the impacts of climate change as they constitute the majority of the world's poor, are the main caregivers to children, and are more dependent on natural resources for their livelihood.<sup>38</sup> Thus, every country must strengthen their national commitment and action to promote gender equality and women's human rights.<sup>39</sup> Additionally, there must be compliance with international agreements that countries have ratified, such as the Universal Declaration of Human Rights ratified in 1948. There continues to be gender inequality in the world, making it harder for women to gain legal and socioeconomic status, affecting their health and everyday life. Intervention strategies must aim to improve gender equality in employment, education, political participation, and legal rights such as owning land or property, and access to divorce and child custody. Any intervention must include rigorous input from community members and local governments with the main voice being from both cisgender and transgender women.

### Establish, Implement, and Evaluate National Programs for Violence Prevention

Extreme weather events will increase as climate change worsens causing increased violence and early child marriage.<sup>40</sup> National governments must acknowledge violence against women is a problem and must be addressed using evidence-based interventions, looking towards legal and judicial reform. In addition, they must create an individualized plan to prevent future violence and respond to it when it occurs. Violence against women is a multisectoral problem and must be treated as a risk factor for ill-health. Any program and intervention must include both cisgender and transgender women, and ensure continuous input from community members, particularly women.

### Improve Medical and Health Care Access to Women and Families

While women provide the majority of health care services, they rarely receive all the care they need. Countries must ensure women's health services are included in insurance and are accessible to any woman who needs it. These can include HIV/AIDS care, pregnancy and natal care, sexual violence treatment, screening and treatment for cervical cancer, mental health, among others. Medical coverage must also include both married and unmarried women, cisgender and transgender women, and sex workers. In addition, programs and incentives must encourage more women to have a career in medicine, especially higher and more powerful positions.

## **Nature-based Solutions**

### Regenerative Agricultural Practices

The transition from monoculture industrial farming, which requires pesticides and/or fertilizer, to one that is regenerative and localized offers the opportunity to not only reduce GHG emissions but also help to sequester carbon. Regenerative practices involve organic management practices, an emphasis on ecological diversity, traditional knowledge, agroforestry, and landscape

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<sup>38</sup> United Nations. (n.d.). *WomenWatch: Women, Gender Equality and Climate Change*. Retrieved October 5, 2021, from [https://www.un.org/womenwatch/feature/climate\\_change/](https://www.un.org/womenwatch/feature/climate_change/)

<sup>39</sup> García-Moreno, C., Jansen, H. A. F. M., Ellsberg, M., Heise, L., & Watts, C. (2005). *WHO multi-country study on women's health and domestic violence against women*. <https://www.who.int/publications-detail-redirect/who-multi-country-study-on-women-s-health-and-domestic-violence-against-women>

<sup>40</sup> Ahmed, K. J., Haq, S. M. A., & Bartiaux, F. (2019). The nexus between extreme weather events, sexual violence, and early marriage: A study of vulnerable populations in Bangladesh. *Population and Environment*, 40(3), 303–324. <https://doi.org/10.1007/s11111-019-0312-3>

complexity. These practices must be prioritized to give healthier food to everyone, especially those who currently live in food deserts or have limited access to healthy food. In addition, incentives to promote these practices and have more land dedicated to them must involve those who have been disproportionately exploited by colonialism and systemic discrimination in historical and modern contexts, including BIPOC, women, LGBTQ+, and immigrants.

### Terrestrial Forest and Coastal Zone Conservation

Protecting terrestrial forests, wetlands and coastal zones are vital for sequestration of carbon, preventing the emergence of novel zoonotic diseases, and promoting biodiversity. Forest destruction can increase the risk from bat-borne Hendravirus<sup>41</sup>, and forest fragmentation can increase the risk of Ebola virus outbreaks that from 2004 to 2014 were linked to spillover cases in highly disturbed forest areas in Central and West Africa.<sup>42</sup>

Healthy forests also reduce the risk of vector-borne disease transmission from arthropods like mosquitoes and other insects. These disease vectors can be strongly affected by losses of forest cover, either through changes in microclimate, local patterns of biological diversity, or other environmental factors. For example, deforestation has been shown to increase the biting rates of malaria mosquitoes and malaria incidence in the Amazon region.<sup>43</sup>

Conservation efforts that help protect current forests and coastal zones and restore areas that were previously lost must be incentivized and encouraged to reduce GHG emissions and improve human health. It is vital that there is a cessation of converting intact ecosystems for agriculture use or urban sprawl. Landscape restitution and providing greenspaces in urban areas act as carbon sinks and improve health outcomes especially mental health. It is also essential to include and respect Indigenous rights and voices to any conservation effort as they have been historically marginalized and left out of conversations regarding conservation.<sup>44,45</sup>

### **Healthy and Green Cities**

#### Engage in Creative Placemaking for Community Development and Urban Planning

Creative placemaking is a way to facilitate and design social infrastructure, which helps to support the quality of life in a community. Creative placemaking involves a cross-sectoral approach that integrates art, culture, and design activities to deeply engage communities.<sup>46</sup> Communities must be prepared for the climate crisis as extreme weather events become more common. Engaging in creative placemaking can include planning festivals that celebrate nature and educates about the harms of pollution, creating community gardens with art spaces that utilize vacant lots, or using visualization techniques and storytelling to reimagine how spaces could be used.<sup>47</sup> This approach offers a unique opportunity for communities to take ownership of their built environment and advocate for green spaces, museums, sustainable buildings, local renewable energy among

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<sup>41</sup> Plowright RK, Reaser JK, Locke H, Woodley SJ, Patz JA, Becker DJ, et al. Land use-induced spillover: a call to action to safeguard environmental, animal, and human health. *Lancet Planet Health*. 2021 Apr;5(4):e237–45.

<sup>42</sup> Rulli MC, Santini M, Hayman DTS, D'Odorico P. The nexus between forest fragmentation in Africa and Ebola virus disease outbreaks. *Scientific Reports*. 2017 Feb 14;7(1):41613.

<sup>43</sup> Vittor AY, Pan W, Gilman RH, Tielsch J, Glass G, Shields T, Patz JA. Linking Deforestation to Malaria in the Amazon: Characterization of the Breeding Habitat of the Principal Malaria Vector, *Anopheles darlingi*. *Am J Trop Med Hyg*. 2009 Jul;81(1):5–12.

<sup>44</sup> Whyte, K. (2020). Too late for indigenous climate justice: Ecological and relational tipping points. *WIREs Climate Change*, 11(1), e603.

<https://doi.org/10.1002/wcc.603>

<sup>45</sup> Convention on Biological Diversity. (2015, May 5). *Traditional Knowledge Information Portal*. Secretariat of the Convention on Biological Diversity.

<https://www.cbd.int/ik/>

<sup>46</sup> National Endowment for the Arts. (n.d.). *Creative Placemaking*. Retrieved September 10, 2021, from <https://www.arts.gov/impact/creative-placemaking>

<sup>47</sup> Helicon Collaborative. (2018). *Farther, Faster, Together: How Arts and Culture Can Accelerate Environmental Progress*. Art Place.

<https://heliconcollab.net/wp-content/uploads/2018/04/Farther-Faster-Together-1.pdf>

other things. When the community has ownership over their built environment and are able to freely express their emotions through art, health and equity become prioritized.

### Green Buildings and Weatherized Housing

Buildings produce 6% of heat-trapping emissions worldwide and use more than half of all electricity.<sup>48</sup> Buildings and houses must be efficient, green, and resilient to climate change impacts in order to transition to a 100% renewable energy society and improve the health and wellbeing of the population. Measures such as efficient and affordable cooling and heating, insulation, energy and water efficient appliances, and adequate air flow can help reduce wasted energy and making it easier for renewable energy to supply the world's energy needs. To achieve this there must be significant changes to building codes. In addition, regulators, which oversee utility companies, can obligate those companies to decarbonize by 2045. Governments can take a lead through a buying clean policy: using companies for government buildings that adhere to the highest environmental standards. Green building and weatherized housing will also create healthier living environments, especially for low-income and frontline communities, by reducing indoor air pollution, and heat or cold related illnesses.

### Lessons Learned from International Comparisons

#### **U.S. and India**

When identifying policies for different countries that help to mitigate and adapt to the climate crisis, it is **essential to look at the resources and cultural context of each country**. The U.S., an example of a developed country with vast resources and power to address the climate, may have a similar policy recommendation as India, an example of a developing country with limited resources, but each country has different approaches.

Both the U.S. and India are large contributors to GHG emissions globally. Each has the opportunity to transform their energy systems to one that is regenerative and part of the green and just transition. However, each has their own set of advantages and challenges. The U.S. has vast resources at its disposal and can easily provide incentives and subsidies to encourage renewable energy and sustainable development. However, India has more limited resources and must prioritize where to use these resources for its population. In addition, the cultural context of each country is different, with India having a long history of inequality between different cultural and ethnic groups and the U.S. having strong systemic racism and wealth inequality. Despite these differences, similar policies can be used to help each country transition with a few adjustments to the policy avenue.

For both India and the U.S., a fossil fuel phase-out strategy is recommended but there are different strategies for each. Natural gas production in the U.S. and the subsequent export of natural gas has steadily increased in recent years, with the construction of new pipelines that have strong opposition from Indigenous communities that have often been marginalized and left out of conversations over their own land. Thus, we recommend a natural gas phase-out policy to prevent major health disasters with leaks and also improve equity and power of Indigenous communities. In contrast, India has a long history of coal mining, with low-income communities facing the most negative health impacts, and uses coal as its main source of energy. Therefore, we recommend a coal phase-out policy instead. Additionally, electrifying public transportation is recommended in

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<sup>48</sup> *Buildings: ProjectDrawdown*. (2020, February 5). Project Drawdown. <https://drawdown.org/sectors/buildings>

the U.S. and India but focused on fair and subsidized fares in India versus building infrastructure in the U.S. Reducing food waste is also recommended to both countries but while the U.S. recommendations focus on preventing food waste on all levels, especially the individual, India's recommendations focus on food waste in the supply chain because of a lack of adequate storage.

## **Nigeria and Ethiopia**

Cultural and historical contexts can bring important perspectives to policy recommendations, especially in climate change policies as they routinely address energy and agriculture sectors with GHG emissions. Nigeria is the largest economy in Africa, heavily relying on oil and natural gas for both economic and energy needs.<sup>49</sup> In contrast, Ethiopia relies on biofuels and hydropower for its energy and electricity needs and uses agriculture as a large sector in its economy.<sup>50</sup> While both countries have similar economic resources and power, the energy mix differs and offers different opportunities for policy recommendations. In addition, both countries must learn from Indigenous knowledge and give power to Indigenous communities in all conversations regarding climate change policies.

For both Nigeria and Ethiopia, a fossil fuel phase-out strategy is recommended with the focus on oil and natural gas in Nigeria and biofuels in Ethiopia. While Ethiopia already has some renewable energy infrastructure, mainly from hydropower, the focus is to diversify its renewable energy mix with solar and wind and to reframe biofuels as a non-renewable resource. Nigeria mainly relies on oil and natural gas for its energy needs and thus needs more renewable energy infrastructure to fully phase-out fossil fuels. Both Nigeria and Ethiopia have land use change and forestry as the top contributor to GHG emissions, mostly due to deforestation and unsustainable agricultural development. Each country has policies dedicated to sustainable agriculture, including sustainable land management, water infrastructure, and urban agriculture. Ethiopia has the added consideration of biofuels which not only affects its energy mix but also its agricultural contribution to GHG emissions. Of course, biofuels for household cooking represents a widespread public health hazard of indoor air pollution. While transportation is not the main concern in terms of GHG emissions, we recommend Complete Streets and Electrifying Public Transportation to create more pedestrian-friendly infrastructure, reduce the need for personal vehicles, and improve the use of public transportation.

## **Potential Roles for CUGH**

CUGH has a network of 174 academic institutions and 31,000 individuals around the world. This is a powerful network that can advocate with governments to implement what we already know will reduce carbon emissions, while maximizing population health benefits. Despite ample knowledge about what we can do today to reduce carbon emissions, there exists an enormous gap in the implementation of those solutions at a national, state, community, or individual levels. CUGH has excellent relationships with numerous institutions in low- and middle-income countries (LMICs). It can act as a conduit to ensure that those institutions are centrally integrated into advocacy efforts and their solutions are central to these efforts.

In addition, research questions can be crowd sourced and CUGH member institutions can apply for grants to undertake the research and development necessary to address the climate change crisis. In the United States there has been a call to triple the clean energy research and

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<sup>49</sup> *Nigeria Energy Outlook – Analysis*. (n.d.). IEA. Retrieved October 22, 2021, from <https://www.iea.org/articles/nigeria-energy-outlook>

<sup>50</sup> *Ethiopia Energy Outlook – Analysis*. (n.d.). IEA. Retrieved October 22, 2021, from <https://www.iea.org/articles/ethiopia-energy-outlook>

development investments from roughly \$2.5 billion to \$7.5 billion. CUGH member institutions can advocate for this change.

CUGH can also advocate for the integration of a greater awareness of the nexus between climate change, the environment, public health, and inequities in investment between biomedical and non-biomedical disciplines. At present, there is a dearth of investment from agencies and private foundations at this nexus of climate change and health; CUGH can help make the case for increasing such investments.

### **Conclusion and Road to COP27**

COP27 will, at the time of the writing of this article, take place on the continent of Africa. It is critically important that voices from African experts and Indigenous communities are integrated into any plans of action coming out of the COP27 meeting. The progress of the solutions should be assessed at COP27. The COP26 in Glasgow is an opportunity to elevate the centrality of health and equity as world leaders negotiate solutions to climate change. With an African COP on the horizon, it's of primary importance to also aggregate and share existing programs and interventions from African nations already confronting weather extremes worsened by climate change.

Ultimately, the path to decarbonization runs through government, private sector, and community collaboration. Whether governments at all levels choose to pursue and implement policies that will curb the increase in atmospheric carbon dioxide will be determined in large part by the demands of their voters and those who fund political parties. The scientific community, with collaboration from Indigenous and local communities, has a vital role in producing the knowledge that can support evidence-based policies. It also has an important responsibility in advocating for those policies. The failure to include and promote multistakeholder collaboration jeopardizes an effective response to climate change and the subsequent irreversible hazardous impacts on both current and future generations. The health framing of the climate crisis offers common ground on which a broad diversity of stakeholders and decision makers will likely move faster and further.

## Appendix

### Ethiopia Policy Matrix

Name	Tags	Policy Type	Description of Policy	Health Impact	Equity Impact	Political Landscape
<b>Ensure Universal Electricity Access Through Community-Based Renewable Energy Projects</b>	Energy	Agency Action, Legislation	With electricity reaching less than half of the population in Ethiopia and rural communities having even less access, it is essential to ensure universal access to electricity to everyone. It is vital to provide incentives, such as subsidies or grant programs, for community-based renewable energy projects using solar, wind, and microgrids. These projects must include community-led boards to manage and oversee the projects and ensure community engagement and ownership, especially rural, low-income, and women populations.	(+): Increase renewable energy infrastructure, decrease carbon emissions, improve air quality and incidences of lung-related illnesses. Will also improve built environment and improve the economic health of the community. Alleviate energy poverty and energy burden.	(+): Giving communities more control and transparency over their energy is fundamental to equitable practice and the just transition. These projects can also revitalize local economies and provide community benefits	Medium: Ethiopia currently has community-based micro-hydropower plant projects, but they have implementation and capacity issues. Ethiopia also has Promoting Sustainable Rural Energy Technologies (RETs) which promotes renewable energy sources for rural communities.
<b>Biofuel Phase-Out</b>	Energy	Agency Action, Legislation	Create a biofuel phase-out plan that reframes biofuels as a non-renewable resource and transitions Ethiopia to diversified energy by adding solar and wind to the already dominant hydropower. There must also be plans to help low-income and rural households specifically to reduce biofuel use and increase access to renewable energy sources, possibly through subsidies or grant programs. This plan must have community input to ensure it is addressing community needs.	(+) Improved outdoor and indoor air quality, prevent deforestation, improve built environment and economic health of community, prevent illness from burning of biofuel indoors	(+) Gives communities more input in the planning of community infrastructure, ensures specific attention to low-income and rural communities who are most vulnerable to health impacts from biofuels.	Low: Ethiopia plans to substitute their petroleum use with biofuels and has no current plans to phase-out biofuels despite its health and climate implications. However, there has been issues of land grabbing from local populations which has provoked some strong resentment.
<b>Just Transition to Green Economy</b>	Energy, Food/Ag, Transportation	Legislation	Ensure a just transition from an extractive economy with fossil fuels to a regenerative economy by implementing an energy justice policy that ensures availability, accessibility, and affordability to renewable energy services. This policy should include rural households in particular as they are more vulnerable to energy poverty. In addition, there must be a plan to promote and incentivize women's education and freedom, protect Indigenous rights to land, and ensure job creation for previous fossil fuel workers who transition to a green economy.	(+) Improves worker well-being, reduces environmental exposures for workers and communities, improves air quality, improves built environment, reduces energy poverty	(+) Directly helps low-income, rural and frontline communities in the transition to a green economy, gives input from local stakeholders, prevents policies that exacerbate inequity	Medium: Ethiopia has conducted studies looking at inclusive green growth in the four key sectors of agriculture and land use management, forestry, energy, and transport. In addition, the theme for the Climate change and Development in Africa summit is "Just Transition"
<b>Establish Sustainable Land Management &amp; Protect Indigenous Land Rights</b>	Food/Ag	Legislation	Establish community-based sustainable utilization and management of wetlands. In addition, restrict agricultural expansion while ensuring an adequate safety net program for farmers. Considering there has been human rights violations from agricultural expansion, there must be enforcement of Indigenous people's rights and assurance no future development on their	(+) Reduce GHG, improve air quality, improve soil and agricultural land, prevent deforestation, improve environment, and carbon sinks	(+) Ensure rights to Indigenous populations and their land, special consideration to farmers who are in transition to sustainable agriculture and land management	Medium: Ethiopia already has three main programs that focus on land management and agriculture: Agricultural Growth Program, Productive Safety Net Program, and Sustainable Land Management Program. These programs need to

			land without their free, prior, and informed consent.			be improved and expanded.
<b>Promote Sustainable Farming &amp; Affordable Healthy Diets For All</b>	Food/Ag	Agency Action, Legislation	Promote sustainable farming practices by incentivizing the use of conservation tillage, soil and water conservation, legume crop rotations, improved seed varieties, and the use of animal manure as fertilizer, with specific practices dependent on type of agricultural land. Education and outreach must also be a priority to not only include information regarding sustainable practices, but also outreach to include women and other left out populations in the sector.	(+) Improved access to nutritious food, improved soil and agricultural land health, prevent deforestation, improve environment and carbon sinks, reduce food insecurity and poverty	(+) Ensuring the inclusion of women and other populations to sustainable agricultural practices, reduce poverty and food insecurity for areas most vulnerable to climate impacts	High: There are already numerous programs for agriculture and nutrition in Ethiopia that can be expanded and improved upon: Community-based Nutrition Program, Community Management of Acute Malnutrition, Agricultural Growth Program, and Productive Safety Net Program
<b>Expand Climate-Smart Livestock Programs and Education</b>	Food/Ag	Agency Action, Legislation	Invest in climate-smart livestock programs and education that look at ways to raise livestock sustainably without increasing GHG emissions and contributing to other environmental harms. A multi-sectoral and multi-stakeholder approach is needed in order establish operational indicators for determining sustainability of livestock farming systems. These projects and approaches must include community input and engagement to ensure their voices and needs are heard and used.	(+) Reduce GHG emissions, improve human-animal interactions, decrease food insecurity, improve built environment	(+) Community input and engagement in projects, ensure rural and low-income livelihoods are able to still function but more sustainably and climate-smart	Medium: Ethiopia already has a program for Climate-Smart Livestock Systems but needs to be expanded and more heavily invested in.
<b>Invest in Sustainable Small-Scale Irrigation Infrastructure &amp; Technologies</b>	Food/Ag	Agency Action, Legislation	Invest in sustainable small-scale irrigation such as mechanical pumps, treadle pumps, and solar-powered small-scale irrigation. This can improve accessibility and affordability of irrigation technology and help to reduce water consumption. Community engagement is critical and should be used to empower farmers in implementing small-scale irrigation based on the land conditions, rurality, and water availability in the area.	(+) Reduce water waste, improve soil and agricultural land health, improve access to nutritious food, improve environment and carbon sinks	(+) Improve access to technologies, improve community engagement in local projects and investments, inclusion of women farmers	Medium: Ethiopia already has the Participatory Small-Scale Irrigation Development Programme that tries to improve food security, family nutrition. More projects and investments are still needed in irrigation infrastructure.
<b>Incentivize Urban/ Peri-Urban and Community Agriculture</b>	Food/Ag	Agency Action, Legislation	Incentivize urban and community agriculture through programs, grants, or taxes, with special attention to low-income and urban communities. Emphasizes micro-gardening techniques that are suitable for urban areas, such as using rooftops or vacant lots to grow food. These programs and projects must be community-owned and operated to ensure engagement with the local food system. In addition, promote educational awareness of urban agriculture practices to farmers, home gardeners, and schools, with special emphasis on women and youth communities.	(+): Improved built environment, reduce air pollution and urban island heating effect, Food access/food insecurity, increased healthy food consumption	(+): Low-income and urban communities' participation in agriculture and food access, inclusion of women and youth in the urban agriculture sector	High: Addis Ababa (Ethiopia's capital) already has the Extensive Urban Agricultural Scheme in place. In addition, Food Secured Foods Africa has incentives for school gardens.
<b>Electrify Public/Freight Transport Powered by</b>	Transportation	Agency Action, Legislation	Incentivize the electrification of public transportation using renewable energy, such as solar and wind. There must be a focus on low-income and	(+): Reduce GHG emissions, reduces road congestion and road-related	(+) Improve public transit to include low-income and frontline	High: The Addis Adaba-Djibouti Electric Railway was constructed in 2016 and the

<b>Renewable Energy</b>			frontline communities who may use public transit more often than other communities. In addition, public and freight rails must electrify with renewable energy instead of coal and diesel. It is also vital to ensure affordable access to electric public transport for everyone.	injuries, reduce air pollution, improve built environment	communities, help to level out public transit riders	Ministry of Transport's 10-Year Development Plan aims to increase electric railway infrastructure. However, there is no requirement that they must be run on renewable energy.
<b>Complete Streets</b>	Transportation	Legislation	Incentivize urban planning design on a local and national level to include idea of complete streets where the focus is on pedestrians, cyclists, and public transportation instead of personal vehicles. In addition, require active community engagement throughout the processes of design and implementation to ensure buy-in and that the plans are meeting community needs	(+): Reduce GHG emissions, reduces road congestion and road-related injuries, reduce air pollution, improve built environment	(+): Improve safer streets, including widening sidewalks and bike lanes, improving pedestrian walkways, with a focus on low-income and frontline communities	High: There are already days where roads are shut down for walkers and cyclists, called Menged Le Sew or Streets for People. This began in Addis Adaba and has expanded to several other Ethiopian cities.

## India Policy Matrix

Name	Tags	Policy Type	Description of Policy	Health Impact	Equity Impact	Political Landscape
<b>Make Manufacturing Equitable, Green and Sustainable</b>	Energy	Agency Action	Improve zero effect, zero defect and Made in India programs with more rigorous assessments on the environmental and health impacts of manufacturing in India and commit to zero-carbon practices. Also ensure the policy is inherently equitable by allowing unions to form and grant worker's rights in facilities.	(+): Industry is the third highest contributor to greenhouse gas emissions in India. By ensuring manufacturing facilities lower their carbon emissions and better manage their waste, health will improve with better air quality, a built environment, and better working conditions for facility workers.	(+): Ensuring worker's rights and the formation of unions in manufacturing facilities will allow more collective bargaining and representation in the industrial sector.	Moderate: Zero Effect, Zero Defect and Made in India are already policies from the Prime Minister. However, to fully encompass equity and health, more needs to be done and will be more progressive.
<b>Incentivize Local and Community-Based Renewable Energy Projects</b>	Energy	Agency Action, Legislation	Provide incentives, such as subsidies, grant programs, or federally funded programs, to increase the use of community-based renewable energy projects. These can include off-grid energy systems (particularly for communities who are not yet connected to the national grid), community solar gardens, or microgrids. These projects should focus on frontline and underserved communities with the long-term goal of the project being completely citizen or community run.	(+): Increase renewable energy infrastructure, decrease carbon emissions, improve air quality and incidences of lung-related illnesses. Will also improve built environment and improve the economic health of the community. Alleviate energy poverty and energy burden.	(+): Giving communities more control and transparency over their energy is fundamental to equitable practice and the just transition. These projects can also revitalize local economies and provide community benefits	Medium: There are already community-based and microgrid projects in India (the Barefoot College and the Rampura Community Solar Power Plant (CSPP)) that can be expanded and seen as models. However, there may be pushback from the current industry that would rather have large-scale renewable energy projects for profit.
<b>Expand the National Grid and include Smart Grid and Battery Storage</b>	Energy	Agency Action, Legislation	Expand the National Grid to reach the 29 million households that still do not have access to the grid and reliable electricity. This expansion should also include Smart Grid technology and battery storage to make the grid more efficient and account for the intermittency of renewable energy.	(+): Expanding and improving the grid will allow more people to access electricity for heating/cooling, cooking, and other things, improve indoor air quality by providing electricity, improved built environment, more efficiency can improve utility rates	(+): Giving electricity to those who are not connected to the grid at all or have unreliable access to electricity, special attention to frontline and low-income communities.	Moderate: There was already a program that expanded the national grid to all 600,000 villages, but to be connected to the village, only 10% of households had to be connected. Expanding the grid further and new technologies may have pushback because of cost.
<b>No New Coal Plants and Coal Phase-Out Strategy as part of a Just Transition</b>	Energy	Legislation	Ensure no new coal plants are built in India by stopping all approvals and permits to build coal plants. In addition, create a coal phase-out strategy that is in line with the global need to reduce greenhouse gas emissions and a just transition that helps workers who were previously in the fossil fuel industry to be retrained in a green economy.	(+) Improves air quality, reduces incidences of lung-related illnesses, improves built environment, reduces GHG emissions and other pollutants, improves natural environment	(+) Improves communities surrounding coal plants that may suffer from toxins/pollutants, calls for a just transition for workers who previously worked in fossil fuel industry	Moderate: 3 major states in India (Tamil Nadu, Karnataka, and Rajasthan) have already declared a no new coal policy despite some calls to build more coal plants. Other states may follow and grassroots support for no new coal may help the cause.
<b>Decarbonize the Healthcare Sector</b>	Energy	Legislation, Agency Action	Create a strategy and roadmap to decarbonize the healthcare sector in India, looking closely at emissions directly from health care facilities,	(+) Improves air quality, reduces GHG, reduces lung-related illnesses, improves built environment	(+) Focus not only on large hospitals, but also on local level healthcare facilities, such	Moderate: Healthcare without Harm has been advocating for decarbonizing the healthcare sector

			indirect emissions from purchased energy sources, and through the health care supply chain.	and communities where hospitals are	as clinics. Special attention those healthcare facilities that focus on low-income and frontline communities.	on a global level, as well as the Public Health Foundation of India.
<b>Food Sovereignty and Farmer Rights</b>	Food/Ag	Legislation	Ensure the right to food for every Indian citizen by giving control of the food system to local farmers and communities. Also include an emphasis on small-scale and sustainable food systems, including better livestock and water management systems	(+) Improves food insecurity, improves built environment, reduce food in landfills, improve food access and healthy foods	(+) Improves community ownership over the food system, relies on small-scale community food systems giving more equitable ownership of food	Moderate: India already has the National Food Security Act which can be a foundation to build upon. There has also been increased awareness and advocacy on more local ownership of food systems.
<b>Food Waste and Storage Infrastructure</b>	Food/Ag	Agency Action	Provide funding for food storage and capacity, funding for temperature-controlled food distribution infrastructure, and composting/anaerobic digestion to reduce food waste. Special focus on communities that live in a food desert or have limited access to nutritious food.	(+): Reduce food in landfills, reduce GHG and methane, help distribute food to those in need, potentially improve soil to grow crops with composting materials	(+): Give food to those who need it, reduce wasted food	Moderate: Food waste has been recognized as an issue with the kickstart project, Sampada. Further need to reduce food waste and distribute food to those who need it has been a large advocacy lever.
<b>Better Water Management and Sustainable Agricultural Practices</b>	Food/Ag	Legislation, Agency Action	Invest in better water management infrastructure, specifically for groundwater and wastewater. Incentivize and reward farmers who use sustainable agricultural practices, such as crop diversification, and water-smart operations.	(+): Help with carbon sequestration, improve food system, improve environmental health, improve water quality	(+) Focus on local and small-scale farming and food systems, improve built environment for communities who face the largest burden of water quality issues	Moderate: There has already been calls and research to make farming and water management in India more sustainable and climate-smart, specifically from the Lancet Countdown and Public Health Foundation of India.
<b>Electrifying two/three wheelers</b>	Transportation	Legislation	Incentivize, through grant programs, taxes, or subsidies, the electrification of two and three wheelers and ensure the electricity comes from renewable energy.	(+) Improving air quality, reduce GHG emissions, improve built environment	(+): Allows communities, who either use or operate the two and three wheelers, a part of the just transition to a green economy	Moderate: India already has electric two and three wheelers on the road. Barriers to mass use are safety standards and battery disposal.
<b>Electrify and Expand Public Transportation</b>	Transportation	Legislation	Electrify and expand all public transportation, such as buses and trains, in all major cities and ensure the electricity that is used comes from renewable energy, such as solar or wind. Also ensure fares for public transit are low, possibly through subsidies, to incentivize more users.	(+): Improving public transportation can help with road congestion by reducing number of cars on the road, reduce GHG emissions, improve air quality through renewable energy, improve built environment.	(+) Expanding public transportation improves access for communities who need public transportation and keeping fares low allows more people to use public transportation.	Moderate: Delhi already has over 60% of their buses not only electrified, but also run-on a nearby solar plant. However, there may be some pushback from the upfront cost and safety of expanding public transit, especially with COVID-19.

## Nigeria Policy Matrix

Name	Tags	Policy Type	Description of Policy	Health Impact	Equity Impact	Political Landscape
<b>Oil and Natural Gas Phase-Out Plan</b>	Energy	Agency Action, Legislation	Create a plan to shift Nigeria's economy away from oil and natural gas to renewable energy and sustainable agrobusiness. This includes reducing production of oil while also improving other sectors of the economy. In addition, there must be a phase-out plan for natural gas that includes reducing export and use of liquified natural gas. These plans must include engagement with local stakeholders, including workers in the oil and natural gas sectors.	(+) Improves air quality, reduces incidences of lung-related illnesses, improves built environment, reduces GHG emissions and other pollutants, improves natural environment, reduces oil and LNG pollution	(+): Improving communities who live near drilling sites and oil refineries, usually affecting low-income and rural communities. Also improve community input and engagement in Nigeria's economic future	Moderate: Nigeria has had many oil spills which has caused major health impacts to women, children, and older populations. In addition, there has been conversations regarding removing subsidies for fuel companies, including the Petroleum Motor Spirit (PMS).
<b>Incentivize Community and Distributed Renewable Energy Projects</b>	Energy	Agency Action, Legislation	Provide incentives, such as subsidies, grant programs, or nationally funded programs, to increase the use of community-based and distributed renewable energy projects. These can include off-grid energy systems (particularly for communities who are not yet connected to the national grid), community solar gardens, microgrids, and rooftop solar. These projects should focus on frontline, underserved, and rural communities, with the long-term goal of the project being completely citizen or community run.	(+): Increase renewable energy infrastructure, decrease carbon emissions, improve air quality and incidences of lung-related illnesses. Will also improve built environment and improve the economic health of the community. Alleviate energy poverty and energy burden.	(+): Giving communities more control and transparency over their energy is fundamental to equitable practice and the just transition. These projects can also revitalize local economies and provide community benefits	High: As part of Nigeria's COVID-19 recovery plan they removed all fossil fuel subsidies and incentives and instead has outlined a plan to install more solar power. In addition, there is a specific focus on rural communities and off-grid technology to not only help people move away from using biofuels indoors but also to increase solar power.
<b>Just Transition</b>	Energy	Legislation	Ensure a just transition from an extractive economy with fossil fuels to a regenerative economy by implementing an energy justice policy that ensures availability, accessibility, and affordability to renewable energy services. This policy should include rural households in particular as they are more vulnerable to energy poverty. In addition, there must be a plan to promote and incentivize women's education and freedom, protect Indigenous rights to land, and ensure job creation for previous fossil fuel workers who transition to a green economy.	(+) Improves worker well-being, reduces environmental exposures for workers and communities, improves air quality, improves built environment, reduces energy poverty	(+) Directly helps low-income, rural, and frontline communities in the transition to a green economy, gives input from local stakeholders, prevents policies that exacerbate inequity	Medium: There has already been calls for more equitable and just action on the climate crisis. Many youth mobilizers have advocated against a "climate apartheid" that amplifies existing problems of inequality, food shortages, crimes, and conflict. Especially since Nigeria has ended subsidies for fossil fuels, a just transition is needed.
<b>Sustainable Land Management and Water Infrastructure</b>	Food/Ag	Legislation	Establish community-based sustainable utilization and management of wetlands. In addition, restrict agricultural expansion while ensuring an adequate safety net program for farmers. Promoting sustainable farming practices such as soil and water conservation, improved seed varieties, and crop diversification, is essential. Acknowledging Indigenous knowledge and treaty rights is also key to enhancing these practices.	(+) Improved access to nutritious food, improved soil, and agricultural land health, prevent deforestation, improve environment and carbon sinks, reduce food insecurity and poverty	(+) Ensuring the inclusion of women and other populations to sustainable agricultural practices, reduce poverty and food insecurity for areas most vulnerable to climate impacts	Medium: Access to clean water still remains an issue in Nigeria and while there are programs to address it (PEWASH), more infrastructure is needed. In addition, while the Nigerian government has pledged to reduce deforestation for agriculture but needs more

			Education and outreach about sustainable practices, specifically for women and youth, must be a priority.			investment in sustainable farming practices.
<b>Incentivize Urban and Community Agriculture</b>	Food/Ag	Legislation	Incentivize urban and community agriculture through programs, grants, or taxes, with special attention to low-income and frontline communities who benefit the most from ownership over local food. Emphasizes sustainable agriculture and land management in urban planning initiatives.	(+): Improved built environment, reduce air pollution and urban island heating effect, Food access/food insecurity, increased healthy food consumption	(+): Low-income and frontline communities' participation in agriculture and food access	Medium: Urban and city farming has been growing in Abuja, mainly due to government incentives to grow the agrobusiness sector and reduce the economy's dependence on oil.
<b>Complete Streets</b>	Transport	Agency Action, Legislation	Incentivize urban planning design on a local and national level to include idea of complete streets where the focus is on pedestrians, cyclists, and public transportation instead of personal vehicles.	(+): Reduce GHG emissions, reduces road congestion and road-related injuries, reduce air pollution, improve built environment	(+): Improve safer streets, including widening sidewalks and bike lanes, improving pedestrian walkways, with a focus on low-income and frontline communities	Moderate: Abuja currently has a masterplan to design the Abuja City Centre to increase pedestrian-friendly walkways while also promoting business. However, this needs to be expanded across Nigerian and city centers.
<b>Electrifying Public Transit Using Renewable Energy</b>	Transport	Agency Action, Legislation	Incentivize the electrification of public transportation using renewable energy, such as solar and wind. There must be a focus on low-income and frontline communities who may use public transit more often than other communities.	(+): Reduce GHG emissions, reduces road congestion and road-related injuries, reduce air pollution, improve built environment	(+) Improve public transit to include low-income and frontline communities, help to level out public transit riders	Medium: The Nigerian Federal Capital Territory Administration (FCTA) has pledged to partner with the National Automotive Design and Development Council to introduce electric transportation system in Abuja, the nation's capital. But this needs to be expanded.

## South Africa Policy Matrix

Name	Tags	Policy Type	Description of Policy	Health Impact	Equity Impact	Political Landscape
<b>Weatherized and Retrofitted Housing</b>	Energy	Legislation, Ministry	Create a program to mobilize a workforce to weatherize and retrofit houses and buildings, specifically low-income and frontline communities. Applies to homeowners, renters, and general buildings.	(+) Improve living environment, efficient heating and cooling in houses, improve built environment, reduce GHG, improved efficiency	(+) Mobilizing workforce with workers' rights with specific attention to low-income, frontline, fossil fuel workers, etc. to help with transition	Moderate: Several organizations already working on this including the World Green Building Council and the Green Building Council of South Africa.
<b>Feed-in Tariffs</b>	Energy	Executive, Legislation	Provide price certainty and long-term contracts to help finance renewable energy investments, with particular incentives for small-scale, community driven solar projects.	(+) Improve air quality by building more RE, reduce air pollution, reduce GHG emissions	(+) Build more local and community-based projects, potentially having more community ownership over energy, focus on frontline communities	Moderate: Previously done in 2007 to accelerate RE infrastructure, supported by justice and public health groups. Also support for local RE projects, especially rural areas with the off-grid solar home system program.
<b>Climate Justice Charter</b>	Energy	Legislation	Adopt the Climate Justice Charter in the South African Constitution. Includes principles of deep just transitions such as climate justice, social justice, eco-centric living, participatory democracy, socialized ownership, international solidarity, decoloniality, and intergenerational justice	(+) Improves built environment, improves worker wellbeing, guarantees food and water rights, and improves job and work health	(+): Directly helps frontline communities and prevents more policies that exacerbate inequity, equity is foundational in charter	Moderate: Push from environmental groups to adopt on national and local levels
<b>Urban and Community Agriculture</b>	Food/Ag	Legislation, Ministry	Incentivize urban and community agriculture through programs, grants, or taxes, with special attention to low-income and frontline communities who benefit the most from ownership over local food. Emphasizes sustainable agriculture and land management	(+): Improved built environment, reduce air pollution and urban island heating effect, Food access/food insecurity	(+): Low-income and frontline communities' participation in agriculture and food access	Moderate: Already implemented in Joburg through the Urban Agriculture Initiative with the Johannesburg Inner City Partnership
<b>Peoples' Food Sovereignty Act</b>	Food/Ag	Legislation	Transforms the food system by breaking up the control of food corporation and repositioning the state to realize the Constitutional right to food; also includes an emphasis on small-scale and sustainable food systems	(+) Improves food insecurity, improved built environment, reduce food in landfills, improve food access and healthy foods	(+) Improves community ownership over the food system, relies on small-scale community food systems giving more equitable ownership of food	Moderate: Act was introduced in 2016 but has since been stalled. Pushback from current food corporations
<b>Complete Streets</b>	Transportation	Legislation	Incentivize urban planning design on a local and national level to include idea of complete streets where the focus is on pedestrians, cyclists, and public transportation instead of personal vehicles.	(+): Reduce GHG emissions, reduces road congestion and road-related injuries, reduce air pollution, improve built environment	(+): Improve safer streets, including widening sidewalks and bike lanes, improving pedestrian walkways, with a focus on low-income and frontline communities	Moderate: City of Johannesburg has implemented complete streets in designing urban planning. Potential for upscaling
<b>Electrification of Public Transit</b>	Transportation	Legislation, Ministry	Provide grant funding and/or incentives to electrify public transit systems including buses, school buses, passenger rail, and fleet vehicles, and modernizing roads, bridges, and rail.	(+): Reduce GHG emissions, reduces road congestion and road-related injuries, reduce air pollution, improve built environment	(+) Improve public transit to include low-income and frontline communities, help to level out public transit riders	Moderate: Relative support to electrify public transportation such as buses but potential opposition from taxi industry who may rather have incentives for EVs in general

## South Korea Policy Matrix

Name of Policy	Tags	Policy Type	Policy Description	Health Impact	Equity Impact	Political Landscape
<b>Coal and Nuclear Phase-Out by 2028 as Part of a Just Transition</b>	Energy	Legislation	Ensure no new coal and nuclear plants are built by stopping all approvals and permits to build these plants. In addition, create a coal and nuclear phase-out strategy that is in line with the global need to reduce greenhouse gas emissions and a just transition that helps workers who were previously in the fossil fuel industry to be retrained in a green economy.	(+) Improves air quality, reduces incidences of lung-related illnesses, improves built environment, reduces GHG emissions and other pollutants, improves natural environment	(+) Improves communities surrounding coal and nuclear plants that may suffer from toxins and pollutants from coal and long-term waste disposal from nuclear, calls for a just transition for workers who previously worked in fossil fuel industry	Medium: South Korean environmentalists, NGOs, and residents have already been advocates against new and existing nuclear power plants, deeming them unhealthy and dangerous. In addition, coal is seen as unprofitable by 2028.
<b>Incentivize Community and Distributed Renewable Energy Projects</b>	Energy	Ministry Legislation	Provide incentives, such as subsidies, grant programs, or nationally funded programs, to increase the use of community-based and distributed renewable energy projects. These can include off-grid energy systems (particularly for communities who are not yet connected to the national grid), community solar gardens, microgrids, and rooftop solar. These projects should focus on frontline, underserved, and rural communities, with the long-term goal of the project being completely citizen or community run.	(+): Increase renewable energy infrastructure, decrease carbon emissions, improve air quality and incidences of lung-related illnesses. Will also improve built environment and improve the economic health of the community. Alleviate energy poverty and energy burden.	(+): Giving communities more control and transparency over their energy is fundamental to equitable practice and the just transition. These projects can also revitalize local economies and provide community benefits	Medium: South Korea has already invested in large renewable energy projects, such as the Saemangeum solar plant. However, there is less emphasis on community-ownership and distributed energy systems. In addition, more input and engagement in rural communities is essential.
<b>Ensure Community-Ownership and Community Boards to Oversee Offshore Wind Farms</b>	Energy	Ministry, Legislation	As offshore wind farms are being proposed and approved, there must be stipulations to include a community board that oversees the operations of the wind farm to ensure community input and ownership over the project, especially local fishermen to which these projects affect their daily lives. In addition, a proportion of the profits must be dedicated back to the community in which the wind farm is in.	(+) Improves air quality, reduces incidences of lung-related illnesses, improves cardiovascular health, improves built environment, reduces GHG emissions and other pollutants, improves natural environment	(+) Gives communities more input into renewable energy projects and ownership of how these projects are managed and operated on a long-term scale. In addition, these projects, with dedicated funds from the farm, can help revitalize local economies and provide community benefits	Medium: South Korea already has several offshore wind farms in construction but there has been some local opposition due to concerns for marine life and noise pollution. There are also projects that already gives a proportion of profit back to the local community.
<b>Center Climate Justice and Health into Climate Policy</b>	Energy	Legislation	Ensure current and future climate policy is rooted in climate justice and health, especially in the creation of the South Korean Green New Deal. There must be provisions for historically marginalized and low-income communities who face the effects of climate change the worse. In addition, it must address carbon inequality, divestment from fossil fuels, a just transition, and emission reductions instead of market-based solutions.	(+): Improves worker well-being, guarantees health impacts, reduces environmental exposures, improves built environment, reduces GHG emissions and other pollutants	(+): Directly helps frontline communities and prevents more policies that exacerbate inequity, improves community power over the climate crisis	Medium: South Korea's current Green New Deal, although strives to reduce emissions drastically with specific targets for 2030 and 2050, it does not include climate justice or a just transition, which is essential in any climate policy.
<b>Smart and Green Cities</b>	Energy	Ministry, Legislation	Incentivize the planning and implementation of green and smart infrastructure for cities and	(+) Improves air quality, reduces GHG emissions, improves built	(+) Ensures community input and oversight over their own city/town,	Medium: In 2008, South Korea had a 5-year plan for green urban growth.

			towns. This includes incentives for local renewable energy projects, efficient and sustainable buildings, retrofitted housing, and social infrastructure projects (libraries, green spaces, art). Any plans to improve infrastructure must gain community input and have a mechanism for community oversight/ownership over projects.	environment, reduces urban island heating effect, community wellbeing	can help revitalize local economies, gain community benefits	However, there was confusion on what "green" meant and communities where not informed enough.
<b>Incentivize Urban and Community Agriculture</b>	Food/Ag	Legislation	Incentivize urban and community agriculture through programs, grants, or taxes, with special attention to low-income and frontline communities who benefit the most from ownership over local food. Emphasizes sustainable agriculture and land management in urban planning initiatives.	(+): Improved built environment, reduce air pollution and urban island heating effect, Food access/food insecurity, increased healthy food consumption	(+): Low-income and frontline communities' participation in agriculture and food access	Medium: Seoul is already investing in urban farming infrastructure and jobs. In addition, there is local support for more urban agriculture and recent research on underground agriculture in abandoned subway infrastructure. However, it needs to be expanded to all of South Korea. There also needs to be emphasis on community-owned and operated to ensure equity and a just transition.
<b>Complete Streets</b>	Transport	Ministry, Legislation	Incentivize urban planning design on a local and national level to include idea of complete streets where the focus is on pedestrians, cyclists, and public transportation instead of personal vehicles.	(+): Reduce GHG emissions, reduces road congestion and road-related injuries, reduce air pollution, improve built environment	(+): Improve safer streets, including widening sidewalks and bike lanes, improving pedestrian walkways, with a focus on low-income and frontline communities	Moderate: There has been some investment and interest in Seoul in creating pedestrian-friendly districts in the city center. However, there needs to be transformative change in urban planning to make sure streets are centered on pedestrians and cyclists, not personal vehicles.
<b>Electrifying Public Transit Using Renewable Energy</b>	Transport	Ministry, Legislation	Incentivize the electrification of public transportation using renewable energy, such as solar and wind. There must be a focus on low-income and frontline communities who may use public transit more often than other communities.	(+): Reduce GHG emissions, reduces road congestion and road-related injuries, reduce air pollution, improve built environment	(+) Improve public transit to include low-income and frontline communities, help to level out public transit riders	Moderate: South Korea already has a renowned public transportation system, especially in large city centers. However, they need to be electrified using renewable energy resources.

## Trinidad & Tobago (T&T) Policy Matrix

Name of Policy	Tags	Policy Type	Policy Description	Health Impact	Equity Impact	Political Landscape
<b>Offshore Wind Farms</b>	Energy	Legislation, Ministry	Invest in and do research on offshore wind options for T&T. Create offshore wind farm projects with community input and community-led management of the farms, such as through a community board and community-ownership.	(+): Reduce GHG emissions, improved air quality, decrease lung-related illness, improved built environment	(+): Allows community ownership over the wind farm, from its research, implementation, and management, equitable and just transition to renewable energy	Moderate: T&T is already doing some research on offshore wind options. It also has promise to be a growing market both for T&T but also globally.
<b>Renewable Energy Integration</b>	Energy	Legislation	Review and change legislation to allow Independent Power Producers (IPP) to build renewable energy infrastructure to sell back to the national grid. In addition, legislation should allow net-metering and grid interconnection to make it easier for solar power to enter the energy market in T&T	(+): Reduce GHG emissions, improved air quality, decrease lung-related illness, improved built environment, improved environment	(+): Ensure any RE infrastructure has had community input and allows for part community ownership over the energy plant, focus on low-income and frontline communities need for reliable and sustainable energy	Moderate: Been increasing interest for RE, especially solar in T&T. Current legislation creates barriers for producers to build RE facilities and sell the energy to the national grid. Unsure how much support a new piece of legislation will have.
<b>Community Solar</b>	Energy	Ministry Action, Legislation	Incentivize and scale up community solar projects that allow for community ownership and input with specific focus on low-income and frontline communities.	(+): Reduce air pollution, improve built environment, reduce GHG emissions	(+): Helps improve community ownership over their energy, improve community environment, focus on low-income communities	Moderate: T&T already has pilot programs to put solar panels on community centers, schools, and rural areas that also include education programs. There is a strong possibility of scaling this up and giving more communities access to these programs.
<b>Natural Gas Phase-Out</b>	Energy, Transport	Legislation	Phase out fuel subsidies for natural gas, petroleum, and diesel that disproportionately help high-income households and create barriers for low-income households. Instead, incentivize and subsidize renewable energy, such as solar and wind, with specific focus to low-income and frontline communities.	(+): Improved air quality, improved built environment, decrease mortality and morbidity from fossil fuels	(+): Phase-out fuel subsidies for high-income households and private transportation, incentivize renewable energy for low-income and frontline communities	Moderate: A report from the IMF suggests to phase out fuel subsidies for high-income households and private transportation. T&T has agreed to transition out of NG but will instead transition to compressed natural gas instead.
<b>Community-based Agriculture</b>	Food/Ag	Agency Action, Legislation	Incentivize urban and community agriculture through programs, grants, or taxes, with special attention to low-income and frontline communities who benefit the most from ownership over local food. Emphasizes sustainable agriculture and land management	(+): Improved built environment, reduce air pollution and urban island heating effect, Food access/food insecurity, increased healthy food consumption	(+): Low-income and frontline communities' participation in agriculture and food access	Moderate: There has been some experiments for sustainable development and agriculture through Green Markets. There is also the Grow Garden Initiative that works with communities to improve agricultural skills.
<b>Reduce food and plastic waste</b>	Food/Ag		Provide incentives for donation storage and capacity, funding for temperature-controlled food distribution infrastructure, and provide financial support and reduce permitting barriers for food and plastic waste reduction (composting and anaerobic digestion).	(+): Reduce food in landfills, reduce GHG and methane, help to donate extra food	(+) Improve food insecurity issues by giving food to those who need it, improve built environment in low-income and frontline communities	Moderate: T&T has already banned the use of plastic bags and other single-use plastics. Further needs to be done about food waste and sustainable waste management infrastructure.

<b>Develop Efficient Mass Public Transit System</b>	Transport	Ministry Action, Legislation	Incentivize the electrification of public transportation, such as buses and high speed rail, using renewable energy, such as solar and wind. This includes modernizing public transit infrastructure to improve safety, flexibility, and reliability of public transit.	(+): Reduce GHG emissions, reduces road congestion and road-related injuries, reduce air pollution, improve built environment	(+): Improve public transit to include low-income and frontline communities, help to level out public transit riders	Moderate: Improving public transit is part of T&T's carbon reduction strategy, but it lacks the specificity of electrifying through renewable energy.
<b>Complete streets</b>	Transport	Legislation, Ministry Action	Incentivize urban planning design on a local and national level to include idea of complete streets where the focus is on pedestrians, cyclists, and public transportation instead of personal vehicles.	(+): Reduce GHG emissions, reduces road congestion and road-related injuries, reduce air pollution, improve built environment	(+): Improve safer streets, including widening sidewalks and bike lanes, improving pedestrian walkways, with a focus on low-income and frontline communities	Moderate: There has been some efforts to build more bike lanes around large cities. There is a need to be more of a systemic shift to complete streets to reduce road congestion in T&T.

## U.S. Policy Matrix

Name	Sector	Policy Type	Description of Policy	Health Impact	Equity Impact	Political Feasibility
<b>Community Solar Consumer Choice Act of 2020</b>	Energy	Legislation	Expand community solar energy, requires Dept of Energy to establish program for expanding community solar energy options, including options for low-income and moderate-income individuals, requiring electric utilities to offer a community solar program.	(+): Reduce air pollution, improve built environment, reduce GHG emissions	(+): Helps improve community ownership over their energy, improve community environment, focus on low-income communities	Medium: Community solar has been passed in many states such as Colorado and Minnesota, but there has been pushback from utilities, especially investor-owned utilities as this will not make profit.
<b>Ban the Use of Hydraulic Fracturing for Natural Gas and Oil</b>	Energy	Legislation	Prohibit federal agencies from issuing permits to expand fracking infrastructure and require EPA to complete surveys of all oil and natural gas wells	(+) Improve environmental exposures in air and water, improved air pollution, reduce GHG from methane leakages, improved birth outcomes	(+): Improving communities who live near wells and drilling sites, usually affecting low-income and frontline communities	Medium: Highly contentious issue, but gaining more support from the left, especially after the Texas Power Grid Crisis.
<b>Energy Resilient Communities Act and Microgrid Infrastructure</b>	Energy	Legislation	Require Dept of Energy to establish a program to award grants to make critical energy infrastructure more resilient to climate change hazards, grants for developing clean energy microgrids, and create a FEMA Hazard Mitigation Plan	(+): Preparing for climate change, improve air pollution with microgrids, more efficient energy, improved built environment	(+): Specific eligibility for projects with greatest reduction of public health disparities in communities experiencing disproportionate level of air pollution	Medium: Not passed in last Congress and may have push back from fossil fuel interest groups. Growing support from legislators who focus on climate change
<b>End Polluter Welfare Act of 2020</b>	Energy	Legislation	Ends several incentives for fossil fuels such as restrictions on use of appropriated funds by international financial institutions for projects that support fossil fuels and an increase in oil spill liability trust fund financing rate	(+): Improved environmental exposure, help to transition to renewable energy to lower air pollution	(+): Fossil fuel infrastructure and incentives affect frontline communities more; getting rid of incentives help to level playing field	Low: Large interest groups that will be hard to go against (fossil fuel, oil, gas, etc.).
<b>Grid Modernization and Battery Storage</b>	Energy	Agency Action, Legislation	Requires Dept of Energy to conduct a program to modernize the electric grid by developing standards to compare the storage capacity and capabilities of different types of electricity storage, promotes the development of micro-grid systems, and ensures a reliable and resilient electric grid.	(+): Reduces energy waste, possibly improves energy rates and energy burden, better equips renewable energy which can lower air pollution and GHG emissions	(+): Grid becomes more efficient with benefits to affordability potentially lowering energy cost burden, prevents power outages	Medium: Several bills have been introduced but have not passed. Possible push back from regional system operators or other interest groups.
<b>Just Transition/Climate Equity Act</b>	Energy	Legislation	Any new legislation, regulation, or federal investment related to climate change issues must determine the impacts of such legislation, regulation, or investments on frontline communities. Establishes a Climate and Environmental Equity Office within the Congressional Budget Office and establishes an Office Climate and Environmental Justice Accountability within the Office of Management and Budget	(+): Improves worker well-being, guarantees health impacts, reduces environmental exposures	(+): Directly helps frontline communities and prevents more policies that exacerbate inequity	Medium: Multiple attempts at similar pieces of legislation but unsuccessful. Perhaps with a new administration this can be changed.
<b>HUD and USDA programs for</b>	Food/A g	Agency Action	Use existing HUD programs (such as Neighborhood Stabilization Program and Brownfields Economic	(+): Improved built environment,	(+): Low-income and frontline communities'	High: Agency under Biden likely

<b>Urban/Community Agriculture</b>			Development Initiative Grants) and USDA programs (such as Know Your Farmer, Know Your Food) for urban and community ag	reduce air pollution and urban island heating effect, Food access/food insecurity	participation in agriculture and food access	to agree with policy
<b>Expanded Food Donation Policies</b>	Food/A g	Agency Action, Legislation	Expand farm to food bank programs and reduce financial barrier of farmers donating food, clarify guidance on food safety for donations, require food donation reporting	(+): Reduce food in landfills contributing to GHG emissions, help distribute healthy food, food access	(+): Give food donations to those who need it, reduce wasted food	Medium: May have influence from interest groups about the safety of donated food
<b>Organic Waste Management</b>	Food/A g	Agency Action, Legislation	Disincentivize, limit or ban food from landfills, incentivize implementation of state and local-level organic waste bans, eliminate restrictions and barriers to feeding food scraps to animals, and increase landfill tipping fees	(+): Reduce food in landfills, increase composting, improving built environment	(+): Ensures food is allocated to those who need it instead of being wasted, prevents wasted labor	Medium: May have pushback from interest groups on organic waste, but also support from legislators who focus on climate change
<b>Food Waste Reduction Infrastructure</b>	Food/A g	Legislation	Provide funding for donation storage and capacity, funding for temperature-controlled food distribution infrastructure, and provide financial support and reduce permitting barriers for food waste reduction (composting and anaerobic digestion)	(+): Reduce food in landfills, reduce GHG and methane, help to donate extra food	(+): Ensures food is allocated to those who need it instead of being wasted, prevents wasted labor	Medium: May have pushback from interest groups on organic waste, but also support from legislators who focus on climate change
<b>Community Agriculture Development and Jobs Act</b>	Food/A g	Legislation	Creates new office in USDA called the Office of Community Agriculture, promote agriculture in nontraditional communities and improve nutrition in such communities, provide loans, loan guarantees, and grants to expand farmers' markets	(+): Improve built environment, reduce food deserts and insecurity, helps bring more local and more nutritious food	(+) Improve community with expansion of farmers markets, to bring more nutritious food to low-income areas and food deserts	Medium: The act was introduced in 2011-2012 and did not pass. May be hard to re-introduce, but could be good timing with current climate change push
<b>Reduce and Eliminate Govt incentives for monocultural farming systems and Farmer Transition from Monoculture to Regenerative</b>	Food/A g	Legislation	Limit eligibility for govt subsidized crop insurance to only include crops grown using approved soil conservation practices, phase out govt subsidized crop insurance programs for single crops, incentivize full-time family farming. Reward farmers for undertaking practices that enhance ecological functions (with Conservation Stewardship Program), transform training for existing US soil health experts, increase funding to the USDA Conservation Programs	(+): Help with carbon sequestration, improve food system, improve environmental health	(+): Prevents exploitation of labor for farmworkers and workers in supermarkets, processing plants and restaurants, improve community ownership over food system	Medium: A lot of pushback from agriculture industry and groups like Monsanto who make a profit out of monoculture; but support from youth and legislators
<b>Invest in Electrification of Public Transportation</b>	Transportation	Legislation	Provide grant funding to electrify public transit systems including buses, school buses, railcars, and fleet vehicles, and modernizing roads, bridges and rail. Modeled after Dept of Transportation grant program.	(+): Reduce GHG emissions, reduces road congestion and road-related injuries, reduce air pollution, improve built environment	(+) Improve public transit to include low-income and frontline communities, help to level out public transit riders	Medium: Different viewpoints on how to electrify transportation with some who want only EVs and not public transit. Hard pushback.
<b>Complete Streets Act of 2019</b>	Transportation	Legislation	Directs each state to establish a competitive program to provide technical assistance and grants for design and construction of complete streets, Dept of Transportation establish benchmarks and guidance, states set aside 5% of their federal highway money to implement a complete streets program	(+): Reduce GHG emissions, reduces road congestion and road-related injuries, reduce air pollution,	(+): Improve safer streets, including widening sidewalks and bike lanes, improving pedestrian walkways, with a focus on low-	Medium: Possible pushback from interest groups such as General Motors and other urban planning groups. But support from youth and legislators

				improve built environment	income and frontline communities	focused in climate change and transportation
<b>Bike Share Transit Act</b>	Transportation	Legislation	Allows bikeshare projects to be eligible for federal funding, allows bikeshare projects eligible to be an associated transit improvement projects, eligibility if they shift traffic demand to non-peak hours or other transportation modes	(+): Improve physical activity, improve road safety, reduce air pollution and GHG	(+): Improve community environment, focus on geographic areas that need it the most with crumbling infrastructure, improve bike access	Medium: Bill introduced last year but did not get anywhere. Not on national agenda to improve bikes availability and access
<b>Connecting America's Active Transportation System Act</b>	Transportation	Legislation	Direct Dept of Transportation to carry out an active transportation investment program to provide competitive grants for states, Indian tribes, multi-county special districts, and local or regional govt organizations. Obligate at least 30% of funds to certain projects, including projects that connect people with public transit, businesses, workplaces, schools, residences, and other community centers.	(+): Improve physical activity, improve road safety, reduce air pollution and GHG	(+): Includes multiple communities in eligibility, improves sidewalks, bikeways, and trails to connect communities	Medium: Introduced last year but did not get anywhere. Large infrastructure program, hard to convince long-term

## **CUGH Virtual Summit**

### **The Road to COP27: Climate and Health Through Three Lenses**

#### **Hosts**

Consortium of Universities for Global Health (CUGH), Boston College, University of Edinburgh, Johns Hopkins University, University of Pittsburgh, University of Wisconsin-Madison,

#### **Agenda**

*11:00am Eastern Standard Time*

#### **Introduction**

Speakers:

- Agnes Binagwaho, Former Minister of Health, Rwanda
- Introduced by: Jonathan Patz, Director, Global Health Institute, University of Wisconsin
- Victor J. Dzau, President, National Academy of Medicine
- Introduced by: Maureen Lichtveld, Dean of Public Health, University of Pittsburgh

*11:15am Eastern Standard Time*

#### **Session 1- Pragmatic Policy Recommendations for COP26 Part 1: Energy, Transportation, Construction, Agriculture and Manufacturing**

Speakers:

- Alexander Müller, Director, Think Tank for Sustainability
- Joy St. John, Executive Director, Caribbean Public Health Agency (CARPHA)
- Gary Minsavage, Sr. Environmental Health Advisor, Exxon Mobil Corporation, Corporate Strategic Planning
- Moderator: Maureen Lichtveld, Dean of Public Health, University of Pittsburgh

*12:20pm Eastern Standard Time EST*

#### **Session 2 – Pragmatic Policy Recommendations for COP26 Part 2: Green Financing, Nature Based Solutions, Healthy Cities**

Speakers:

- Susan Gardner, Director, Ecosystems Division, United Nations Environment Programme
- Charles Okeahalam, Chairman, Amref Health Africa
- Nnoli Edozien Ndidi, Chair, Circular Economy Innovation Partnership
- Moderator: Elizabeth Grant, Assistant Principal (Global Health) and Director of the Global Health Academy, University of Edinburgh

15 minute break

*1:35pm Eastern Standard Time*

#### **Session 3- Agenda Items for COP27 in Africa**

Speakers:

- Laetitia Sieffert, Programme Management Officer, Convention on Biological Diversity, UN Environment Programme
- Caradee Wright, Senior Specialist Scientist, South African Medical Research Council
- Deoraj Caussy, Epidemiologist, Integrated Epidemiology Solution
- Diarmid Campbell-Lendrum, Head, Climate Change and Health Programme, World Health Organization
- Moderator: Keith Martin, Executive Director, Consortium of Universities for Global Health

*2:40pm Eastern Standard Time*

**Concluding Fireside Chat: Next Steps to Bridging the Policy Implementation Gap**

- Achim Steiner, Administrator, United Nations Development Programme
- *Moderated by:* Philip Landrigan, Director, Global Public Health Program and Global Pollution Observatory, Boston College

*3:00pm Eastern Standard Time*

**Event Concludes**