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How Nations Can Develop Climate Policies While Sustaining a Strong Economy

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ABSTRACT

Nations are years behind where they must be to meet their climatic pledges and goals, primarily because they find that fighting climate change isn't worth the economic challenges it entails. This paper outlines the impact of strengthening emissions reporting guidelines and economic decarbonization. It uses policies established by the governments of China and Japan to argue for methods of making economic decarbonization and emissions transparency more plausible.

Introduction

Global temperatures are continuously rising, the effects of which have dramatically increased in recent years. These include droughts, natural disasters, temperature extremes, and food crises, to name a few. The National Aeronautics and Space Administration (NASA) reported that July 2023 was the hottest month ever recorded, and temperatures are still climbing (Coon & Goebel, 2023). Climate change–specifically, greenhouse gas (GHG) emissions–is the primary cause of such temperature extremes. These emissions concentrate in the Earth's atmosphere and create the "greenhouse effect," where the sun's radiation can pass through the atmosphere and heat the Earth's surface, but pollutants prevent that same radiation from leaving. This traps heat and contributes to a rise in surface-level temperature.

The Paris Agreement –a legally binding call to action signed by 194 nations in 2016–is designed to limit this rise in temperature to 2 degrees Celsius above pre-industrial levels with a further push for 1.5 degrees Celsius (*Key Aspects of the Paris Agreement*, n.d.). The global goal, as outlined by the Paris Agreement, is to reach net-zero carbon emissions by 2050. However, to accomplish this, individual nations must fulfill their obligations to reduce emissions within their societies. To date, Paris Agreement signatories have failed to do this. According to the Climate Action Tracker (CAT), none of the 40 largest emitters, which account for around 85% of the Earth's total greenhouse gas (GHG) emissions, are on track to meet Paris Agreement goals (*CAT Climate Target Update Tracker*, n.d.).

Two signatories of the Paris Agreement, Japan and China, are among these critical polluters, ranked fifth and first in global net emissions, respectively. Neither is on track to meet its National Determined Contributions (NDCs); however, both have made much progress in establishing robust climate policy. These countries are in similar geographical locations and are both at the forefront of financial and technological innovation. However, while Japan has a smaller net gross domestic product (GDP), it has a much higher GDP per capita and is classified as a developed economy. Conversely, China is classified by the World Trade Organization (WTO) as a developing nation despite having the world's largest economy (*WTO | Doha Development Agenda: Negotiations, Implementation and Development - Groups in the Negotiations*, 2021). Both nations' financial landscapes have created different challenges and opportunities to create a net-zero economy. A strong economy, while seemingly helpful when financing large-scale projects, can also make the implementation of said projects far more complex. This is because many businesses rely on emissions to operate, creating a challenge of maintaining business while reducing emissions. Both nations have and continue to respond to the climate crisis

differently; however, each nation has developed strategies that have proven to have positive benefits and can be adopted by other nations in their fight against climate change.

Background

Climate change occurs due to GHG emissions released into the atmosphere. There are both naturally occurring and human-caused releases of GHGs, the latter of which is used to determine if a nation is meeting its climatic goals. The three-leading human-caused gasses are categorized and measured: Carbon Dioxide (CO_2), the overwhelming majority of the three; Methane (CH_4); and Nitrous Oxide (N_2O) (*Causes of Climate Change*, n.d.). Such gasses are often reported using a combined metric called Carbon Dioxide equivalents (CO_2e). Calculated using a global warming potential multiplier, CO_2e represents the climatic effect of a single metric ton of each GHG relative to CO_2, where one metric ton of CO_2 also has a CO_2e value of one metric ton (*Definition*, n.d.).

How GHG emissions are measured varies from nation to nation and is, ideally, determined by individual nations' reporting standards and guidelines. Nations cannot meet their NDCs under the Paris Agreement unless these emissions are adequately measured. However, the constraint many governments face is that as regulations get stronger, companies start to relocate their production facilities to developing countries with lower emissions standards (Ben-David et al., 2019). This makes it very difficult for business-forward countries to establish anything but pledges on interminable scales in a time where short-term change is critical.

A Brief Introduction to Carbon Credits

At the heart of a nation working to meet its climatic goals are businesses that must accept changing regulations and pledge to eliminate their contributions to a nation's net emissions. Article 6 of the Paris Agreement establishes the validity of carbon markets–marketplaces for carbon credits–to help reduce nations' net emissions (*The Paris Agreement*, n.d.). Many businesses unable to meet their short-term pledges buy carbon credits or a stake in a decarbonization project, lowering their net emissions. The carbon credit market has minimal governance, and the legitimacy of appraisals can vary. This leaves much uncertainty on the efficacy of carbon credits, as companies may use them to falsify the milestones, they are meeting concerning their carbon pledges (Phillips & Ombres, 2022). Many nations have set up carbon markets to facilitate these transactions, each varying in appraisal methods. Such markets have also begun to use digital measurement, reporting, and verification (MRV) methods when verifying carbon impact. This lessens the potential for data fraud and can be used to standardize market guidelines.

Reporting Methods

The current standard for emissions reporting is part of a rating that companies receive on their overall environmental sustainability, social impact, and governance (ESG). Each pillar utilizes specific metrics determined by the sector in which the company operates. The environmental aspect of ESG correlates primarily with a corporation's usage of natural resources and its consequent impact on the environment. Power usage plays a significant role in measuring environmental impact; however, water usage, impacts on biodiversity, and land degradation also have a tremendous influence. There are many different ESG calculators and ESG appraisal organizations, but the Greenhouse Gas Protocol is regarded as the gold standard of environmental reporting. The GHG Protocol measures three scopes of emissions: Scope 1 refers to emissions from direct combustion in business operations, such as company-owned vehicles or boilers in company-owned facilities. Scope 2 emissions are indirect emissions stemming from purchased goods, leased offices, or purchased electricity; these can be offset

by using renewable energy sources such as solar panels. Scope 3, the most complex of the scopes, measures emissions associated with the lifecycle of a company's product, which often includes another company's direct emissions. Scope 3 is split into two sections: upstream, referring to production-based emissions, and downstream, or emissions due to usage and disposal. One of the biggest concerns among companies is the topic of double counting. Double counting occurs when the same emissions are counted twice, once in a company's scope 3 and another in its partners' scope 1 or 2. For example, suppose a company's supplier has an inherently negative impact on the environment. In that case, the company itself may, by association, see a decline in its environmental rating, resulting in the end of that partnership. Although companies may not take responsibility for the ecological damage caused by their partners, the producer will be forced to offset its emissions to continue working with its partner. At least if the emissions are double-counted, both companies have a target to offset the negative, which generally offsets more GHGs than double-counted emissions.

Tracking ESG

ESG scores are determined using different calculators and software that vary by organization. Investors use these assessments to make decisions based on long-term environmental stability. The issue lies in the lack of standardization in ESG assessments. ESG data are abundant, but the lack of regulation within the assessment process makes it incredibly difficult to validate the data and discern between different projects and companies. Furthermore, these calculators don't consider greenwashing, where a company markets itself as more environmentally friendly than they are, resulting in the public also having a skewed idea of the actual happenings and environmental impact of a company; nor do they account for impact-washing, when the positive impacts of an investment are overinflated to the public.

Limitations

This lack of standardized metrics is a key limitation in this research, as differing reporting methods may lead to varied baseline emissions and intensity of policy response. Data on country-specific emissions may be self-reported, leading to an underrepresentation of total emissions. This makes drawing equal comparisons between country-level policies and their net impact on global emissions difficult.

Japan Overview

With no ESG guidelines, Japan has remained among the world's top polluters due to the sheer magnitude of its industry. Japan's emissions peaked in 2013 at around 1.41B tons of CO_2e (*Japan's Nationally Determined Contribution (NDC) Japan's Greenhouse Gas Emission Reduction Target Japan Aims to Reduce Its G*, n.d.). Since then, emissions have slowly reduced. In 2022, Japan emitted 1.12B metric tons of CO_2e, a slight increase from the previous year but an overall decrease from 2013 levels (Clark & Umekawa, 2023). In 2020, the nation pledged to achieve net-zero emissions by 2050, with a 43% decrease in 2013 emissions levels by 2030 (*Japan's Nationally Determined Contribution (NDC) Japan's Greenhouse Gas Emission Reduction Target Japan Aims to Reduce Its G*, n.d.).

Japan has benchmarked its goals using its Carbon Neutrality and Green Growth Strategy. This strategy outlines 14 key industries – including hydrogen, automobiles and batteries, nuclear power, semiconductors, and information & and technology – and lays out plans to invest in them to continue growing as climate regulations get stricter (Kim, n.d.).

Japan is also making headway into decarbonizing its economy through its 3Rs initiative. The 3Rs–Reduce, Reuse, and Recycle–represent Japan's goal of shifting toward a circular economy that runs on reused materials rather than waste, thereby reducing downstream emissions (*3R Initiative*, n.d.).

Japan's Ministry of Economy, Trade, and Industry (METI) has also worked with private organizations to help decarbonize the economy. METI commissioned the Tokyo Stock Exchange to create a digital framework for a Carbon Credit Market. Japan's Carbon Credit Market is paired with a Cap-and-Trade program, which allows for a steady decrease in carbon usage and provides an economic incentive for companies that do not exceed their carbon caps by allowing them to sell their unused carbon allowances (*Japan - Tokyo Cap-And-Trade Program*, n.d.). This emissions scheme focuses on two main markets: J-credits – carbon credits verified and issued by the government – and voluntary carbon market (VCM) credits – carbon credits verified and auctioned off by private companies (Sebastian, 2023). Those who want to meet their nationally determined contribution requirements generally opt for the J credits, but those who solely want to achieve net-zero emissions are geared more toward the VCM credits. However, it is essential to note that this program has yet to launch.

One of Japan's most successful initiatives is its Global Warming Countermeasures Tax—a tax on the purchase of all fossil fuels based on the rate at which they emit carbon. Bringing in USD $1.684 Billion for Japan, the tax has proven effective in generating funds for projects reinforcing environmental sustainability while reducing the nation's GHG emissions (*Carbon Pricing Dashboard | Up-To-Date Overview of Carbon Pricing Initiatives*, n.d.). There are, however, caveats to the tax. Although it has brought a sizable amount of revenue to the Japanese Government, the tax levied by the Japanese government is minuscule compared to that of the European Union, which generally sits at about USD $100 per metric ton of carbon (Salzman, 2023). In contrast, the Japanese rate per metric ton is 289 yen–approximately 1/56th of the European rate.

The individualized measurement of carbon emissions within companies still retains much ambiguity within Japan. Regarding ESG and emissions reporting, Japan has continued its push for a 4th scope: avoided emissions. So far, this has garnered much support from other G-7 nations who believe that it can be used as a positive incentive within companies, an internal morale-booster, and a better way to measure progress (*Japan Wins G-7 Support for 'Avoided Emissions' Climate Concept*, 2023). The Japanese government also pushes for complete domestic emissions tracking and reporting standardization. By March 2025, a final draft of the complete emissions reporting standards will be released. However, there has been no mention of when this will take effect, and reporting will remain voluntary (Di Sibio, 2023).

China Overview

Since 2006, China has consistently been the single largest global polluter. It is home to the largest manufacturing industry in the world, producing more than 28.4% of all globally manufactured outputs (*Manufacturing, Value Added (% of GDP) - China | Data*, n.d.). China also is the largest consumer of coal in the world, consuming almost as much coal as the rest of the world combined. China's coal consumption has continued to rise, and emissions levels are expected to peak in 2025 (*China*, 2022). China has pledged to increase the share of non-fossil fuel energy to 25% and, after peaking by 2030, make a severe 65% reduction in its carbon emissions from 2005. Furthermore, the Chinese government has pledged to achieve full carbon neutrality by 2060. However, without solid policies, China's goals are unrealistic (*China's Route to Carbon Neutrality: Perspectives and the Role of Renewables*, 2022).

Rebounding from COVID-19 restrictions, China's economic focus has been less on economic decarbonization and more on regaining energy and economic sustainability. But efforts have been made on China's front. Although ambitious at their core, the nature of China's initiatives isn't the only thing that can be called into question; many also question China's ability to fund new climate projects. Given its classification as a developing country, China has access to a small fund that developing nations can dip into and use to finance

new climate projects. This has led to much controversy, mainly due to China's status as the largest economy in the world. This status allows China to take money from the loss and damage fund, a new fund that pushes larger countries to donate money that developing countries can use to finance their climate projects. However, China needs USD $17 trillion to finance its overarching goals (Shalal, 2022).

This hasn't stopped China from initiating policies to curb carbon emissions. Some that have already taken off include the Emissions Trading Scheme (ETS) – China's carbon market launched in January 2021. Currently, the market only covers the nation's power sector, which accounts for 40% of China's CO_2 emissions (*In-Depth Q&A: Will China's Emissions Trading Scheme Help Tackle Climate Change?*, 2021). However, the market accounts for more than 4 billion tons of CO_2 emissions, classifying it as the largest ETS market. China's ETS has no fixed cap on the power industry's carbon emissions. Instead, it uses a flexible system that allows the carbon cap to fluctuate yearly. Without a guaranteed downward trend in its carbon cap, China negates any promise to lower overall emissions through the ETS. China prices Carbon at USD $7.60 per ton of CO_2, undercutting most ETS schemes in price. Along with the low rates for carbon, China has set a limited penalty for fraudulent listings, where carbon credits purchased to fund a project that has a lesser environmental impact than marketed, maxing out at USD $4,605 (*In-Depth Q&A: Will China's Emissions Trading Scheme Help Tackle Climate Change?*, 2021). This initiative has proven successful for China, producing about USD $1.54 billion for China and handling almost 300 million tons of carbon (Xijia, 2023).

China has also implemented the "1 + N" plan to decrease the economy's reliance on Carbon Emissions. Here, the "1" signifies the nation's long-term goals and the ideologies and philosophies that inform its policies, while the "N" signifies an action plan encompassing a multitude of approaches within itself to target and decarbonize different markets within China (Huld, 2022).

In April 2022, China released the "Implementation Plan on Accelerating the Establishment of a Unified and Standardized Carbon Emission Statistics and Accounting System," outlining its national carbon credit accounting system plan. However, since the plan was announced, there has been no record of a timeline for either the creation or implementation of these guidelines (*【印发《关于加快建立统一规范的碳排放统计核算体系实施方案》的通知】-国家发展和改革委员会*, 2022).

Comparison

Pledges

Japan has pledged to reach net-zero emissions by 2050 with a 46% cut from 2013 levels to be reached by 2030, goals which Japan is well on its way to accomplishing (*Carbon Neutrality | Global Issues - JapanGov* -, n.d.). China's goals stretch over a much longer timeframe than Japan's and seem less plausible. China plans to reach a peak in CO_2 emissions and bring CO_2 emissions to less than 35% of 2005 levels. They plan on doing this by heavily increasing the share of non-fossil fuel energy sources to 25% by 2030 (*China's Climate Change Policies*, 2022). Furthermore, China plans to reach net zero by 2060 (*China's Road to Net Zero: Reshape the Country and the World*, 2023). China's emissions continue rising and are expected to stay flat at high levels until 2030. Until China reaches its peak in emissions, its goal of net zero emissions will become less attainable by the day as the damage that China's environment faces inches toward irreparability.

Japan has pledged to reach net zero by 2050 and reduce emissions by 43% from 2013 levels by 2030. Compared to China, these are far more realistic. However, Japan itself isn't on track to reach these goals. The key difference between Japan's and China's pledges is that Japan has already peaked. Consequently, it only has plans to reduce over the following years. By waiting for its peak, China intends to push back the implementation of its plans while simultaneously making plans to enact much more vigorous policies. Although this seems far more effective, it simply pushes the problem back to a later date without the promise that it won't keep getting pushed back.

Carbon Markets

China and Japan have created similar policies to overcome their climatic deficiencies. Both have created large-scale carbon markets, each with the power to bolster their domestic economies severely. Due to the sheer volume of emissions within China and the consequential outcome of there being more opportunities to create and finance climate projects, China's ETS covers more in transactions as it's estimated to cover 4 Billion Tons of CO_2 or 40% of China's total emissions (*China National ETS*, 2023). In its first wave of production, China's ETS only covers China's power sector – 48% of China's total emissions (*Executive Summary – An Energy Sector Roadmap to Carbon Neutrality in China – Analysis - IEA*, n.d.). In contrast, Japan's Carbon Market is open to anyone and covers almost all sectors within the country. China has the framework and capacity to expand its market; however, it has veered from doing so due to its ETS implementation being regarded as a trial period. There is a large market for ETS beyond the power sector because many companies aim to comply with China's loose carbon regulations. China seeks to find its full market potential before expanding to all sectors.

Japan doesn't have China's market opportunity, as it operates on a much smaller scale, covering less than a quarter of China's current phase (*Pricing Greenhouse Gas Emissions: Key Findings for Carbon Pricing in Japan*, n.d.). Japan's carbon market operates in tandem with a cap-and-trade scheme, where the government grants carbon allowances to corporations that can then be bought or sold if a company falls short of or exceeds the limit of its allowance. This cap then decreases the following year, ensuring a decrease in emissions. This incentivizes companies to lower their carbon usage targets and creates more volume for the carbon market. China has chosen not to place a set carbon cap on companies and has opted for one that changes annually in either direction. Such a cap doesn't ensure that any company will make steady progress and could, in turn, result in an outcome that would take much longer to reach than Japan. Although this hurts the goal, it does have inherent benefits. By blurring the lines between progress and leniency, China will easily create progress that doesn't hurt businesses. 80% of the world's GDP comes from China, and a third of China's GDP comes from the manufacturing sector (Textor, 2023). Especially when it's much more difficult for the manufacturing sector to shift towards greener practices and China wants to cover the manufacturing sector under ETS eventually, China saves a substantial portion of its business by reducing environmental expenses towards the manufacturing industry.

Reporting Guidelines

Neither Japan nor China have taken any executive action toward creating solid, unified reporting guidelines. Still, both have announced their consensus toward a need for standardized rules and have published plans for reaching that goal. Japan has made more of an effort, having published dates by which drafts of regulatory plans will be published. However, there is yet to be a plan or timeline given for the execution of a mandate requiring companies to use such standards. Currently, Japan has mandated all enterprises to report their emissions with a skeleton of guidelines resembling what the corporations need to publish, not how they must do so, leaving a lot of uncertainty about the accuracy of reporting. China has pushed nations to publish their carbon footprint but has not made any legislation regarding ESG responsibility. Both countries' slow movement toward the goal of stricter reporting guidelines stems from the uncertainty of what could happen to businesses within their nations. By incurring further regulation, companies may go under due to a lack of resources to finance decarbonization, or, out of fear of that happening, companies may move to offshore areas with less regulation. However, for each country to live up to its goals, it needs accurate metrics, which can only come when enterprises realize their corporate responsibility to the environment.

Outcomes of the Shift Towards Stronger Guidelines

Beyond the climatic benefits of more robust reporting guidelines and climate regulations, nations are also bound to face economic changes. As reporting guidelines become stricter, a shift in private investment will likely occur. The relevance of environmental impact continues to increase as investors look into long-term investments (Eccles & Klimenko, 2023). The corporations that cannot keep up with their climatic promises will lose such investment, and money will be reinvested in more equitable companies that will continue to keep up with growing climate regulations. What many fear to be an economic downturn is more likely to be a restructuring of finances. Companies that currently receive heavy investment may not when harsher regulations come into place.

How Nations Can Adapt

Financing

Establishing stronger emissions regulations and reporting guidelines can seem challenging, especially for a nation with financial struggles. A lack of capital remains a massive roadblock when establishing nationwide policies, particularly in developing countries where countries struggle to decide between establishing regulations, losing prominent business, and retaining business at the expense of their environment. For many countries, even a short-term investment with a near-guaranteed economic return can sink finances to a point where such a long-term return won't help because a nation cannot manage the rest of its expenditures. Nations can combat this by entering the carbon market, as China has (Kansuk, 2022). Such a method provides economic sustainability and can be aided by other nations. For example, the government of Namibia – which has pledged to reduce its carbon emissions by 91% – has focused heavily on research and development of a Namibian carbon market framework funded by environmental aid from Japan (*Promotion of Carbon Markets in Namibia for an Enhanced Implementation of the Nationally Determined Contributions (NDC) Towards Net-Zero Emissions and Climate-Resilient Development, in Response to the Climate Emergency*, 2022). Once Namibia enters the carbon market, many of its carbon projects previously hindered by inadequate finances become possible. This will create a whole new market for Namibian businesses and environmentalists.

Nations that engage in the carbon market can look to Japan for how they implemented Cap and Trade systems to incentivize environmental improvement by selling surplus carbon allowances as VCM credits. Like Japan, countless nations–including Sweden, the United States, Finland, New Zealand, and Germany– offer environmental aid to other countries (*Most Environmentally Friendly Countries: Thanks to Environment Workers, Volunteers and Activists*, n.d.). The United Nations' (UN) loss and damage fund also houses millions of dollars for nations to tap into (*What You Need to Know About the COP27 Loss and Damage Fund*, 2022).

Implementation

Business-forward nations, developed and developing alike, face the fear of hurting business by strengthening their guidelines. This challenge is far more complicated to combat. Nations like the US or Great Britain have the capital to decarbonize different markets and sectors through incentivization or direct investment. However, implementing policies that decarbonize nations' economies remains a difficult challenge. In the case of small agrarian nations like Ghana, whose agriculture sector contributes to 54% of its GDP, things seem near-impossible (*Ghana at a Glance | FAO in Ghana*, n.d.). Not much can be done in the short term, and in cases like Ghana's, the only way to guarantee improvement is by bringing the skills to the farmers through workshops.

With the financial support of the United Nations Development Program and a Swiss voluntary carbon cooperation, Ghana was able to provide workshops to over 10,000 rice farmers, accounting for 80% of all rice production. By teaching sustainable agricultural processes and showing farmers how to reduce water usage, Ghana brought down the Carbon output of the rice industry, a key component in the Agricultural Sector (Kansuk, 2022). By providing such resources, even small nations can start regulating such sectors and creating progress in reducing Carbon outputs. China faces this same issue; its heavy reliance on the manufacturing industry has led to hefty carbon usage within the nation. In 2022, 28% of China's GDP was from its manufacturing industry (*Manufacturing by Country 2023*, n.d.), and nearly one-fifth of China's workforce is employed by a company within the manufacturing sector (Xiaozhao & Wen, 2022).

Similarly to Ghana's agricultural sector, the manufacturing businesses within China serve as a cornerstone of the Chinese economy. However, China cannot just fix the issue of manufacturing-based emissions through training workshops, nor can they survive the complete elimination of the industry. Not all industries can be helped; some industries inherently negate environmental processes. The only way for governments to guarantee a negative trend in carbon usage from such industries is through direct legislature. This may hurt business, but with the green trend that economies are beginning to follow, the damage from mitigating the success of such industries would only be moving up the timeline of their inevitable failure.

The outcome of the eventual decarbonization of these markets is that nations can tighten these regulations. Pushing a net zero agenda unto critical sects, even one as rigid as the agricultural sector, is a straightforward way to enable solid reporting guidelines without placing unrealistic expectations on businesses. This is vital, especially for business-forward nations struggling to meet their NDCs.

A Lack of Shared Responsibility

Globally, many nations need to take accountability for their contribution to the issue of climate change. Especially in comparison to nations like China and the United States of America, which account for about 45% of the world's total GHG emissions, many smaller nations don't contribute a high percentage of global emissions (*Global Greenhouse Gas Emissions Data | US EPA*, 2023). This is often used to justify their lack of action on the climate crisis. So, when governments see that China still hasn't reached its peak in emissions, the responsibility they feel for the issue dwindles. The UN cannot hold nations legally accountable for their inaction on climate, so there's no external body to hold nations to the promises outlined in their NDCs. It is, however, also in the interests of developing nations themselves to work towards solving this issue, as developing nations have historically been the most impacted by the problem. For global goals to be reached, the small countries must also do their part; as more continue to fail to recognize their obligation towards the environment, the amount of progress lost racks up. With the aid of larger nations, small nations can fulfill their responsibilities to the environment and reach their NDCs.

Conclusion

This review contrasts the methods by which nations strengthen their climatic policy and overcome various roadblocks. It compares two nations with similar markets and locations but vastly different volumes of carbon emissions and capabilities to fund new initiatives.

Economic success is widely believed to hinder a nation's ability to establish stronger environmental regulations. This belief has led many nations to let loose regulations plague their economies as businesses pollute the environment with little to no consequence. The only way for nations to achieve their climatic goals is to decarbonize their economies, regardless of the financial burden it may place on them. This is only possible if nations are willing to adapt to the roadblocks that stop them from progressing rather than using such roadblocks to shield themselves from their environmental responsibility.

The climate should be a universal priority. Yet, many nations still refrain from acting due to concerns over short-term economic sustainability. Still, this doesn't consider the economic impacts of inaction and climate change's long-term threat. Nations must adapt to preserve their environment's and businesses' interests. To do so, global knowledge-sharing and capacity-building are key. Governments must act rapidly and in unison to avoid the worst impacts of climate change through the development of improved policies, standardized emissions guidelines, and equitable access to financing.

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References

【印发《关于加快建立统一规范的碳排放统计核算体系实施方案》的通知】-国家发展和改革委员会. (2022, August 19). 国家发展改革委. Retrieved October 30, 2023, from https://www.ndrc.gov.cn/xwdt/tzgg/202208/t20220819_1333233.html

Carbon Neutrality | Global Issues - JapanGov -. (n.d.). The Government of Japan. Retrieved October 30, 2023, from https://www.japan.go.jp/global_issues/carbon_neutrality/

CAT Climate Target Update Tracker. (n.d.). Climate Action Tracker. Retrieved October 30, 2023, from https://climateactiontracker.org/climate-target-update-tracker-2022/

Causes of climate change. (n.d.). Language selection | Climate Action. Retrieved October 30, 2023, from https://climate.ec.europa.eu/climate-change/causes-climate-change_en

China. (2022, November 3). Climate Action Tracker. Retrieved October 30, 2023, from https://climateactiontracker.org/countries/china/

China National ETS. (2023, March 27). International Carbon Action Partnership. Retrieved October 30, 2023, from https://icapcarbonaction.com/en/ets/china-national-ets

China's climate change policies. (2022, October 16). European Parliament. Retrieved October 30, 2023, from https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/738186/EPRS_BRI(2022)738186_EN.pdf

China's road to net zero: reshape the country and the world. (2023, February 23). Economist Intelligence Unit. Retrieved October 30, 2023, from https://www.eiu.com/n/china-road-to-net-zero-reshape-the-country-and-the-world/

China's Route to Carbon Neutrality: Perspectives and the Role of Renewables. (2022, July 6). IRENA. Retrieved October 30, 2023, from https://www.irena.org/publications/2022/Jul/Chinas-Route-to-Carbon-Neutrality

Climate Change. (n.d.). Ministry of Foreign Affairs of Japan. Retrieved October 30, 2023, from https://www.mofa.go.jp/policy/environment/warm/cop/index.html

Coon, A., & Goebel, R. (2023, August 14). *NASA Confirms July 2023 is Warmest Month on Record*. NASA Scientific Visualization Studio. Retrieved October 30, 2023, from https://svs.gsfc.nasa.gov/14396/

Definition. (n.d.). Definition. Retrieved October 30, 2023, from https://www3.epa.gov/carbon-footprint-calculator/tool/definitions/co2e.html

Di Sibio, C. (2023, August 23). *What's next for Japanese sustainability disclosure standards*. EY. Retrieved October 30, 2023, from https://www.ey.com/en_jp/sustainability/whats-next-for-japanese-sustainability-disclosure-standards

Executive summary – An energy sector roadmap to carbon neutrality in China – Analysis - IEA. (n.d.). International Energy Agency. Retrieved October 30, 2023, from https://www.iea.org/reports/an-energy-sector-roadmap-to-carbon-neutrality-in-china/executive-summary

Ghana at a glance | FAO in Ghana. (n.d.). Food and Agriculture Organization. Retrieved October 30, 2023, from https://www.fao.org/ghana/fao-in-ghana/ghana-at-a-glance/en/

Global Greenhouse Gas Emissions Data | US EPA. (2023, February 15). Environmental Protection Agency. Retrieved October 30, 2023, from https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data

Japan's Nationally Determined Contribution (NDC) Japan's Greenhouse Gas Emission Reduction Target Japan aims to reduce its g. (n.d.). UNFCCC. Retrieved October 30, 2023, from https://unfccc.int/sites/default/files/NDC/2022-06/JAPAN_FIRST%20NDC%20%28UPDATED%20SUBMISSION%29.pdf

Japan - Tokyo Cap-and-Trade Program. (n.d.). International Carbon Action Partnership. Retrieved October 30, 2023, from https://icapcarbonaction.com/en/ets/japan-tokyo-cap-and-trade-program

Japan wins G-7 support for 'avoided emissions' climate concept. (2023, April 25). Nikkei Asia. Retrieved October 30, 2023, from https://asia.nikkei.com/Spotlight/Environment/Climate-Change/Japan-wins-G-7-support-for-avoided-emissions-climate-concept

Kansuk, S. (2022, June 30). *Carbon Justice for All: How Carbon Markets Can Advance Equitable Climate Action Globally*. United Nations Development Programme. Retrieved October 30, 2023, from https://www.undp.org/africa/blog/carbon-justice-all-how-carbon-markets-can-advance-equitable-climate-action-globally

Manufacturing by Country 2023. (n.d.). World Population Review. Retrieved October 30, 2023, from https://worldpopulationreview.com/country-rankings/manufacturing-by-country

Manufacturing, value added (% of GDP) - China | Data. (n.d.). World Bank Open Data. Retrieved October 30, 2023, from https://data.worldbank.org/indicator/NV.IND.MANF.ZS?locations=CN

Most Environmentally Friendly Countries: Thanks to Environment Workers, Volunteers and Activists. (n.d.). Volunteer FDIP. Retrieved October 30, 2023, from https://www.volunteerfdip.org/most-environmentally-friendly-countries

The Paris Agreement. (n.d.). UNFCCC. Retrieved October 30, 2023, from https://unfccc.int/process-and-meetings/the-paris-agreement

Paris Agreement English. (n.d.). UNFCCC. Retrieved October 30, 2023, from https://unfccc.int/files/meetings/paris_nov_2015/application/pdf/paris_agreement_english_.pdf

Pricing Greenhouse Gas Emissions: Key findings for carbon pricing in Japan. (n.d.). OECD. Retrieved October 30, 2023, from https://www.oecd.org/tax/tax-policy/carbon-pricing-japan.pdf

Promotion of Carbon Markets in Namibia for an enhanced implementation of the nationally determined contributions (NDC) towards net-zero emissions and climate-resilient development, in response to the climate emergency. (2022, August 29). United Nations Development Programme. Retrieved October 30, 2023, from https://www.undp.org/namibia/press-releases/promotion-carbon-markets-namibia-enhanced-implementation-nationally-determined-contributions-ndc-towards-net-zero-emissions

Sebastian, V. (2023, July 11). *Japan eyes voluntary carbon market amid low J-Credit liquidity*. S&P Global. Retrieved October 30, 2023, from https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/energy-transition/071123-japan-eyes-voluntary-carbon-market-amid-low-j-credit-liquidity

3R Initiative. (n.d.). 3R Initiative. Retrieved October 30, 2023, from https://www.env.go.jp/recycle/3r/initiative/en/index.html

What is the Kyoto Protocol? (n.d.). UNFCCC. Retrieved October 30, 2023, from https://unfccc.int/kyoto_protocol

What you need to know about the COP27 Loss and Damage Fund. (2022, November 29). UNEP. Retrieved October 30, 2023, from https://www.unep.org/news-and-stories/story/what-you-need-know-about-cop27-loss-and-damage-fund

WTO | Doha Development Agenda: Negotiations, implementation and development - Groups in the negotiations. (2021, April 12). World Trade Organization. Retrieved October 30, 2023, from https://www.wto.org/english/tratop_e/dda_e/negotiating_groups_e.htm#grp002b