https://doi.org/10.52131/jee.2023.0402.0039

*i*RASD Journal of Energy & Environment

Volume 4, Number 2, 2023, Pages 101 - 111

Journal Homepage:
https://journals.internationalrasd.org/index.php/jee

Egypt's Approach and Initiatives Towards Greener Future: Policy Paper

Hagar Hammad[1], Yara Hossam[2], Mohamed Mahmoud[3], Irene S. Fahim[4]

[1] School of Engineering and Applied Sciences, Smart Engineering Systems Research Center, Nile University, Cairo, Egypt. Email: hagarhammad31@gmail.com
[2] School of Engineering and Applied Sciences, Industrial and Service Engineering and Management Department, Nile University, Cairo, Egypt. Email: y.hossameldin@nu.edu.eg
[3] School of Engineering and Applied Sciences, Architecture and Urban Design Department, Nile University, Cairo, Egypt. Email: mmahmoud@nu.edu.eg
[4] School of Engineering and Applied Sciences, Industrial and Service Engineering and Management Department, Nile University, Cairo, Egypt. Email: isamy@nu.edu.eg

ARTICLE INFO

Article History:

Received: October 05, 2023
Revised: December 13, 2023
Accepted: December 15, 2023
Available Online: December 17, 2023

Keywords:

Sustainability
Climate change
Greenhouse gas emissions
Conference of parties
Sustainable development
Green economy

JEL Classification Codes:

Q001, Q53, Q54, Q56

Funding:

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

ABSTRACT

Climate change as a matter had little attention of public debate, especially in developing countries, until the recent floods caused by the dragon storms in the Middle East and the forest fires in the Mediterranean. Egypt, being strategically crucial in Africa, the Mediterranean, and the Arab world, with strong connections to other countries, aimed to go from promises to action and to discover real answers to climate change by building on past COPs. The administration assumed a more prominent role by coordinating the 27th Conference of the Parties to the United Nations Framework Convention on Climate Change (COP27). People started to realize that this is not something only happening elsewhere in the world. Egypt took the initiative; Challenges have been assessed to reach suitable mitigation approaches, and Egypt's first NDC has been issued to meet the global agenda. Egypt's vision was to accelerate global climate action at the UNFCCC 27th Conference of the Parties (COP 27) through emissions reduction, advanced adaptation, and enhanced flow of appropriate finance, prioritizing developing countries worldwide.

Corresponding Author's Email: y.hossameldin@nu.edu.eg

Citation: Hammad, H., Hossam, Y., Mahmoud, M., & Fahim, I. S. (2023). Egypt's Approach and Initiatives Towards Greener Future: Policy Paper. *IRASD Journal of Energy & Environment*, *4*(2), 101–111. https://doi.org/10.52131/jee.2023.0402.0039

1. Introduction

A great goal was planned at COP 26 in Glasgow in November; the parties had agreed to meet the 1.5-degree goal (Lim et al., 2022). However, the pandemic delayed it. Many parties to the Paris Agreement had failed to submit their mitigation pledges, known as nationally determined contributions (NDCs). In addition, developed countries have failed to provide 100$ billion annually to help developing countries with their mitigation plan (Cornes, 2022). The war in Ukraine was another factor that affected climate policies in several ways. For example, sanctions on Russian oil led the United States to encourage home-based fuel companies to increase production, which opposes their promised plans in Glasgow (Business Monthly, 2022d).

Despite Egypt being a poor country with low emissions, the government has committed to hosting the 27th Conference of the Parties to the United Nations Framework

Convention on Climate Change (COP27). Egypt clarified its goals for the Conference by making significant and equitable advancements on all unresolved issues. This involves implementing a thorough mitigation work plan, establishing new regulations on global adaptation goals, tackling the issue of loss and damage, and properly handling the challenge of climate finance to build trust by ensuring no country is excluded. To comprehend the worldwide scope of the climate crisis and the consequent necessity for prompt and swift measures. The statement underscores the importance of transitioning from promises to action by executing precise, quantifiable projects on the field, as stated by the COP27 official.

2. Challenges to Meet COP27 Goals

Egypt is a nation that is highly susceptible to the effects of climate change. The Egyptian government has begun to concentrate on reducing and adjusting to the effects of climate change in many sectors. The 27th Conference of Parties (COP 27) to the United Nations Framework Convention on Climate Change (UNFCCC) is nearing, and it was essential to discuss the challenges that Egypt faced in each sector and the measures that were taken to address them as well as referring to other successful policies implemented in other countries that could serve as models for Egypt.

Transportation Sector: Egypt's transportation sector challenges lie in the laws and regulations. The problem with not accrediting the Egyptian General Organization for Standardization and Quality. It refuses to convert any car from fuel to electricity except with the parent company's approval. The parent company refuses as it will lose maintenance funds. Unlike countries that do not require these approvals, there is a conflict of interest. There is no explicit law for licensing converted cars, and there is a lack of support from the Insurance Supervisory Authority. In addition to the high cost of transformation, which makes the transformation economically unfeasible in light of the current situation of incentives and the tax system.

The United States previously offered several recommendations for policymakers in the "Transport and Climate Change Global Status Report." They encouraged using green alternatives to transportation, such as walking and cycling, which can only happen if the government invested in improving infrastructure that will make it easier and more accessible to people. It also encourages fuel-efficient and low-emission vehicles, such as hybrid and electric cars, by legislating laws about fuel efficiency standards and tax incentives (SLOCAT, 2022).

Industry Sector: Problems are specific to the Industrial Development Authority and problems specific to accreditation offices 2017 of 15, especially the inactive IDA law. Problems in the renewal of the industrial register. Electricity delivery problems: Supplying plants with electricity takes time. The ineffectiveness of intellectual property protection law as implementation is complex; the entity concerned must be identified to receive intellectual property complaints and determine the course of action. Foreign currency crisis: There must be a priority to provide hard currency for companies involved in the green transition (Qalaa Holding, n.d.).

China's industrial sector is recognized as the primary global source of greenhouse gas emissions. The International Energy Agency (IEA) issued various suggestions in their paper titled "Low-Carbon Industrial Strategies for China." The leading suggestions were enhancing energy efficiency through high-efficiency equipment and methods and advocating for renewable energy sources like wind, solar power, and biomass energy. Furthermore, carbon capture and storage technology (CSS) reduces emissions by preventing CO_2 from entering the atmosphere. CO_2 is captured from industrial factories and transported via pipelines to a storage site. In the final step, it is injected into underground geological formations, such as deep coal seams, to be stored (He et al., 2020).

Waste Management & Energy Recycling Sector: The Central Bank's decision on documentary credits is a significant obstacle: there must be a clear plan for the waste sector. There is no road map to attract investors. The existence of a sizeable random sector that dominates this industry affects companies' competitiveness in the absence of incentives—the competition with the informal sector and state support. There is no obligation for real estate developers to obtain sustainable production inputs, which lack the demand side and an inhibitor of sustainable raw material for production (the supply side) (ERRADA, n.d.).

The publication titled "Municipal Solid Waste Management and Greenhouse Gas Reductions" by the World Bank presents a comprehensive examination of diverse waste management methodologies and corresponding suggestions and policies for mitigating greenhouse gas emissions derived from waste. The report advocates for enhancing waste disposal practices and integrating waste into other industries, such as repurposing food scraps or feedstock as fertilizers, recycling and reusing construction and demolition waste in concrete production, and transforming old textiles into new garments. This approach can effectively reduce gas emissions by minimizing the volume of waste deposited in landfills. Additionally, the report proposes the implementation of landfill gas capture as a means of curtailing methane emissions. The gas capture process entails drilling wells in landfill sites to collect methane gas transported through pipelines to a processing facility (World Bank Group, 2018).

Agricultural Investment: Although the initiation procedures for electricity should be curtailed, even if it incurs costs for the company (the decision from the governorate is still pending), it impacts emissions. The primary obstacle lies in the Central Bank's decision regarding documentary accreditation, which prevents the company from importing the necessary devices. Obstacles persist in land registration despite completing all procedures and the full-price payment.

Egypt has examined the agricultural industry's impact on climate change in a policy paper written by the International Food Policy Research Institute (IFPRI) titled "Egypt's Agriculture and Climate Change: Challenges and Opportunities." The report advocates for diversifying crops, as agriculture in Egypt predominantly focuses on water-intensive crops, such as rice and sugarcane. Adopting drought-tolerant crops like olive trees, date palms, and barley can alleviate the excessive demand for water, thus enhancing resilience to climate change impacts related to water resources. Furthermore, the report underscores the issue of soil degradation in Egypt and recommends implementing sustainable soil conservation practices, including cover cropping and conservation tillage. Cover cropping aids in reducing soil erosion and augmenting the organic matter content of the soil by cultivating crops specifically chosen to enhance soil health. Conservation tillage is another practice that minimizes soil disturbance during planting (Perez et al., 2021).

Building Sector: The primary challenge lies in lacking a well-defined regulatory framework and stipulations for embracing environmentally friendly practices in the construction sector. Unlike many other countries, Egypt lacks an independent non-governmental entity responsible for issuing a national code for green buildings. Moreover, there are no specific criteria for selecting construction materials that support green industries nor a comprehensive local supply chain for such materials. The decision to invest in green buildings entails significant costs; therefore, it is imperative to provide adequate incentives to render such investments economically viable.

The World Green Building Council has released a set of standards in the paper "Net Zero Carbon Buildings: A Framework Definition" to help promote sustainable practices in the construction industry. The report recommends using passive design strategies, including natural ventilation, daylight access optimization, and building envelope optimization. Additionally, the report emphasizes the importance of monitoring and reporting emissions throughout the entire life cycle of a building as a crucial tool for tracking progress toward mitigating climate change. Climate change's worldwide influence has prompted numerous

countries, organizations, and communities to suggest legislation outlining its effects across various industries and proposing appropriate future tactics. Egypt has acknowledged the need to tackle climate change and has implemented many measures to decrease carbon emissions (UK Green Building Council, 2019).

3. Recognized Efforts before COP27

3.1 Government Sector: Egypt's First Updated NDC

The Paris Agreement, created in 2015, is a legally binding international agreement designed to tackle climate change. At the Conference of Parties 21 (COP 21) in Paris, 196 states signed the agreement. The main goal of this agreement is to limit the rise in global temperatures to 1.5 degrees Celsius compared to pre-industrial levels. An essential aspect of this agreement is nations' need to regularly provide revised national climate action plans, referred to as Nationally Determined Contributions (NDCs). Egypt recently submitted an updated NDC encompassing various critical sectors, including electricity, oil & and gas, transport, industry, urban cities, tourism, and waste management (Business Monthly, 2022b). With regards to electricity generation, transmission, and distribution, efforts are being made to achieve a 33% reduction in greenhouse gas (GHG) emissions compared to the Business-as-Usual (BAU) scenario by 2030. The estimated target for GHG emissions in 2030 is 214.74 MtCO2e, as depicted in Figure 1. To accomplish this, a range of mitigation strategies have been implemented, focusing on increasing the capacity of renewable energy sources to contribute 42% of the electric power supply by 2035. Investments are being made to improve and update the transmission and distribution network by setting up substations with extra-high voltage control centers and intelligent grids. Electric distribution corporations have played a crucial role in establishing programs for maintaining, upgrading, and replacing old power facilities (Business Monthly, 2022e).

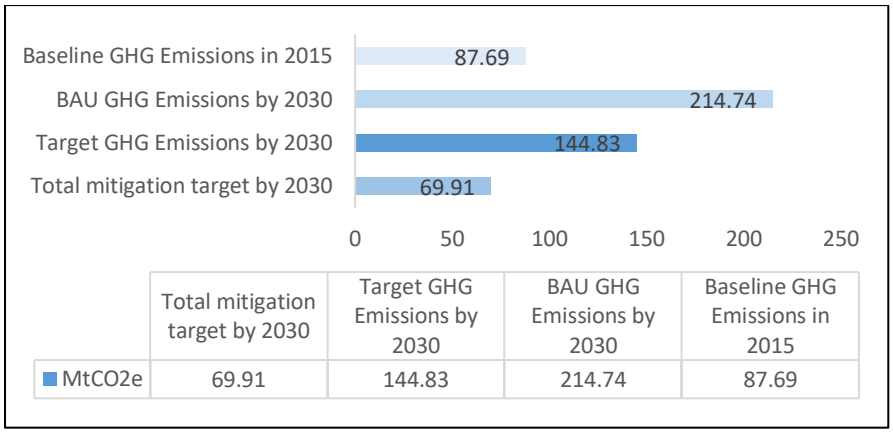

Figure 1: Electricity Updated National Climate Action Plan

Greenhouse gas (GHG) emissions in the oil and gas sector are expected to decrease by 65% compared to the business as usual (BAU) scenario by 2030. Additionally, the target GHG emissions in 2030 are estimated to be 0.89 MtCO2e, as illustrated in Figure 2. From now until 2030, the primary objective is to recover and utilize associated gases from crude oil fields to produce liquefied petroleum gas (LPG), natural gas, and condensates. Currently, 17 ongoing initiatives and 36 planned initiatives are dedicated to achieving this objective. In line with the "Hayat Karima" initiative, which promotes a dignified way of life, expanding natural gas pipelines to 180 villages, serving a population of 476,000 residents, is anticipated by 2030.

Furthermore, a proposal is to establish a facility in Idku that would produce 205 thousand cubic meters of medium-density wood panels (MDF) annually, utilizing 250 thousand tons of rice straw. In order to reduce plastic waste and promote environmentally friendly petrochemical production, two programs are being planned. These programs are expected to produce 75,000 tons of biodegradable plastic bags and 30,000 tons of polyethylene by converting plastic waste into oil. Furthermore, plans are to extract 350,000

tons of algal oil annually for biofuel production and to make 100,000 tons of bioethanol as part of the program to create alternative green fuels (Business Monthly, 2022c).

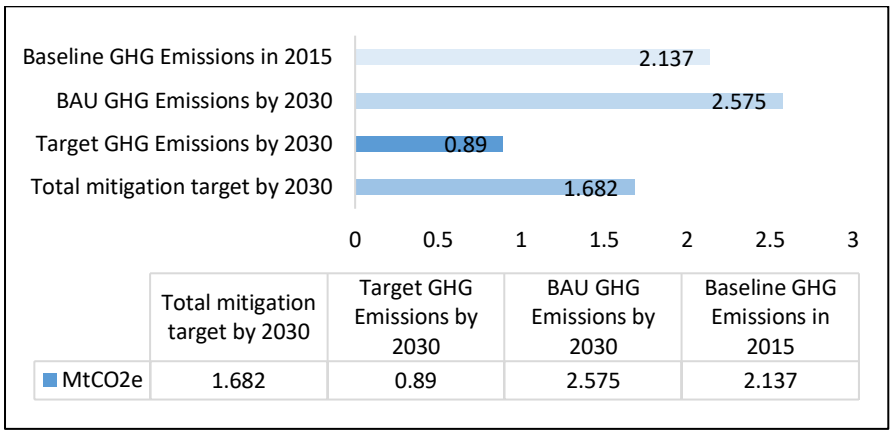

Figure 2: Oil & Gas Updated Climate Action Plan

In the transport sector, the total GHG reduction % compared to BAU in 2030 is 7%, and target GHG Emissions by 2030 are estimated to be 8.96 $MtCO_2e$, As shown in Figure 3. The national road project seeks to construct 7,000 kilometers of new roadways and renovate 10,000 kilometers of existing roadways while utilizing asphalt recycling technology. Cairo metro network is expanded, where three new lines are created along with stage 3 of line 3. Two electric rails are created, and the high-speed electric shuttle connects 60 cities over 2,000 kilometers. Furthermore, electric light rail transit runs through 19 stations at 103km (Business Monthly, 2022a).

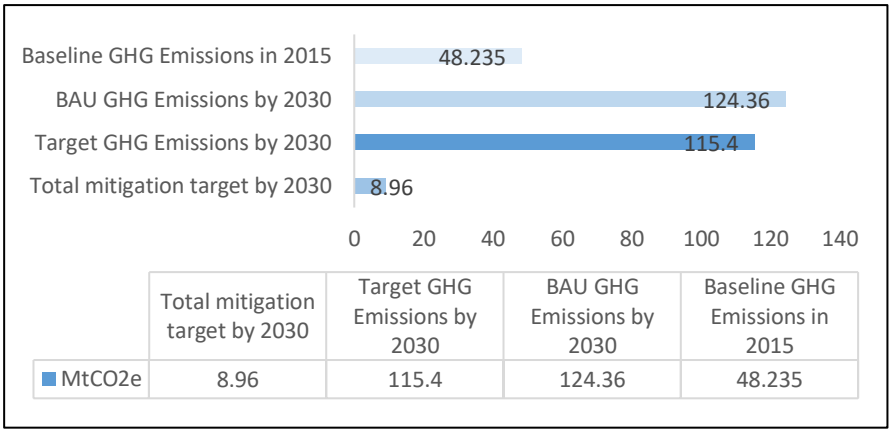

Figure 3: Transport Updated Climate Action Plan

Developing a low-carbon plan for the Egyptian cement industry in the industrial sector involves implementing many strategies. The solutions involve partially replacing traditional fuels with new ones, reducing clinker content in cement by up to 80%, and lowering the average specific energy consumption from 3,710 to 3,550 MJ/ton of cement. A plan is to replace carbon-based feedstock with green hydrogen to create green ammonia and shift towards producing low-carbon nitrogen fertilizer. The aim is to reduce the average specific thermal energy consumption by 10% in three energy-intensive industries: iron and steel, fertilizers, and ceramic tile industries. Promoting eco-industrial parks is widely supported, as reported in Business Monthly (2022a).

The future outlook for the construction sector and urban cities includes implementing green building standards in buildings and urban cities. It is anticipated that by 2030, 19,960 residential units will be constructed under these standards. This expansion will also involve the adoption of energy-efficient appliances and the elimination of non-energy-efficient equipment. Moreover, establishing green areas and sustainable parks irrigated with treated wastewater would act as carbon sinks in newly developed urban areas. Moreover, there are

plans to install rooftop PV panels for electricity generation and 5,300 solar water heaters (Business Monthly, 2022b). The tourism industry is shifting towards sustainability. This involves increasing renewable energy sources and implementing solar water heating for home use and swimming pools in tourist hotels and resorts. Solar water desalination is also being put into action. Efforts to decrease energy usage include switching from traditional lighting to LED lights, enhancing building structures, using efficient HVAC systems, and adopting effective water circulation methods (Business Monthly, 2022e).

The administration has detailed a comprehensive trash management plan. The goal is to build 215 wastewater treatment facilities and effluent treatment plants in three sections by 2030. The strategy involves setting up fixed and mobile transfer stations, mechanical and biological treatment (MBT) facilities, and replacing uncontrolled dumpsites with hygienic landfills. The methods will boost collection efficiency from 55% to 95% by 2025. Moreover, there is an objective to enhance the role of waste-to-energy in solid waste management. This will be accomplished by using trash as a substitute fuel in the cement industry, transforming waste into biofuels, and producing electricity through combustion, pyrolysis, and other advanced technologies. The goal is to achieve a waste-to-energy contribution of 20% of collected waste by 2026 (Business Monthly, 2022e).

3.2 Private Sector Initiatives in Egypt

The concept of sustainable finance was highlighted by the 2015 Paris Agreement, specifically in Article 2, paragraph 1(c), which stresses the importance of financial activities aligning with efforts to lower greenhouse gas emissions and promote economic resilience in response to climate change. Green and sustainable finance sectors guarantee that investments and projects support creating a sustainable, low-carbon environment. In the future, low and middle-income countries will face the primary difficulty of securing adequate funding for increasing green initiatives.

The establishment of the Sustainable Finance Committee by the Federation of Egyptian Banks, under the leadership of Dr. Dalia Abdel Kader, represents a significant initiative in light of Egypt hosting COP27 in Sharm El-Sheikh in November. This committee comprises distinguished individuals from various banking sectors, including risk and credit departments, corporate finance, SME financing, financial inclusion, investment, banking services, marketing, and communications. The objective was to coordinate and bolster the endeavors of the Egyptian banking sector in raising awareness regarding global trends and developments in sustainable financing. The committee's overarching goal was to engage the banking sector in three key areas: environmental and community risk management, climate change mitigation, and the provision of banking products that finance emerging sectors across multiple domains, thereby optimizing profitability and aligning with the Sustainable Development Plan for 2019–2023. Moreover, institutions seeking to qualify must assess their carbon footprints, as international development institutions require the fulfillment of sustainability criteria as a prerequisite for securing funds with measurable returns. Consequently, sustainable finance becomes indispensable in promoting sustainable economic growth (Business Monthly, 2022c).

In collaboration with "DORNA," Al Ahram Beverage Company, under the supervision of the Ministry of Environment, has announced a partnership aimed at achieving a target of recycling 25% of its plastic PET production by the conclusion of 2022. Furthermore, it intends to increase its annual investments to attain the complete recycling of PET manufacturing by 2025. In addition to the environmental benefits, this collaboration allows Al Ahram Beverages to enhance the lives of 600 recycling employees in the May 15 area whose properties were devastated by the flooding in March 2020. In the energy field, ABC has commenced using green electricity derived from renewable sources, resulting in a 55% reduction in carbon emissions compared to the levels recorded in 2018. Moreover, in water, ABC has achieved "water balancing" by implementing efficient pivot irrigation methods rather than traditional flood irrigation, thus enhancing agriculture. ABC has made it a

priority to adhere to the decisions made at COP27 to meet global emissions targets by 2030 across all sectors (Business Monthly, 2022b).

4. Recommendations after COP27

Financing Climate Action: The Conference of Parties made decisions that emphasized the need for approximately four trillion dollars to be invested annually in renewable energy until 2030 in order to achieve net zero emissions by 2050 (IEA, 2022). The provision of this funding necessitates a transformation of the financial system and its structures and procedures, which includes the participation of governments, central banks, commercial banks, institutional investors, and other financial actors (UNFCCC, 2022a).

Concerns have been raised regarding the widening gap between the needs of developing country Parties, particularly those resulting from the increasing impacts of climate change and their increased debt, and the support provided for their attempts to implement their nationally determined contributions. It is important to note that these needs are now estimated to be between USD 5.8 and 5.8 trillion before 2030, according to the United Nations Framework Convention on Climate Change (UNFCCC). Concerns have been raised concerning the developed country Parties' pledge to raise one hundred billion dollars annually by 2020 in the framework of mitigating measures. All of the commitments that have not yet been fulfilled. However, decisions must be made soon (UNFCCC, 2014).

To enhance mitigation efforts and address inequities in access to finance, including its costs, terms and conditions, and the economic vulnerability of developing countries to climate change, developed countries and other sources must provide accelerated financial support for developing nations (IPCC, 2022). According to the United Nations Framework Convention on Climate Change (UNFCCC), more significant public funds for mitigation and adaptation in vulnerable countries, particularly in sub-Saharan Africa, would be feasible and would have substantial social benefits regarding access to critical energy.

The global climate finance flows are insufficient compared to the total needs of developing nations, with expected flows of USD 803 billion for 2019–2020 (UN Framework Convention on Climate Change, 2014). 31–32% of the necessary yearly investment is needed to keep global warming well below two °C or at 1.5 °C, and lower than anticipated based on identified investment opportunities and the cost of not achieving climate stabilization objectives. Requests are made to investors of multilateral development banks and international financial institutions to adjust global development bank practices and priorities, increase funding, simplify access, and gather climate finance from different sources. It also urges global development banks to establish a new vision and corresponding operational model, channels, and instruments appropriate for effectively tackling the global issue of climate change.

Net-zero Coalition: Achieving net zero involves reducing greenhouse gas emissions to the lowest possible level, ideally reaching zero. The Earth is said to have warmed by 1.1 °C compared to temperatures in the 1800s. The emissions are still increasing. Countries must decrease their emissions by 45% by 2030 to achieve net zero by 2050 and limit global warming to 1.5 degrees (UNFCCC, 2022b). During COP27 on November 8, an expert group appointed by UN Secretary-General António Guterres in March 2022 introduced a 10-recommendation agenda. The main goal is for non-state actors to publicly pledge to achieve net-zero emissions and to contribute a proportional share to global climate mitigation efforts. The pledge should include interim targets for 2025, 2030, and 2035 and strategies to achieve net zero emissions following IPCC or IEA pathways by 2050 or earlier, and they should be maintained after that. The High-Level Expert Group (n.d.) also suggested developing a transition plan, phasing out fossil fuels, expanding renewable energy, coordinating lobbying efforts, and speeding up the regulation process.

Climate Adaptation: Climate change is an undeniable reality. Moreover, although countries are working to reduce emissions and mitigate global warming, it is imperative that

we also begin to adjust to the climatic impacts in order to safeguard ourselves. Countries at COP26 approved the Glasgow Climate Pact, which includes a provision to increase financial assistance to developing nations for climate change adaptation (Jacobs, 2022). Glasgow implemented a work endeavor to set a global adaptation goal. The work program should have addressed the requirements and remedies for numerous countries' climate emergencies (Nations, 2022a). There was significant worry about the disparity between present adaption levels and the levels needed to alleviate the negative impacts of climate change. COP27 urges Parties to implement a novel approach to enhance adaptive capacity, bolster resilience, and diminish susceptibility to climate change. The decadent country Parties are urged to enhance their support in climate finance, technological transfer, and capacity-building for adaptation to assist developing nation Parties. The "Least Developed Countries Fund" and the "Special Climate Change Fund" both assist poor nations in making efforts to address climate change. Developed countries are also urged to boost their donations to the two Funds.

The Conference of Parties emphasizes the importance of protecting, preserving, and rejuvenating water resources such as river basins, aquifers, and lakes. Furthermore, it encourages Parties to integrate water into their adaptation initiatives (UNFCCC, 2022b). Early alert and methodical monitoring: Flaws exist in the global climate observation system, particularly in poorer nations, and must be resolved. Thirty-three percent of the world's population, with sixty percent in Africa, does not have access to early warning and climate data services. The COP27 focused on enhancing the coordination of activities within the systematic observation community to deliver valuable climate data for mitigation, adaptation, and early warning systems. It also emphasized the importance of data for understanding adaptation limitations and attributing extreme events. They supported the United Nations Secretary-General's request on World Meteorological Day, March 23, 2022, to fully incorporate early warning systems for extreme weather and climate change within five years. They urged development partners, international financial institutions, and organizations involved in the Financial Mechanism to assist in implementing the Early Warnings for All initiative (UNFCCC).

Renewable Energy: Energy is seen as the crucial element in addressing the climate crisis. Energy generation involving the combustion of fossil fuels generates a significant quantity of greenhouse gasses. Scientists have stated that emissions must be decreased by over 50% by 2030 to achieve net zero by 2050. This can only be accomplished by investing in additional renewable energy sources that are accessible, affordable, and sustainable. 80% of world energy production is attributed to Fossil Fuels. Renewable energy accounts for approximately 29% of electricity generation, sourced from sun, wind, water, and geothermal heat (Nations, 2022c).

During COP27, it was stressed that all Parties must make immediate, significant, quick, and sustainable reductions in greenhouse gas emissions across all sectors. The global energy crisis highlights the urgent necessity to swiftly enhance the reliability and resilience of energy systems by accelerating the shift to renewable energy during this crucial period. The importance of enhancing a clean energy mix, incorporating low-emission and renewable energy sources at all levels to diversify energy mixtures and systems in different national contexts was emphasized (UNFCCC, n.d.).

Loss and Damage refer to the adverse effects of climate change that occur even after efforts to mitigate and adapt to it. During COP27, it was classified as either economic or non-economic. Economic loss and damage refer to adverse effects that may be quantified, such as the expenses incurred in reconstructing infrastructure after flood damage or the income lost from crops devastated by drought. Non-economic impacts are adverse effects that are challenging to quantify, such as psychological distress from encountering a tropical cyclone, disruption of communities due to population displacement, decline in biodiversity, influence on cultural heritage, human migration, and impacts on local community well-being and sources of income (Nations, 2022b). The need to provide an appropriate and effective response to loss and damage was highlighted. There is worry

about the significant financial costs incurred by developing countries due to loss and destruction, leading to an increasing debt load and hindering the attainment of the Sustainable Development Goals (UNFCCC, 2022b).

Initial attention was focused on financial systems for loss and damage and the negative impacts of climate change. The decisions discussed in the fourth session of COP27 were approved under agenda item 7 and received applause. The decisions set up the organizational structure of the Santiago network to help with its complete execution, including supporting its necessary role in providing technical assistance for adopting suitable techniques at the local, national, and regional levels in developing nations. Individuals are susceptible to the adverse effects of climate change. The commitment to choose the host of the Santiago network's secretariat by 2023 will be recognized through a selection process that is open, transparent, fair, and unbiased, following the guidelines in paragraphs 17–18 of decisions discussed in the Draft decision proposed under agenda item 7 of COP27 during its twenty-seventh session (Draft decision, n.d.-a, n.d.-b).

5. Our Recommendations

While COP27 has covered several topics and introduced multiple recommendations to mitigate these topics, there are still some areas where additional recommendations are needed to address the challenges.

Technology transfer: Access to clean energy technologies is crucial in transitioning to a low-carbon economy. COP27 may have missed discussing clear and specific recommendations on the technology transfer mechanism from developed to developing countries. Developed countries can make technology transfer more applicable by providing developing countries with the best practices and tools and organizing workshops, conferences, and other events to share their expertise in deploying clean energy projects. They can also encourage collaboration with their international organizations. Meanwhile, developing countries can work on the policies and frameworks that regulate the deployment of clean energy technologies and create an appealing environment for other countries to invest in.

Carbon pricing: There were no clear recommendations at COP27 regarding carbon pricing. It is an efficient policy tool that puts a price on greenhouse gas emissions to encourage company owners and individuals to reduce their carbon footprint. To encourage people to adopt this policy, governments should raise awareness of the benefits carbon policy can offer in economic, social, and environmental fields. This can also be encouraged by providing economic incentives from the government to businesses and individuals that reduce their greenhouse gas emissions. Furthermore, technical assistance should be offered from other countries that have already led this initiative to encourage governments to apply the policies. Technical expertise can help design and implement the policy by providing training and capacity-building support.

Climate information services (CIS): It is a crucial tool to support climate adaptation and mitigation and should be encouraged by all countries. In order to ensure its effectiveness, it is vital to encourage collaborations and partnerships among a wide range of sectors and stakeholders, especially researchers and practitioners. It is also essential to make it accessible by developing a user-friendly and constantly updated platform to be sustainable over the long term.

Climate Education: The road of climate mitigation and adaptation starts with people realizing its importance. Many conferences, including COP27, addressed the importance of climate education without a specific application plan. Climate education programs should be tailored based on their audiences, such as school students, company owners, or policymakers. In this way, it is more efficient to reach the audience's way of thinking and ensure the information is relevant to them. It should also include more civic work, not only theoretical data, to encourage individuals to engage in climate change mitigation.

6. Conclusion

Egypt was among the first countries to start transitioning to a green economy by taking governmental and public sector steps towards a greener future and presenting its updated Nationally Determined Contributions (NDCs). The revised NDC is by Egypt's developmental and climate change policies, based on Egypt's sustainable development plan outlined in Egypt's Vision 2030. Egypt's strategic importance in Africa, the Mediterranean, and the Arab world and its strong international connections motivated a shift from making promises to taking action and seeking tangible solutions to address climate change, building on past COPs. The administration assumed a more prominent role by coordinating the 27th Conference of the Parties to the United Nations Framework Convention on Climate Change (COP27). Egypt achieved a crucial milestone during COP27 by creating a new fund for loss and damage, benefiting countries at risk from climate change.

Authors Contribution
Hagar Hammad: study design & and concept, data analysis and interpretation, drafting
Yara Hossam: literature search, data collection, drafting
Mohamed Mahmoud: critical revision, incorporation of intellectual content
Irene S. Fahim: literature search, visualization, drafting

Conflict of Interests/Disclosures
The authors declared no potential conflicts of interest regarding the research, authorship, and/or publication of this article no funding source.

References

Business Monthly. (2022a). AL-Ahram Beverages company is fighting climate change through its production and serving community. *The Journal of the American chamber of commerce in Egypt*, *Egypt: AmCham* (November), 3. https://businessmonthlyeg.com/magazine-issue/

Business Monthly. (2022b). AL-Ahram Beverages invest in PET Recycling In partnership with DORNA. *The Journal of the American chamber of commerce in Egypt*, *Egypt: AmCham* (September), 8. https://businessmonthlyeg.com/magazine-issue/

Business Monthly. (2022c). Egypt's First Updated NDC Mitigation & Adaptation Targets. *The Journal of the American chamber of commerce in Egypt*, *Egypt: AmCham* (September), 36-37. https://businessmonthlyeg.com/magazine-issue/

Business Monthly. (2022d). How Can Geopolitics Hamper Climate Goals at COP27. *The Journal of the American chamber of commerce in Egypt*, *Egypt: AmCham* (October), 16-19. https://businessmonthlyeg.com/magazine-issue/

Business Monthly. (2022e). Prioritizing the Adoption of Strong Environmental, Social and Governance Measures: "Sustainable Finance" A Strategic Path for Mashreq Bank". *The Journal of the American chamber of commerce in Egypt*, *Egypt: AmCham* (September), 2-4. https://businessmonthlyeg.com/magazine-issue/

COP27. (n.d.). *COP27 official*. Retrieved February 27, 2023 from https://cop27.eg/#/

Cornes, G. (2022). COP26 Debrief: The Good News and the Very Bad News. *Political Insight*, *13*(1), 22-25. https://doi.org/https://doi.org/10.1177/20419058221091634

Draft decision. (n.d.-a). *Santiago network for averting, minimizing and addressing loss and damage under the Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts.* Aagenda item 7 of the Conference of the Parties 27th Session, Paris.

Draft decision. (n.d.-b). *Santiago network for averting, minimizing and addressing loss and damage under the Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts.* Aagenda item 7 of the Conference of the Parties: Paris Agreement 4th Session, Paris.

ERRADA. (n.d.). *Egyptian regulatory reform and development activity – better regulations, less bureaucracy, more Digital Services*. Retrieved December 10, 2022 from https://www.errada.gov.eg/

He, J., Li, Z., Zhang, X., Wang, H., Dong, W., Chang, S., . . . Gu, A. (2020). Comprehensive report on China's long-term low-carbon development strategies and pathways. *Chinese Journal of Population, Resources and Environment*, *18*(4), 263-295. https://doi.org/https://doi.org/10.1016/j.cjpre.2021.04.004

High-Level Expert Group. (n.d.). Net Zero Emissions Commitments of Non-State Entities. In. Integrity Matters: Net Zero Commitments by Businesses, Financial Institutions, Cities and Regions.

IEA. (2022). *World Energy Outlook 2022*. US: International Energy Agency (IEA). https://www.iea.org/reports/world-energy-outlook-2022

IPCC. (2022). Summary for Policymakers. In H Pörtner et al (Ed.), *Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge: Cambridge University Press. https://doi.org/https://www.ipcc.ch/report/ar6/wg2/

Jacobs, M. (2022). Reflections on COP26: International diplomacy, global justice and the greening of capitalism. *The Political Quarterly*, *93*(2), 270-277. https://doi.org/https://doi.org/10.1111/1467-923X.13083

Lim, A. M., Balsari, S., & Hung, K. K. (2022). COP 26, climate change, and emergency medicine: What must we do? *Hong Kong Journal of Emergency Medicine*, *29*(2), 69-71. https://doi.org/https://doi.org/10.1177/10249079221081561

Nations, U. (2022a). *Loss and damage: A moral imperative to act*. United Nations. Retrieved February 22, 2023 from https://www.un.org/en/climatechange/adelle-thomas-loss-and-damage

Nations, U. (2022b). *Net zero coalition*. United Nations. Retrieved February 22, 2023 from https://www.un.org/en/climatechange/net-zero-coalition

Nations, U. (2022c). *Renewable energy: Powering a safer future*. United Nations. Retrieved February 22, 2023 from https://www.un.org/en/climatechange/raising-ambition/renewable-energy

Perez, N. D., Kassim, Y., Ringler, C., Thomas, T. S., ElDidi, H., & Breisinger, C. (2021). *Climate-resilience policies and investments for Egypt's agriculture sector: Sustaining productivity and food security*. International Food Policy Research Institute. https://doi.org/https://doi.org/10.2499/9780896294189

Qalaa Holding. (n.d.). *Home Page - Qalaa Holdings*. S.A.E. Retrieved December 10, 2022 from http://www.qalaaholdings.com/

SLOCAT. (2022). Global Transport and Climate Change: Transport and Climate Change Global Status Report. In *Partnership on Sustainable, L. C. T.*

UK Green Building Council. (2019). *Net Zero Carbon Buildings: A Framework Definition Advancing Net Zero Programme Partners Lead Partner*. Programme Partners. https://www.ukgbc.org/ukgbc-work/net-zero-carbon-buildings-framework

UN Framework Convention on Climate Change. (2014). *UNFCCC Standing Committee on Finance: 2014 Biennial Assessment and Overview of Climate Finance Flows*. Retrieved February 3, 2023 from http://unfccc.int/files/cooperation_and_support/financial_mechanism/standing_committee/application/pdf/2014_biennial_assessment_and_overview_of_climate_finance_flows_report_web.pdf

UNFCCC. (2014). *UNFCCC Standing Committee on Finance*.

UNFCCC. (2022a). *Egypt's First Updated Nationally Determined Contributions*. Retrieved February 2, 2023 from https://www.preventionweb.net/files/57333_egyptiannationalstrategyfordrrengli.pdf

UNFCCC. (2022b). *Sharm el-Sheikh Implementation Plan - COP27. Sharm El-Sheikh Climate Change Conference*. 1-10. Retrieved February 2, 2023 from https://public.wmo.int/en/our

UNFCCC. (n.d.). *Determination of the needs of developing country Parties*. Retrieved February 2, 2023 from https://unfccc.int/topics/climate-finance/workstreams/needs-report

World Bank Group. (2018). Municipal solid waste management a roadmap for reform for policy makers.