ALTERNATIVE POLICY SOLUTIONS

BACKGROUND PAPER

Just Energy Transition in Egypt

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Alternative Policy Solutions

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Alternative Policy Solutions is a non-partisan, public policy research project at The American University in Cairo. Using rigorous, in-depth research and a participatory process of consultations with a diverse range of stakeholders, we propose evidence-based policy solutions to some of the most difficult challenges facing Egypt. Our solutions are innovative, forward-looking and designed to support decision makers’ efforts to introduce inclusive public policies.

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1. Summary

A just energy transition is crucial for Egypt for several reasons. First, the transition from energy deficiency to a surplus created by access to new forms of energy, such as natural gas, requires an overall energy management program to optimize the fuel mix and ensure efficient use of resources. Second, by determining the optimal rate of development of new energy sources and using energy exports to alleviate balance of payment problems, a just energy transition would help address social and economic needs. A significant scaling up of renewable energy in order to decrease the carbon intensity of the energy sector and reliance on fossil fuels would reduce greenhouse emissions and help Egypt meet its commitments under the Paris Agreement, transitioning the country to a low carbon development path. A just energy transition would also reduce exposure to external price shocks and position Egypt as a clean energy hub in the region.

2. Introduction

Economic inflation has plagued Egypt recently with the US dollar currently pegging 30 Egyptian pounds, with supply chain ramifications that are still being seen. This is in comparison to 15 EGP to the USD only two years ago in 2021. The Russian war in Ukraine has exacerbated global economies as well as placed pressure on Europe for energy security away from Russian gas and propagated a spillover effect of German coal plants being re-opened for the first time since 2020 (Reuters, 2022) As the world looks towards decarbonization to meet the Paris Agreement on Climate Change, the state of national and global affairs forces us with a challenging reality to do so. An energy transition in many countries, both developed and developing alike, come with an ensuing suite of factors including trade agreements, subsidies, financing and cost incursion, technology transfer, infrastructure capabilities, human resources and capacity building, natural resource availability and/or scarcity, and stakeholder engagement. While an energy transition is significant to reduce carbon emissions and meet Paris Agreement targets of 1.5 degrees Celsius, it is imperative that this happens in a just manner that incorporates the needs of the most vulnerable, and leaves no person behind. A just energy transition ensures that individuals, groups and communities at the frontlines of energy production, carbon-intensive industries and the climate crisis receive the benefits of a transformation to a clean energy economy. This would be achieved by diversifying the energy mix away from fossil fuels and investing in renewable energies like wind and solar, and through decarbonization efforts in high emission sectors like transportation and industry using technologies such as electric vehicles. Some of the immediate benefits of a just energy transition include improved energy efficiency, lower carbon emissions, new opportunities for local business to thrive, and local job creation.

In Egypt, the government holds substantial influence over the energy sector and how its transition is to take place. This doesn't negate the inclusion of many private sector actors, particularly in the development of renewable energy projects that are supporting this transition from a business standpoint. The development of large-scale renewable projects in Egypt, such as the Benban Solar Park in Aswan have paved the way for the private sector to assist the government through this transition.

Among the main obstacles to a just energy transition are the economic challenges that Egypt faces which compel it to focus on strategies that maximize immediate revenue. Natural gas extraction and production remains a priority due to heightened demand from Europe, triggered by the Ukraine crisis, as well as domestically – although most is exported. Environmental sustainability remains secondary to business and economic considerations despite the increased and urgent demands of climate change.

There are significant opportunities for thorough engagement with various stakeholders throughout

the process of a just energy transition. One opportunity could be working with and supporting think tanks and academic institutions that could fill the data gap and provide an advocacy platform through position papers to influence government strategies. Another is engaging youth groups and CSOs, which exist throughout the country and already understand the need for energy transformation and have boots on the ground to allow implementation in rural areas and not just urban centers. The business case that comes with moving to a just energy transition for a country like Egypt is another path of engagement.

The main objective of this paper is to provide a critical situational analysis of the energy sector in Egypt, and to highlight existing policy gaps. This paper examines the various facets of a just energy transition in Egypt and how it may be able to move forward.

The methods used in this background paper aim to review the literature available on the energy transition and/or the energy sector in Egypt, as well as to look at the national strategies and policies relevant to a just transition.

Energy transition background

A pivotal marker in COP28 held in Dubai at the end of 2023is the global stocktake. In 2015 the governments of the world agreed in Paris to limit increasing temperatures to 1.5 degrees Celsius by reducing their emission pathways (Paris Agreement). They all pledged emission reduction targets in their Nationally Determined Contributions (NDCs) that were submitted to the UNFCCC to see if this was sufficient. In Glasgow in COP26, it was calculated that the pledged NDC's would continue to heat the world by 2.8 degree Celsius, and that the countries would need to return back and update their NDC's to more ambitious targets for emission reductions to be calculated once again at COP28 in Dubai. Hence COP28 marks the point whereby the updated NDC's will be calculated at the Global Stocktake to determine if the emission pathways pledged are sufficient to limit increasing temperatures to 1.5 degrees Celsius. Last year, Egypt updated its NDC in the lead up to COP27 in Sharm El Sheikh and attempted to focus on green transition across the country with the momentum around COP.

Egypt has a significant role in the international and regional energy market, due to its geographic location in North Africa and in close proximity to Europe, and its central place in the Arab region and Africa. Egypt has the potential to become a hub for the export of clean energy across the Africa, Europe and the Middle East, with its unique climate and exemplary potential for solar radiation as well as wind power.

The 17 Sustainable Development Goals (SDGs) have all called for action on sustainability that can be directly or indirectly related to energy, but SDG 13 on climate action speaks directly to states to "take urgent action to combat climate change and its impacts by regulating emissions and promoting developments in renewable energy".

A just energy transition is important for a variety of reasons. The Alliance for a Just Energy Transition, supported by UNDP and WWF, has encouraged eight principles that need to be met for a just energy transition to take place (UNDP, 2023). These entail:

1. Be guided by science and understand the urgency to reduce emissions in line with the goals set out by the Paris Agreement.
2. Be fair and uphold the rights, needs and values of everyone. No single group should be privileged over others and the upfront costs must not fall on those with the least responsibility for climate change or ability to bear them.
3. Be sustainable, ambitious and consistent with wider holistic strategies that contribute to the energy transition needed to limit the global temperature increase to 1.5°C, or well under 2°C.

4. Be comprehensive, transparent and inclusive, which requires that just transition strategies developed at the national level be co-designed and implemented at the local level.

5. Ensure clearly-defined, robust and meaningful stakeholder engagement and social dialogue, including a specific focus on social protection and gender equality policies to promote equitable access to benefits.

6. Be centered on climate justice so that the burdens of climate change, as well as the costs of avoiding it, are shared fairly; both internationally and inter-generationally. Implementation of the transition must support jobs, local communities and improve human wellbeing in the developing world.

7. Recognize energy access as an essential contributor for social wellbeing, economic growth, and an enabler of sustainable development. Improved livelihoods and transformation of energy systems must enable large scale access to clean, safe and reliable energy to meet developmental needs of all.

8. Ensure access to justice, decision-making and information. Find a common approach to investment which upholds indigenous and local community rights. Recognition and implementation of the right to meaningful participation in energy transition decision-making processes for all stakeholders, acknowledging and compensating for differences in resources and capacity to engage.

The Paris Agreement (PA) aims to prevent the worst effects of climate change, limiting the temperature increase to well below 2 degrees Celsius above pre-industrial times. Between 2020 and 2030 global emissions should decrease by 7.6% per year to achieve the 1.5 degree Celsius scenario identified in the agreement. By 2050, global emissions would have to reach Net Zero (i.e., remaining emissions are compensated by natural or technological carbon sinks). We need to hold both governments and private sector companies, which are responsible for a significant share of emissions, accountable for these reductions. So far 1706 companies out of the 2000 largest publicly traded companies in the world have committed to net zero commitments. The Science Based Target Initiative (SBTI) creates guidance and certifies companies' targets for decarbonization. This is a lead partner of the "Business Ambition for 1.5 degree C campaign", which mobilizes companies to set net-zero science-based targets in line with a 1.5-degree C future. As we demand governments transition towards greener energies, we need to identify what the private sector is doing and how it aims to meet these targets as lessons learned.

Fossil fuel use is on the rise, with 70% of the increase in fossil CO2 emissions projected to come from natural gas by 2030 if current policies are not strengthened to align with the Paris Agreement goal of limiting global warming to 1.5°C. To meet this goal: No new investments should be made in natural gas exploration and production, unabated gas-fired power generation needs to be phased out in many countries by 2040, and globally by 2050, and total gas demand would need to decrease by 21%–61% from 2020 levels by 2050. Egypt currently has the highest energy consumption in North Africa.

The increase in Egypt's average temperatures has accelerated during the past two decades, dramatically raising energy demand for cooling during the summer. Climate projections show that Egypt will experience a higher level of warming than the world average by 2100 and face a significant increase in electricity demand due to more frequent extreme heat events coupled with urbanization and population growth (IEA Egypt, 2023). Rising ambient temperatures could add stress to power generation from natural gas, solar PV and wind, decreasing generation efficiency. The combination of increasing electricity demand for cooling and decreasing generation efficiency calls for a more resilient energy system (IEA Egypt, 2023).

Solar PV and wind power plants that are generally

designed for conditions of around 25°C could become less efficient in higher temperatures, such as 35°C. Climate projections show that over 80% of existing and planned solar PV capacity would experience over 20 more days per year with a maximum temperature above 35°C under a low-emissions scenario (Below 2°C) and over 60 days under a high-emissions scenario (Above 4°C) in 2080-2100 compared with 1850-1900. This is significantly higher than the world average, where less than 40% of solar PV capacity would be exposed to the same level (IEA Egypt, 2023). Similarly, wind power plants' level of exposure to a maximum temperature above 35°C is even higher: almost 100% of existing capacity would see an increase of over 20 days under a low-emissions scenario, and over 80 days under a high-emissions scenario. The exposure level of wind power plants to warming is particularly notable given that only 7% of wind power capacity around the world would reach that exposure level (IEA Egypt, 2023).

The combination of increasing electricity consumption for cooling and decreasing generation efficiency from gas, solar and wind power plants could add strain to Egypt's electricity systems. Climate resilience measures could help electricity systems cope better with the adverse impacts of rising temperatures and heatwaves; possible examples include incorporating climate impact assessment into energy planning, additional cooling systems for thermal power plants, innovative design to cope with higher temperatures, improved energy efficiency and behavioral changes.

Although Egypt has less than 80 mm of annual rainfall, flood risks have increased in some regions due to the high regional variability in precipitation which is projected to increase, especially in a high-emissions scenario, causing different results for two power generation technologies: natural gas power and hydropower (IEA Egypt, 2023). While most natural gas power plants in Egypt are projected to see a moderately drier climate with increasing competition for cooling water, hydropower power plants are expected to experience a slightly wetter climate with an increase in generation capacity factor by 2100 (IEA Egypt, 2023).

While most parts of Egypt have remained dry, the severity and frequency of flash flooding in some regions has increased in recent years. For instance, heavy rainfall in April 2018 flooded Greater Cairo causing power outages for over 20 hours. Similarly, in March 2020 heavy rains combined with strong winds hit several cities in north-eastern Egypt, damaging transformers, transmission lines and towers. Financial losses in the electricity sector due to this event exceeded USD 13 million (IEA Egypt 2023). Promoting climate-risk informed decision making is also critical to ensure that energy transitions are climate resilient. Given that Egypt is projected to face a notable increase in multiple climate hazards by the end of this century, decisions on future energy systems need to be informed by accurate information on climate risks and impacts.

Egypt is projected to experience a higher increase in annual mean temperature and extreme heat events than the world average, while facing an increasing variability in precipitation and a sea level rise. Climate projections show that certain locations can be more exposed to climate hazards and some energy technologies tend to be more vulnerable to such hazards. To minimize adverse impacts of climate change on energy security, decision makers in the energy sector need to consider climate risks when they determine the energy mix, locations, generation and cooling technologies, and strategies for operation and maintenance.

3. The Energy Sector in Egypt

Egypt has been working towards an energy transition. It is important to note that urgent action is needed to meet increasingly ambitious renewable energy targets, which must remain focused on affordability and accessibility. For instance, the Egyptian government set targets for renewable energy to constitute 20% of the electricity mix by

2022 and 42% by 2035. However, in 2021 renewable energy (including hydropower, wind, solar and other renewables) contributed just over 6%. Big strides must be made if these targets are to be met. By another estimate, approximately 8.8% of Egyptian households are in fuel poverty (Belaid 2022). Providing affordable, clean energy to these 9 million households will be vital to deliver climate targets in a socially inclusive manner.

We can look at neighboring Middle Eastern countries for examples and lessons learned. Emerging examples of working towards a more inclusive transition in the region include Jordan's net metering system which is funded through the country's Renewable Energy and Energy Efficiency Fund (PV magazine 2015). Under this program, Jordan gives loans to small consumers in rural communities (each with monthly electricity consumption of less than 600 KWh) to install a household solar PV system, leading to savings on electricity bills. Another example is Morocco's reform to maintain fossil fuel subsidies that particularly benefitted poor and rural communities, while reducing overall support for fossil fuels and reinvesting these savings in renewable energy projects that create sustainable jobs (WRI 2021). This paper will examine how responding to energy transition in Egypt entails also being inclusive of all stakeholders for a just transition that encompasses all.

3.1 Oil and gas

Egypt has been using fossil fuels as a primary source of energy. However, as Figure 1 shows, the trend has increased in Egypt while the rest of North Africa remains quite constant. This indicates that despite stated intentions to reduce carbon emissions, these countries are still headed towards an increase in oil production. For Egypt, oil and gas is the largest components of the energy mix as seen in Figure 2, with gas now surpassing oil.

Figure 1
Production of Fuel Oil in North Africa from 2016 to 2020

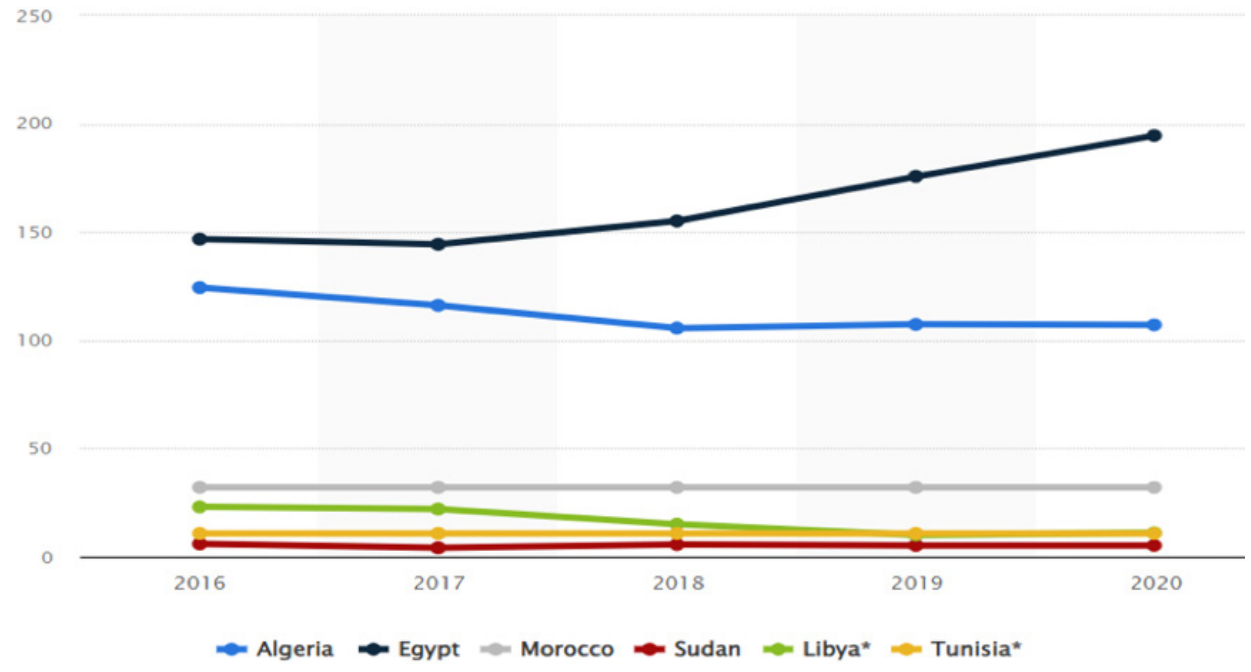
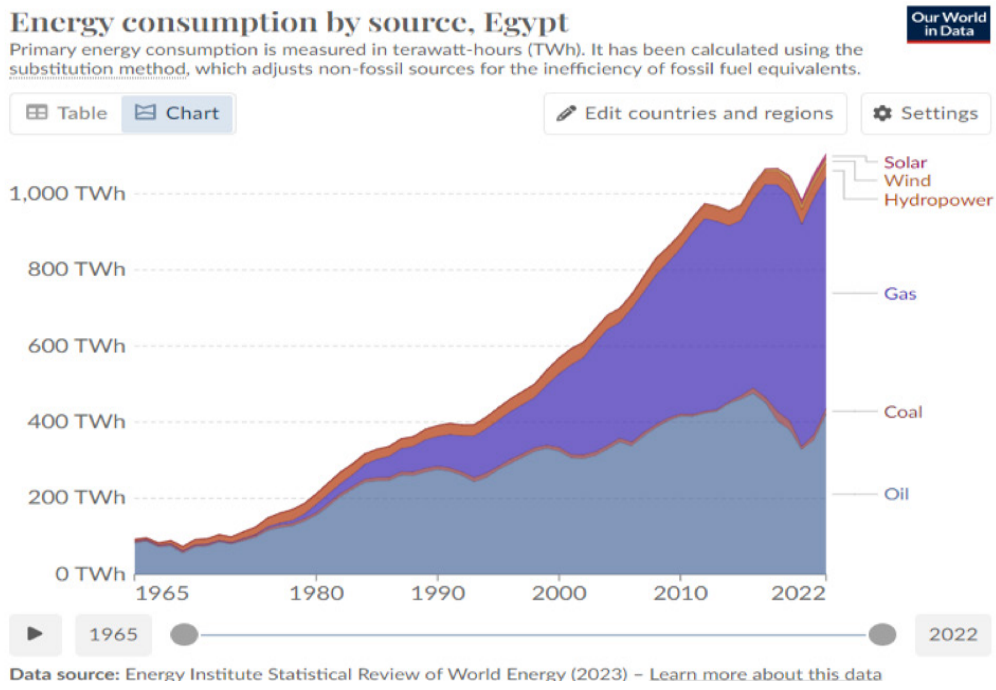


Figure 2

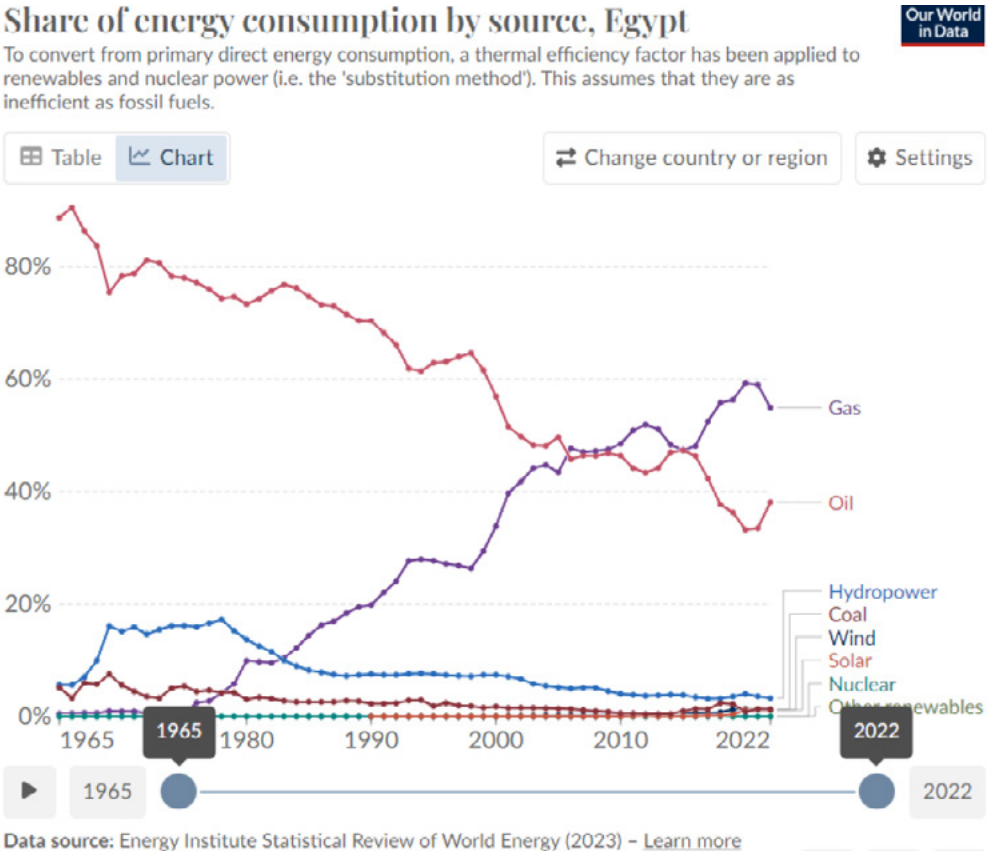
Energy Consumption by Source



Source: OurWorldinData, 2023 (https://ourworldindata.org/energy/country/egypt)

Figure 3

Share of Energy Consumption by Source



Source: OurWorldinData, 2023 (https://ourworldindata.org/energy/country/egypt)

Development strategies that rely on natural gas production and exports are risky, as the world is transitioning to zero emissions and future gas demand is subject to large uncertainties. Jobs in the fossil fuel industry are not secure: employment is estimated to fall by around 75% by 2050 under the ILO›s well below 2°C scenario. Investment in renewable energy value chains can unlock significant co-benefits for local development by growing the economy and creating more and potentially higher-quality employment opportunities in developing countries (Jaeger et al., 2021). Egypt is a large natural gas producer for the region and is expanding production even further.

Prices for natural gas are volatile and extremely sensitive to national and geopolitical developments. Prices in the European Union, for example, sharply increased to all-time-high levels in March 2022 following Russia's illegal invasion of Ukraine. Globally, the consumption of natural gas continues to grow with no signs of slowing down. The latest IPCC report states gas consumption grew by 15% between 2015 and 2019 (IPCC, 2022). This is incompatible with the Paris Agreement's 1.5°C temperature limit, towards which unabated natural gas in primary energy supply should already have peaked globally (Hare et al., 2021). The combustion of gas is responsible for about 20% of global energy-related CO2 emissions—or 7.2 GtCO2 e in 2019 (IEA, 2021a), and there are additional methane emissions from the extraction and transportation of natural gas.

Algeria hosts the second highest natural gas reserves in Africa after Nigeria, while Egypt has the third. Together Egypt and Algeria are ramping up their natural gas production with the assistance of Italian firms such as ENI (ECCO 2021). Italy is the main player through its state-controlled O&G company ENI, who leads fossil fuel production in Egypt and the Eastern Mediterranean region. One of the biggest risks is that the urgency of supply diversification opens new opportunities for O&G companies, led by ENI, as well as gas infrastructure operator and utilities, led by the Italian SNAM and Edison, to sign new agreements that justify new investment in gas exploration, production and infrastructure (in particular LNG terminals and pipelines, with a focus on the EastMed pipeline connecting Egypt to Europe via Israel, Cyprus, Greece and Italy), at the risk of derailing the climate agenda (ECCO 2022). ENI is currently being pegged as the firm providing "gas for peace" by providing natural gas to Europe from North Africa (ECCO 2021) due to the instability in Russia and Ukraine. In April 2022, ENI signed a deal with Egypt to increase gas production and exports to Italy (ENI, 2022). Egypt has the most extended pipeline network in Africa, with 2,000 kilometers (Global Energy Monitor, 2021c). The government reports 800 km of pipelines were constructed in 2014–2020 alone. A further 780 km of proposed pipelines are planned to be constructed, which would increase total pipeline infrastructure by around 40% (Global Energy Monitor, 2021c)

Egypt is responsible for over a third of total natural gas consumption in Africa. Close to 70% of its gas is used for electricity production (Climate Action Tracker 2022). The government has plans to expand natural gas production and to increase natural gas infrastructure across many sectors, including electricity and transport. Egypt's upstream natural gas production has increased again over the past few years. The Egyptian government has listed opportunities for new investments in the gas fields of Zohr, Nooros, North Alex and West Nile Delta (Government of Egypt, 2022). Some of the main international companies operating and investing in Egypt's upstream gas sector include ENI, BP, Shell, Petronas, Wintershall Dea and Rosneft (Global Energy Monitor, 2021c).

Although natural gas is booming in exploration as well as production for Egypt, it is important to note that it will not be able to assist people in poverty. Natural gas is not a transition fuel for the poor from an environmental, social, and economic perspective. First off, environmentally, gas is not a climate-friendly alternative to coal and oil. People living in poverty cannot enjoy a safe and secure

future that keeps warming as close as possible to the agreed safer limit of 1.5°C, without phasing out all fossil fuels. This includes gas, which is still a big emitter of greenhouse gases due to emissions from gas extraction and transportation processes, and fugitive methane emissions. Secondly, socially, natural gas is not necessary for development and industrialization. Hence developing gas will not increase energy access for people living in poverty or provide for energy demands linked to industrialization domestically as most of the gas produced is exported. In addition to this, developing gas has threatened other development goals. Lastly, economically, capitalizing on the increasing price of gas does not boost the economy of low-and middle-income countries. People living in poverty have generally not enjoyed the economic benefits of gas infrastructure. This is because most of the profits are captured by foreign multinational companies, while low- and middle-income countries unfairly take on more financial risks. Instead, the expensive cost of developing gas could deepen national debts and intensify poverty. We're seeing gas being uplifted as the solution to the climate crisis in the Africa Climate Summit, yet in reality, gas often brings more harm than benefits to the communities at the frontline of the climate crisis.

Estimates in Egypt's first updated NDC show that sea level rise may reach 1 meter in some coastal areas of Egypt. In this case several places in the Nile Delta, the northern coast and Sinai could be submerged by 2100 (IEA Egypt 2023). This is particularly alarming since 95% of Egypt's population lives in the Nile Valley and Delta and many energy infrastructure assets are located along the coast and in the Nile Delta. Respectively, 39% and 7% of installed gas and oil power plant capacity is located in areas below 10 meters above sea level. Most gas-fired power plants located in low-elevation areas (below 10 meters above sea level) are projected to be exposed to over 0.4 meters of sea level rise in a low-emissions scenario, and over 0.6 meters of sea level rise in a high-emissions scenario in 2081-2100 (IEA Egypt 2023). Oil refineries in coastal areas are also exposed to sea level rise and associated impacts such as storm surge and flooding. Around 50% of refineries in Egypt are located in low-elevation areas, which is higher than the world average (34%). Among the refineries in low-elevation areas, almost 70% are projected to be exposed to over 0.4 meters of sea level rise in a low-emissions scenario (Below 2°C)2 in 2081-2100 (IEA Egypt 2023).

It is important to note that Carbon Capture and Storage (CCS) may have an important role to play in hard-to-decarbonize sectors like iron and steel, but won't pay off for oil and gas companies without continuing government subsidies. The technology is being piloted particularly in countries of the GCC and potentially soon in Egypt.

3.2 Renewable energy

Egypt does not need to rely on gas to meet its energy needs, as it has abundant and cost-effective renewable energy resources. Increasing renewable energy in the power sector would lead to multiple benefits, including higher employment generation and reduced air pollution. It could also support Egypt's ambition to become a net electricity exporter.

Analysis shows that a high share of renewables in the power sector (82% in 2035) could create an additional 1.8 million jobs compared to the government's 2035 Energy Strategy—translating to nearly 130,000 additional jobs per year. A high share of renewable energy (82% by 2035) could also avoid more than 5,300 premature deaths linked to air pollution from natural gas in the next two decades compared to the 2035 Energy Strategy, which foresees over 50% of electricity to be generated with gas in 2035. "2035 Energy Strategy"

The Egyptian government's 2035 Energy Strategy assumes 42% of renewables and 55% of thermal likely mostly natural gas-based generation in 2035. The strategy presents a "High renewable energy scenario" in which 82% of Egypt›s electricity is

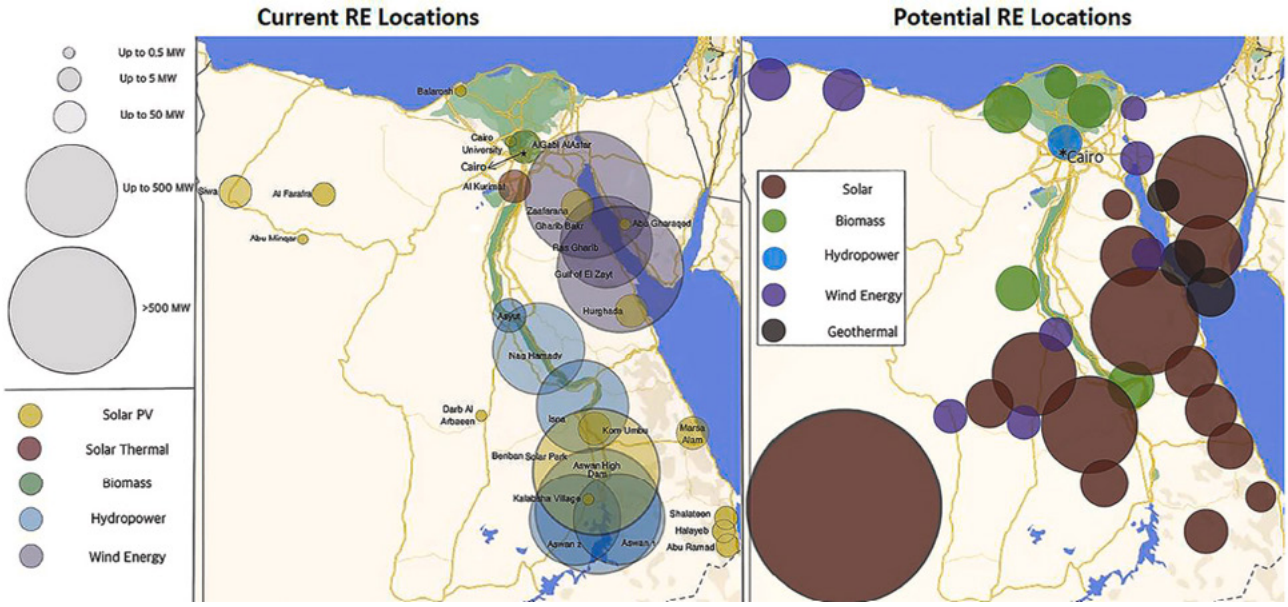
generated with renewable energy in 2035. This share of renewable electricity is within the global range provided in many of the 1.5°C compatible benchmarks for the electricity sector, and supports over 4.5 million 'job years' that is, full time equivalent employment for one person for a year over the period to 2035 or, on average, over 320,000 jobs per year. This is an additional 1.8 million job years compared to the government's current 2035 Energy Strategy pathway that foresees a share of 42% renewables in Egypt's energy mix. It is also over 910,000 job years more than those projected under the "increased renewable energy target" scenario, in which 62% of electricity supply is generated by renewables. The Egyptian government needs to prioritize developing a resilient, future-proof labor market and industrial competences in renewable technologies. Additionally, the health benefits of a higher renewables' scenario is paramount, as reducing Egypt's reliance on gas from 55% to 15% of electricity supply by 2035 can prevent more than 5,300 premature deaths amongst the country's population in the next two decades (Climate Action Tracker 2022). This translates into 177,000 years of life saved.

Egypt has the second highest rate of solar energy utilization in Africa after South Africa, and the thirty-first worldwide (IRENA, 2021). As for wind energy, Egypt generated wind power with a capacity of 5.4 MW and 545 MW from Hurghada and Zafarana wind farms, respectively, in 2001. At a reported cost of $6.8B, the Zafarana wind farm was completed in 2015 and has grown its capacity to 340 and 600 MW by 2017 and 2018, respectively. As a part of the strategy to increase wind power to 7.2 GW by 2020, the government intends to develop wind energy generation capacity during the next few years. In 2020, wind energy was responsible for 1.44% of the total produced electricity, making it the third-highest renewable energy source in Egypt (Salah et al, 2022).

Despite the relatively small contribution of Egypt to the African and the global RE market, Egypt has a power generation potential of 73,656 TWh/y through concentrated solar power (CSP) technology along with a potential of 7650 TWh/y via wind energy. This is followed by 36.0, 15.3, 25.7 and 80 TWh/y through photovoltaic panels (PV), bioenergy, geothermal and hydro power, respectively (DLR, 2005). Despite this, according to the most recent annual report issued in 2018 by the Egyptian Electricity Holding Company (EEHC), Egypt›s total current installed power generation capacity is around 54.5 GW. Of this total generation capacity, renewable energy accounts only for 10% (IRENA, 2018b). It is clear that the utilized RE sources in Egypt are not yet comparable to the existing potential, where Egypt›s geography, temperature, and wind speeds have placed the country in an ideal position for producing energy via renewable sources (Group E.I, 2014). At present, Egypt has set an ambitious objective of achieving 42% of its energy generation capacity from renewable sources by 2035 (known as the 2035 energy target).

Figure 4

Current and Potential Renewable Energy Map of Egypt



Source: Salah et al. 2022.

3.3 Hydrogen

Developing hydrogen infrastructure at scale will be costly and come with a range of challenges, particularly regarding regional water scarcity. The African Green Hydrogen Alliance, launched in May 2022, is comprised of Morocco and Egypt – key North African players – as well as Mauritania, Namibia, South Africa, and Kenya. North Africa should begin to focus on green hydrogen as a driver of industry, transportation, and infrastructure development as energy networks continue to expand. North Africa is a powerful exporting bloc of ammonia and fertilizers. Using green hydrogen to transition away from the capital and emissions intensive process which uses methane or coal as feedstocks for ammonia production towards green ammonia could support the region's export potential and energy storage capacity.

Commercial agreements for Green hydrogen expansion in the region include Energy China building a plant in the Suez Canal Zone in Egypt, which was signed at the COP27 Climate Summit (Enterprise 2023). In total Egypt aims to develop 19 green hydrogen projects within the Suez Canal Zone that are all still in various stages of signing and development. Scatec and Orascom have developed a green hydrogen 100 MW plant in Ain Sokhna that is already operational.

Green hydrogen is being pushed in the region primarily by Europe due to its close geographic proximity. However, the question of who benefits from green hydrogen is still open, as it utilizes the same resources needed for these countries to transition to a green economy, including renewable energies and desalination plants. As many of these countries have still not implemented and completed their renewable targets and are struggling to do so with the current economic climate, for green hydrogen plants to use the existing renewable projects for energy utilization becomes problematic. Additionally, green hydrogen requires freshwater for its processes, meaning proximity to a desalination plant that is already in use in a region that is already water scarce. This once again places pressure on the existing infrastructure of the region's limited desalination plants. Lastly, the storage and transportation of green hydrogen is still not fully safe and hence becomes issue when countries of this region are investing tremendous resources into a technology that may not be the best fit for them at the moment.

4. Just Energy Transition in Egypt

In Egypt, the National Climate Change Council (NCCC) was founded in 2015 as the national authority on climate change and a focal point for the UNFCCC. The same year, Egypt's first Nationally Determined Contribution (NDC) was released to the UNFCC which dictates its emission reduction pathways for the country. It covers the energy sector not only in terms of mitigation but also in the context of adaptation action packages. The document identifies challenges such as the negative impacts of rising temperatures on the efficiency of conventional power plants and photovoltaic cells; the risk of changing rainfall rates on hydropower generation; and the potential impact of sea level rise on power plants and networks located along the coasts. It proposed measures for adaptation, including an assessment of climate change impacts with the aim of finding safe locations for the construction of future power plants, together with building institutional and technical capacity and supporting research and technological development to enhance the climate resilience of the power sector (NDC Egypt 2015).

In May 2022, Egypt launched the National Strategy on Climate Change for 2050. As a sign of goodwill and in preparation of COP27, this strategy outlines some of the objectives that Egypt plans to take in order to mainstream climate change across its sectors. This Strategy is also in line with the Egypt Vision 2030 to coordinate across cross-cutting themes and sectors within the country. In July 2022, Egypt released its updated Nationally Determined Contributions (NDCs) to the UNFCCC. An NDC is a climate action plan to cut emissions and adapt to climate impacts with an emission reduction target in mind. Egypt›s NDCs to the Paris Agreement was submitted in 2017, yet an updated pledge was called for by all parties in Glasgow to increase ambition in GHG emission reductions to remain below 1.5 °C. This target is one that the COP Presidency has vowed to pledge ahead of COP27 as a faith of goodwill for all countries to do the same (Reuters, 2022). On July 18th 2022, Egypt released its updated NDCs online (Egypt NDC 2022). This section aims to provide an analysis of the National Strategy on Climate Change for 2050, to close the gaps as observed within the Strategy.

The updated NDC 2022 doesn't have a national target for emission reductions but only targets to be achieved by the sectors of electricity, transport and oil and gas. The NDC 2022 states that the energy sector should reduce emissions to 33% of the business as usual (BAU) scenario. This means that the target is to make emissions 33% of what they would be without mitigation (Egypt NDC 2022). It also states that it will reduce 7% emissions in the transport sector below BAU, and 65% emission reductions in the oil and gas sector below BAU levels. According to assessments, Egypt would need to reduce emissions by 25% by 2030 compared to today's levels if we are to remain below the 1.5 °C goal (Climate Action Tracker 2022). Thus, the NDC 2022 has been deemed insufficient to meet this target as of yet.

Egypt updated its NDC in June 2022, including a review of the implementation of adaptation measures proposed in the first NDC (NDC Egypt 2022). The updated NDC suggests additional adaptation actions in five sectors: water resources and irrigation; agriculture; coastal zones; urban development; and tourism. Although the climate resilience of the energy sector is not specifically addressed in the updated NDC, the cross-cutting measures such as the improvement of weather forecasting and early warning systems to minimize the impacts of extreme weather events and enacting structural anti-flood interventions, would contribute to the general enhancement of adaptation ability and resilience (NDC Egypt 2022).

Egypt has focused on climate change adaptation and resilience in many other national policies, such as the Sustainable Development Strategy: Egypt Vision 2030 launched in 2016, the National Climate Change Strategy 2050 published in 2022, and the National Strategy for Disaster Risk Reduction 2030 published in 2011 and updated in 2017.

The Sustainable Development Strategy: Egypt Vision 2030 (SDS) represents the national long-term political, economic and social vision for 2030. In this strategy, energy and the environment are identified as two of the ten key pillars. Under the energy pillar, energy security and carbon emissions reduction are emphasized, while the environmental pillar focuses on water management and coastal protection.

The National Climate Change Strategy (NCCS) 2050 was developed at the request of the NCCC, with the objective of creating a reference point for integrating the climate change dimension into general planning across all sectors in a way that supports the achievement of the country's desired economic and development goals with a low-emissions approach. In order to enhance Egypt's adaptive capacity and resilience to climate change and to alleviate the associated negative impacts, the NCCS proposes to enhance climate change action governance, preserve and expand green spaces, consider gender differences in adaptation programmes, enable policies and tools such as climate-risk insurance and green bonds, and integrate climate adaptation and resilience into infrastructure projects, minimizing loss and damage to the country's assets and ecosystems.

In the NCCS, the energy sector is seen as central to achieving sustainable economic growth and low-emission development in the country. It aims to increase the share of all renewable and alternative energy sources in the energy mix. The government has set a target for renewable energy to meet 42% of total electricity production by 2035, confirmed in both the NCCS and Egypt's updated NDC.

The National Climate Change Strategy (NCCS) 2050 proposes integrating climate resilience into infrastructure projects and diversifying power generation technologies. The National Strategy for Disaster Risk Reduction (NSDRR) 2030 recognizes the energy sector as one of the sectors most affected by disasters and proposes: financing for and investment in disaster risk reduction; creating a disaster risk fund; and enhancing preparedness, response, reconstruction and rehabilitation.

Although the climate resilience of the energy sector is not the exact target of such measures, the planned diversification of power generation technologies could also improve climate resilience by reducing dependency on a single energy source. Other measures proposed in the NCCS such as promoting small-scale decentralized systems, energy storage technologies such as batteries, and expanding interconnections, would also have positive effects by enhancing geographical diversification and improving energy sector climate resilience.

Besides climate and energy policies, climate resilience has been addressed in the National Strategy for Disaster Risk Reduction (NSDRR) 2030 with the objective of substantially reducing damage to critical infrastructure and disruption to basic services due to different types of disasters, including those related to climate change. The energy sector is presented as one of the most affected sectors, together with the environment, agriculture, water, housing and infrastructure. As one of the measures to enhance overall resilience, financing and investment in disaster risk reduction are suggested. Investment in renewable energy sources, the creation of a disaster risk fund, the incorporation of climate adaptation into national strategies and plans, and the implementation of disaster risk resilience projects are identified as indicators. In addition, enhancing preparedness, response, reconstruction and rehabilitation are also proposed.

Reviewing and tracking the progress of the identified adaptation measures of the NDCs, NCCS and NSDRR would contribute to successful implementation and help the energy sector improve its resilience measures further. In particular, monitoring achievements in climate change impact assessments, diversification of energy technologies, financing and investment in climate resilience, and institutional and technical capacity building, could provide a useful snapshot of the current status and

develop further actions to fill existing gaps. Making the energy sector decision-making process climate-risk informed will be also critical for climate change adaptation.

4.1 Review of the National Strategy on Climate Change

The Strategy identified five primary goals based on a SWOT analysis conducted by a consultant. The Strategy mentions that it is based on a review by and consultation of stakeholders, but does not mention the methodology by which this has been conducted nor who the consultation was done with. A more thorough explanation of the methodology and review of this Strategy needs to be conveyed to the public to allow for it to be an inclusive process. The five goals that underline the Strategy are discussed and their respective gaps are analyzed below. Each of the five goals will be explored in relation to a just energy transition in Egypt to understand how and if the Strategy is in alignment with what is actually happening on the ground in terms of implementation.

Goal 1: *Achieving Sustainable Economic Growth and Low-Emission Development in Various Sectors*. The main components of this goal include:

- Transforming the energy sector by increasing the share of all renewable and alternative energy sources in the energy mix
- Reducing emissions from the use of fossil fuels
- Maximizing energy efficiency
- Adopting sustainable consumption and production trends to reduce GHG emissions from non-energy activities

This goal is promising as it includes the shift to renewable energies which includes a renewable energy target of 42% by 2035. The updated NDC that was released in July 2022 states that Egypt is now looking to have renewable energy account for 40% of the energy mix by 2030 and will keep its 2035 target unchanged. The Strategy explains the plans to shift towards renewables and the need for that. The Strategy indicates that in order to reach Goal #1 low carbon fuel sources such as natural gas should be utilized (pg. 15, National Strategy 2050). It further indicates suggestions to increase the usage of natural gas such as converting cars to natural gas, delivering natural gas to homes instead of butane, and converting ships to operate on natural gas. As promising and ambitious as Goal #1 is towards reduction of GHG emissions, **the inclusion of natural gas as a transitionary fuel may prove to hinder the process towards low and zero emission pathways**. With the discovery of the Zohr field in the Mediterranean Sea several years ago, Egypt's development plans towards natural gas production are increasing, and do not encourage renewables nor incentivize their usage further.

The other point of contention within this Goal is that **it doesn't include an updated Nationally Determined Contribution (NDC) for Egypt**. In July 2022, Egypt released its updated NDCs online after the National Strategy was revealed (Egypt NDC 2022), and hence the Strategy does not include how the NDCs will be implemented. A pivotal part of the National Strategy on Climate Change however, entails including this target of GHG emission reductions, as well as ways to reach the target.

Goal 2: *Building resilience and adaptation to climate change and mitigating negative impacts associated with climate change*. The main components of the goal include:

- Protecting citizens from the negative health effects of climate change
- Reducing the loss and damage that can occur to country assets and ecosystems by preserving them from the effects of climate change
- Preserving the country›s resources from the effects of climate change
- Having flexible infrastructure and services in the face of Climate Change Impacts
- Implementation of disaster risk reduction concepts

- Preserving and expanding green spaces
- Strengthening women's ability/resilience to adapt to climate change

This goal focuses primarily on adaptation and resilience and looks at many hotspot areas in Egypt that require adaptation including coastal zone management, water stresses, and enhancing infrastructure such as sewage and drainage systems to withstand the extreme weather events in the face of climate impacts. This is important as since the frequency and intensity of storms and flash floods have increased in Egypt over the last few years, we have seen the devastation that it has caused across the country. **This is particularly important with respect to a just energy transition as the infrastructure that currently exists may be continuously at risk and exposed and hence a need for enhanced resilience of the infrastructure is necessary including energy grid lines, power distribution, power plants, etc.** As it typically used to rain only 80 mm of rain/yr in Egypt, the country was never set up with infrastructure to deal with stormwater drainage systems. With more of these frequent storms and floods, a need to develop stormwater drainage systems across the country has become a necessity for adaptation to climate change and better resilience of the country with its readiness in infrastructure.

Goal 2 also includes increasing green spaces in urban settings with afforestation. This is particularly promising as more and more trees have been cut down in urban centers to pave way for roadworks and various infrastructure (Arab Weekly, 2022; VOA, 2022), a point of contention amongst civil society groups that aim to plant more trees in urban settings to reduce temperatures and create a micro climate in these centers (Shagarha 2022). **The Strategy aims to adhere to this Goal for increasing green spaces, but does not describe how this will be implemented, nor does it discuss how it contradicts with the current existing state of cutting down trees in urban centers for infrastructure works.**

Goal 3: *Improving the governance and management of work on climate change*. The main components of this goal include:

- Define the roles and responsibilities of different stakeholders in order to achieve strategic objectives
- Improving Egypt›s position in the international arrangement on climate change measures to attract more investment and climate finance opportunities
- Sectoral policy reform needed to accommodate the interventions required to mitigate and adapt to climate change
- Strengthen institutional, procedural and legal arrangements such as the Monitoring, Reporting and Verification (MRV) system

This goal focuses on the governance aspect of climate change and how best to deal with its institutional needs. This includes establishing climate change units in all the relevant ministries to ensure climate change is mainstreamed across all sectors. The Strategy also includes "encouraging civil society to play a supervisory role in governance" (p. 29 National Strategy), but does not indicate how the modality or format of this will be done. Although this is promising, **there needs to be clear actions as to how the role of civil society in a supervisory role in governance is to take place. This is necessary for a just energy transition as civil society engagement is crucial in the process for a participatory approach.**

Goal 4: *Improving the infrastructure for climate finance.* The main components of this goal include:

- Promote domestic green banking, green credit lines
- Promote innovative financing mechanisms that prioritize adaptation actions, for example green bonds
- Participation of the private sector in financing climate activities and promoting green jobs

- Alignment with Multilateral Development Banks (MDB) Climate Finance Guidelines
- Building on the success of existing climate finance programmes

This Goal discusses the various mechanisms of climate finance and how to facilitate receiving finance from both international and national financiers. It also discusses providing capacity building for persons and agencies on grant writing to apply for climate finance, which is very useful for civil society actors and NGOs who may not have the capacity to do so. There is a need however to focus on providing finance to local NGOs in governorates that reach vulnerable communities, as much of the existing climate financing currently goes to either governmental agencies/ministries or towards projects in main urban centers such as Cairo and Alexandria, but very little financing is being received by the governorates (Climate Action Tracker 2022). **Decentralization of financing for climate projects is needed, so that CSAs that can reach vulnerable impacted communities and that support the move towards a just energy transition across the country.**

Goal 5: *Promoting scientific research, technology transfer, knowledge management and raising awareness to combat climate change*. The main components of this goal include:

- Enhancing the role of scientific research and technology transfer in mitigating and adapting to climate change
- Facilitating the dissemination of climate information and knowledge management among government institutions and citizens
- Raising awareness about climate change among different stakeholders (policy/decision makers, citizens, students)

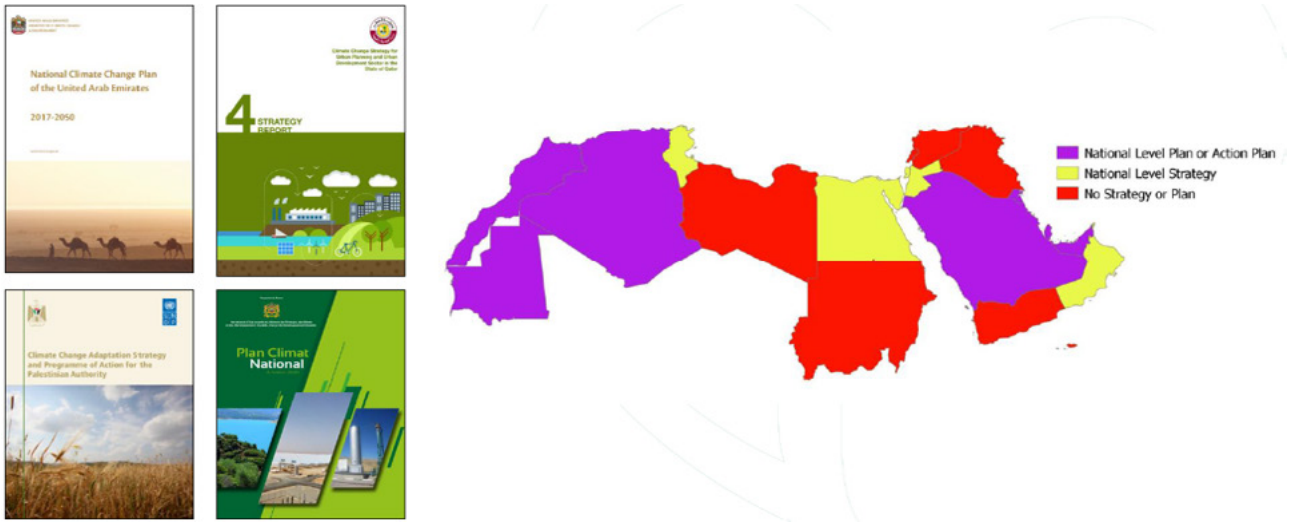
This Goal focuses on scientific research, but a major deficiency in the Strategy is ensuring that science is in fact demand driven by the society at large and not top-down imposed by policymakers. This is a huge gap within the scientific community at large, and closing the science-policy gap to ensure that policy makers are making decisions based on science, as well as ensuring that the science is reaching the policymakers is necessary particularly with an interdisciplinary issue such as climate change. **A just energy transition needs policies informed by science, and so bridging the science-policy gap with respect to energy is necessary, as is scientific research**.

4.2 Observations on the National Strategy on Climate Change

The development of this National Strategy on Climate Change by Egypt is a very progressive step forward. Several countries across Africa and in the region have already developed a National Action Plan on Climate Change, including Morocco, Algeria, Senegal, United Arab Emirates, and the Kingdom of Saudi Arabia. This is shown in Figure 3 of an assessment done by a local NGO in Egypt (Greenish 2022). Egypt's development of a National Strategy on Climate Change is promising, **there is a need to further develop this strategy into an Action Plan with concrete steps for implementation, as several others across the region have done**. The COP Presidency and the national teams should capitalize on the momentum to engage in climate change from all sectors and stakeholders, and to build on the Strategy towards a National Action Plan that is inclusive of all stakeholders and driven by demands from the most vulnerable people and communities.

Figure 5

Status of Climate Change Plans in the Region



Source: Greenish, June 2022

However, the lack of civil society involvement in the development of the Strategy is problematic, as the most vulnerable communities that NGOs and civil society are able to reach, have not been consulted in this process, as was vocalized during the consultations that took place between CSAs for this report. Although there is still a need for civil society engagement into the strategy's development, the strategy does identify civil society to aid in the "implementation of the strategy…through raising awareness about climate action and promoting the value of volunteer work" (pg. 8., National Strategy 2050). The inclusion of civil society is noteworthy, yet the vital role that civil society can still play has not been capitalized on or seized. **Civil society's role can go far beyond merely awareness raising, to policy development, project implementation on the ground, reaching vulnerable communities, providing sustainable services such as biogas and waste regeneration, and much more.**

The Strategy also focuses on the costs for adaptation and mitigation projects that are needed, but **the methodology of how the costs are calculated is not publicly mentioned in the Strategy and requires transparency**. The Strategy notes that the cost of mitigation is 211 billion USD, whereas the cost of adaptation is 113 billion USD (346 billion USD total). The updated NDC however states that its cost would no less than 246 billion USD. Mitigation will account for 196 billion n USD, while adaptation will cost 50 billion USD. **This disparity in the numbers and costs between the Strategy and the NDCs needs to be clarified, as the assumption remains that the 246 billion USD requested in the NDC is to come from climate finance externally, while the remaining 78 billion USD (minus the 346 billion USD from the Strategy) is to come from internal resources. This is still unclear and requires clarification**.

As we have consistently seen within the global community on climate financing one of the biggest problems is that 80% of the climate finance is going to mitigation, and only 20% to adaptation on a global scale. Here **in the Strategy the disparity is 66% to 34% for mitigation and adaptation respectively, but still far from the 50/50 target that we aim to strive for climate finance, as mandated by the Green Climate Fund (GCF 2022)**. This is particularly important for a developing country like Egypt whose focus on adaptation is necessary for resilience to climate impacts. Egypt would certainly require more financing for adaptation and Loss & Damage, and the Strategy should reflect this. **In relation to a just energy transition, mitigation financing appears to be more meaningful to invest in renewable energies accordingly, however adaptation financing is just as**

important for a just energy transition to ensure that communities are able to adapt to livelihood changes caused by a move away from fossil fuel industries and into green jobs.

At COP27 Egypt pitched four main projects worth USD 17.4 billion for climate finance investment. With 6 billion already secured, the remaining USD 11.4 billion is sought for in new investments ahead of the COP (Climate Home News 2022). These four projects entail 1) USD 10 billion to decommission 17 inefficient fossil-fuel power plants and replace them with solar and wind power; 2) Build electric light rail transit (LRT) in Cairo and Alexandria (6 billion already secured for this); 3) Climate proofing the agriculture sector with USD 800 million to build crop resilience in Nile Valley and Delta; and 4) Build six new solar desalination plants with USD 600 million. Within Goal #1 of the Strategy to head towards a low-emission pathway, projects 1, 2 and 4 are mitigation related projects that are seeking financing in this regard to move in this trajectory, while project 3 is intended for adaptation. This further affirms the inconsistency with the National Strategy to have a varying disparity in attention towards mitigation projects vs. adaptation projects. In addition to this, none of these projects that are being pitched for climate finance incorporate the civil society. This needs to be a pivotal part of climate finance projects across the country. **However, in relation to a just energy transition we can see that the three projects related to mitigation are all calling for decarbonizing the sector and moving towards more sustainable energy practices that will assist in the energy transition in this regard**.

Based on the above review and analysis of Egypt's National Strategy on Climate Change and its NDC, several observations to move forward have been put forward. These include:

- The National Strategy on Climate Change 2050 needs to be turned into a National Action Plan on Climate Change with concrete plans of implementation.
- A pivotal part of the National Strategy on Climate Change entails including the NDC pledge of GHG emission reductions, as well as the ways in which to reach the target. The Strategy does not tackle the updated NDC as it was released afterwards.
- A need for decentralization of financing for climate projects is needed away from the main centers to go to other governorates.
- A need to focus on providing finance to local CSAs that can reach vulnerable communities impacted by climate change.
- In the Strategy the disparity is 66% to 34% for mitigation and adaptation respectively, but still far from the 50/50 target that we aim to strive for climate finance and as mandated by the GCF.
- The Strategy states that 346 billion USD will be needed for climate finance, whereas the updated NDC states that it would need 246 billion USD. This disparity in the numbers and costs between the Strategy and the NDCs needs to be clarified, as the assumption remains that the 246 billion USD requested in the NDC is to come from climate finance externally, while the remaining 78 billion USD (minus the 346 billion USD from the Strategy) is to come from internal resources. This is still unclear and requires clarification.
- There is a need to call on the National Strategy to ask for additional adaptation support as it is too low as it stands.
- Fear of natural gas as a transition fuel in the National Strategy on Climate Change 2050 that would hinder a zero-carbon transition. This needs to be outlined with a clear phase out timeline.
- The National Strategy on Climate Change 2050 needs to be developed with the inclusion of civil society and all stakeholders.
- A more thorough explanation of the methodology and review of the National Strategy needs to be conveyed to the public to allow for it to be an inclusive process.

- The National Strategy aims to adhere to increasing green spaces, but does not describe how this will be implemented, nor does it discuss how it contradicts with the current existing state of cutting down trees in urban centers for infrastructure works.
- There needs to be clear actions as to how the role of civil society in a supervisory role in governance is to take place.
- The methodology of how the costs are calculated is not publicly mentioned in the National Strategy and requires transparency.
- CSAs to create a platform to be a watchdog on environmental issues and be able to collaborate on common causes (i.e., phasing out coal in Egypt, banning plastic, planting more trees, etc.)
- Develop case studies as examples of community work on climate change to show how climate finance can be utilized accordingly.

4.3 Stakeholder engagement

Civil Society has come in at many junctures to assist society in propelling issues forward of concern as well as assisting the government in doing so if possible. They are usually any non-profit, voluntary citizens› group which is organized on a local, national, or international level. In the context of energy transition, these stakeholders are responsible for managing the chronic impacts of energy transition that hit many local communities across the globe, in addition to leading significant advocacy efforts on how it should be done. However, the ability of civil society to execute community development and resilience-building efforts is largely dependent on the civic engagement space provided in their respective context. The role and importance of civil society in empowering and supporting communities to find just ways to make energy transition smooth, fair, and just for all. Ultimately, the socio-ecological transformations required for this in terms of policy, behaviors, and corporate activity, will only happen with a strong and consistent social mandate (Kamal et al, 2023). To create a social mandate, it is critical to create social narratives that resonate with values and identities across society, which are propagated by trusted messengers, supported by local norms, and focused on appropriate action. An effective social mandate is only possible if pursued in a rooted approach, led by local experts, who can safely facilitate space for the coming together of different actors around this systemic challenge (Kamal et al, 2023).

5. Conclusions

The National Strategy on Climate Change 2050 as well as Egypt's updated Nationally Determined Contribution (NDC) were positive steps in the right direction before COP27 and to ensure Egypt's transition to reduce emissions. However, the steps that have been identified have shown that Egypt is headed towards a low carbon economy vs. a zero-carbon economy. The latest IPCC report (2022) has identified that we have less than ten years before we use up our entire carbon budget and reach a no-return threshold with respect to catastrophic climate events. , which causes an impending sense of urgency to act now. Many would argue that in these circumstances, that the world including Egypt does not have the time to first transition to a low carbon economy, and then to a zero-carbon economy, as there simply isn't enough time or resources at our disposal to do so. Financially we have seen the burdens with trying to ensure that the USD 100 billion/yr climate finance gets disbursed to the Global South and have still not yet been fully committed. Thus, the argument is to put the resources at our disposal towards a zero-carbon transition instead of a low carbon transition due to limited time and finances. On the flip side of the argument, there is a climate justice and equity debate that notes and emphasizes the need to put the burden of climate change on the Global North who caused this problem, and that the Global South still needs to develop and should not have to bear the burden of this zero-carbon transition on their own. Although both sides pose valid and legitimate arguments, it now becomes

a question of global political will, as well as ambitious domestic climate action on the ground that defines how we move forward.

Egypt has seen a recent expansion in its environmental and climate change civil society sector, notably in 2022 during the UNFCCC COP27 held in Sharm El Sheikh, Egypt. This event encouraged various previously unengaged civil society and private sector entities to become more involved in the environmental space. Yet, civil society›s influence on the climate agenda remains sparse. The UNFCCC conferences held in Egypt and Dubai have opened up discussions about the necessity for change. It›s worth noting that the civil society sector in the region is generally under-resourced, . In addition, much of the financing to CSOs is directed to urban center NGOs and little is directed to rural based NGOs that can make a difference with respect to climate mitigation and adaptation on the ground.

Despite these hurdles, we see echoes of global trends where civic spaces are under pressure. A regional movement is emerging that aims to monitor and influence the policies of International Financial Institutions (IFIs). These actors are pushing for greater transparency and access to information regarding investments made in their own countries.

Main gaps in policies

Its important to outline what some of the main gaps are in policies across the country that have created a bottleneck towards a just energy transition across Egypt.

1. Removal of fossil fuel subsidies to make renewable energies competitive at cost. One of the main challenges for a just energy transition is that fossil fuels are still considerably cheaper than renewable energies. Thus no matter how much renewable energies are incentivized and supported by multilateral banks and financing arrangements, if the government does not remove the fossil fuel subsides, renewable energy will never be as competitive as an energy source within the country.
2. A big proponent of a “Just” energy transition is making sure that those that work in the fossil fuel industry do not lose their livelihoods and incomes through this transition, and that the creation of green jobs in the renewable sector can be utilized to find alternative sources of livelihoods to ensure that no one is left behind.
3. The current trajectory for the country is headed towards expansion of natural gas as an energy source, which counteracts with the intention to move towards zero carbon. While there are economic reasons that necessitate an inclusion of natural gas at this time as an energy source as discussed above, it does however create an obstacle and bottleneck for an energy transition across the country.
4. Stakeholder engagement is a pivotal part of a just energy transition. While the process for the National Strategy on Climate Change has attempted to be inclusive, we still see that a formal participatory approach with relevant stakeholders as well as civil society is still not done. As vulnerable communities’ area at the heart of this transition, their engagement is crucial and necessary.
5. Much of the energy transition relies heavily on having sufficient infrastructure in place to manage such a transition with respect to the energy grid. With planned power outages throughout the summer of 2023, and several power overloads and outages in many other areas across the country, there is a need to invest in the infrastructure that exists to enhance its efficiency and functionality as an energy transition will only add to this burden even further.

While many of these gaps exist within the country, it is important to work in parallel on these gaps as well as finding ways to move forward due to time limitations and constraints with respect to ensuing

climate change impacts and impending GHG thresholds that we are beginning to experience globally. Implementing a just energy transition in Egypt faces several key challenges. These include the following:

1. Institutional Framework: Strengthening the institutional framework and streamlining the roles and responsibilities of various entities involved in energy conservation is crucial. This includes improving coordination and collaboration between government agencies, private sector, and civil society organizations.
2. Financing: Innovative financing techniques and mechanisms are needed to support energy transition projects. This includes attracting private sector investments, exploring public-private partnerships, and developing suitable payback mechanisms for renewable energy projects.
3. Technology and Infrastructure: Adopting appropriate technologies and infrastructure for renewable energy generation and distribution is a challenge. This includes harnessing solar, wind, and other renewable energy sources effectively and integrating them into the existing energy grid.
4. Policy and Regulatory Framework: Developing clear and supportive policies and regulations for renewable energy is essential. This includes setting renewable energy targets, providing incentives for investment in renewable energy projects, and ensuring a level playing field for renewable energy in the energy market.
5. Capacity Building: Building the necessary technical and human capacity to implement and manage renewable energy projects is crucial. This includes training and skill development programs for engineers, technicians, and policymakers in the renewable energy sector.
6. Social Equity: Ensuring a just energy transition requires addressing social equity concerns. This includes ensuring access to affordable and clean energy for all segments of society, particularly vulnerable and marginalized communities.
7. Public Awareness and Engagement: Raising public awareness about the benefits of renewable energy and engaging stakeholders in the energy transition process is important. This includes educating the public about the importance of energy conservation and promoting behavioral changes towards sustainable energy practices.

Addressing these challenges will require a comprehensive and coordinated approach involving government, private sector, civil society, and international organizations.

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