

Investment Prospects in Renewable Energy in North Africa

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فرص الاستثمار في الطاقة المتجددة في شمال أفريقيا

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Abstract:

Africa is a continent with much diversity and untapped potential, with the northern part being among the most well-endowed areas when considering natural resources. A considerable part of North Africa is occupied by the Sahara and hence enjoys a substantial amount of sunlight and gets some of the globe's strongest winds. Such features make this part of Africa the most acknowledged in terms of natural resources. The sunny Northern African nations, like Morocco, Egypt, Tunisia, and Algeria, are not only shifting towards, and in fact adopting, renewable energy as part of their economic diversification goals, but are also striving for sustainability. The cost of technology has gone down, and due to favorable climatic conditions in the region, the production of renewable energy has increased monumentally over the past decade in solar and wind energy.

Investment attraction has been a key role of government policies and regulations. The governments of North African nations have adopted different tax measures, including investment legislation, tax funds for renewable energies, and feed-in tariffs to encourage domestic and foreign investors. The impact of such policies includes an increase in the portion of renewable energy in the country while decreasing reliance on energy imports and fossil fuels.

There are several economic benefits of renewable energy investments in North Africa, such as economic development, job creation, technological advancement, energy security, and environmental sustainability. It likewise places North Africa as a possible center for green hydrogen generation because of the inexpensive renewable resources. The industry, though, still faces several monumental challenges, such as poor infrastructure, inadequate capability of transmission lines, lack of regulatory clarity, shortage of resources, and a workforce with the necessary skills to solve the challenges in the future. Nevertheless, the future is encouraging; should there be governments, there is a strengthening of structures, infrastructure, and international collaboration.

Keywords: Africa, Economic Benefits, Renewable Energy, Investments, North Africa.

المخلص

تُعد أفريقيا قارةً تزخر بقدْر كبير من التنوع والإمكانات غير المستغلة، ويُصنّف شطرها الشمالي ضمن أكثر المناطق حظوةً وثراءً من حيث الموارد الطبيعية. إذ تستحوذ الصحراء الكبرى على جزء كبير من مساحة شمال أفريقيا، مما يمنح هذه المنطقة نصيباً وافراً من أشعة الشمس، فضلاً عن تعرضها لبعوض من أشد الرياح هبوباً على مستوى العالم. وتجعل هذه الخصائص من هذا الجزء من القارة الأفريقية المنطقة الأكثر تميزاً وتقديراً من حيث وفرة الموارد الطبيعية. ولا تقتصر جهود دول شمال أفريقيا المشمسة مثل المغرب ومصر وتونس والجزائر على التحول نحو الطاقة المتجددة (بل وتبنيها فعلياً) كجزء من أهدافها الرامية إلى تنويع اقتصاداتها فحسب، بل إنها تسعى جاهدة أيضاً لتحقيق الاستدامة. ونظراً لانخفاض

تكاليف التقنيات المستخدمة، ويفضل الظروف المناخية المواتية التي تتمتع بها المنطقة، فقد شهد إنتاج الطاقة المتجددة لا سيما في مجال الطاقة الشمسية وطاقة الرياح طفرة هائلة ونمواً استثنائياً على مدار العقد الماضي.

لطالما شكل استقطاب الاستثمارات دوراً محورياً للسياسات واللوائح الحكومية؛ إذ تبنت حكومات دول شمال أفريقيا تدابير ضريبية متنوعة، شملت تشريعات الاستثمار، وصناديق الدعم الضريبي لمشاريع الطاقة المتجددة، وتعريفات التغذية الكهربائية، وذلك بهدف تشجيع المستثمرين المحليين والأجانب. وتتمثل تداعيات هذه السياسات في زيادة حصة الطاقة المتجددة ضمن الميزج الطاقوي للبلاد، بالتزامن مع الحد من الاعتماد على واردات الطاقة والوقود الأحفوري.

تنطوي الاستثمارات في مجال الطاقة المتجددة في شمال أفريقيا على العديد من الفوائد الاقتصادية، مثل التنمية الاقتصادية، وخلق فرص العمل، والتقدم التكنولوجي، وأمن الطاقة، والاستدامة البيئية. كما أنها تضع منطقة شمال أفريقيا في مصاف المراكز المحتملة لإنتاج الهيدروجين الأخضر، وذلك بفضل توافر موارد الطاقة المتجددة منخفضة التكلفة. ومع ذلك، لا يزال هذا القطاع يواجه العديد من التحديات الجسيمة، ومن أبرزها ضعف البنية التحتية، وعدم كفاية قدرات خطوط نقل الطاقة، والافتقار إلى الوضوح التنظيمي، وشح الموارد، ونقص القوى العاملة التي تمتلك المهارات اللازمة لمواجهة هذه التحديات مستقبلاً. ورغم ذلك، فإن المستقبل يبدو واعداً؛ إذ يُتوقع، بدعم من الحكومات، أن يشهد القطاع تعزيزاً للهيكل التنظيمية، والبنية التحتية، والتعاون الدولي.

الكلمات المفتاحية: أفريقيا، الفوائد الاقتصادية، الطاقة المتجددة، الاستثمارات، شمال أفريقيا.

Introduction

Africa is a marvelous continent whose potential and diversity are not exploited. The energy industry in Africa is an interesting narrative of challenges, survival, and growth (Agoundedemba et al., 2023). As mentioned by Lartey (2024), Africa is rich in renewable energy sources, such as bioenergy, hydropower, geothermal, solar, ocean, and wind, which exceed the projected electricity requirement by more than 1000 times by 2040. With such diversity, the continent is in the best position to enjoy many of the benefits of the global energy transition, among them the opportunity to shape its energy landscape and propel it towards sustainable development. One of the richest areas in the world is North Africa. The region not only hosts one of the largest hydrocarbon reserves in the world, dominated by Algeria, but also has immense solar and wind energy resources, which are readily available on the plain, making it an ideal place to invest in renewable energy efforts.

Potential for Renewable Energy in North Africa

Africa is a vast landmass with natural resources, which are vital to the energy situation. It possesses one of the richest renewable energy resources in the world, boasting substantial wind, solar, and geothermal energy, as well as massive oil and gas reserves (Agoundedemba et al., 2023). In the Middle East and North Africa, renewable energy is a relatively minor concern in societal perceptions (Aldulaimi & Abdeldayem, 2022). North Africa is believed to have abundant renewable energy resources (Jurasz et al., 2024). The region has a high level of socio-economic development, industrial development, and access to modern energy, except in Sudan (IRENA, 2023; Khaleel et al., 2026). In the meantime, the energy situation in the region differs from that in other regions of the continent.

Renewable energy has attracted investment in the Middle East and North Africa (MENA) region over the last couple of years for a variety of reasons. The Solar, geothermal, wind, and bioenergy sources of renewable energy have not been fully utilized in the history of the MENA region, particularly in North Africa. a. Lartey (2024) points out that Algeria, Libya, Egypt, and Sudan have large reserves of hydrocarbons and, in the past, they acted as major exporters of oil and gas. These countries have heavily relied on the fossil fuel industry to provide a boost in the economy of the country as a source of domestic power, as well as an important export commodity. Conversely, Tunisia and Morocco are rather unfavorable in terms of oil and gas reserves and have traditionally high energy import prices. Thus, the two countries have the most diversified economy throughout the region, with agriculture, textiles, tourism, manufacturing, and services at their core (Lartey, 2024). Out of them, Morocco produces phosphate and phosphate rock on a large scale, which are relevant to energy transition technologies.

Through solar energy, regions will be able to enhance their economies and reduce the negative impact on the planet by decreasing carbon footprints and greenhouse gas emissions. Nonetheless, in the current day, it is more of an inevitability than an opportunity to capitalize on Africa as a potential source of solar energy, as the continent grapples with numerous electrical issues (Abdelrazik et al., 2022). The continent possesses abundant, readily available solar energy resources due to Africa's favorable location and climate (Alex-Oke et al., 2025). This is an exclusive advantage that helps make solar panels generate electricity and solar-powered water heating in households and industries widespread.

During the last ten years, North Africa has increased its renewable energy generation by 40 percent, erecting 4.5 GW of wind and solar thermal power. Alsharif et al. (2023) reveal that in the past decade, the generation capacity of renewables rose by 80% and by nearly 560% without considering hydropower. This has been realized despite the enormous political and social disaster in the region over the past years in 4 countries. With the improved technology and decrease in costs, nations are developing more detailed policies to enable them to move towards energy. The experiences of Egypt may be taken into consideration. Egypt, like any other country

in the MENA, is not an exception, and the country has high chances of renewable energy sources, especially solar, wind, and biomass. It is admitted that alternative fuels, especially renewable energies, could help find a solution to the shift in the Egyptian energy mix that is still overly reliant on fossil fuels (Belaid et al., 2021). In Egypt, 1.63 GW of solar capacity was in place by 2021, and it constituted 18% of the total solar capacity in Africa. Concurrently, the installed wind power has doubled to about 1.4 GW. It is 21% of the installed total wind power in Africa (Zero Carbon Analytics, 2022).

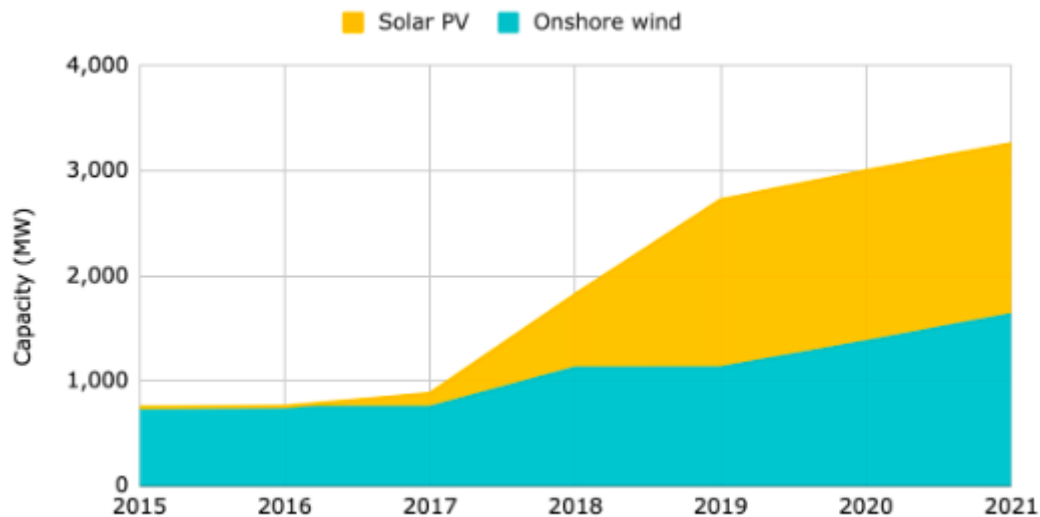


Fig. 1. Renewable energy capacity installed in Egypt 2015-21 (Zero Carbon Analytics 2022).

The potential of producing green hydrogen in North Africa is also unique. Solar irradiation and strong wind are renewable energy sources in the area. Some countries like Tunisia, Morocco, and Egypt, among others, already boast a high number of renewable energy initiatives with the Noor Ouarzazate solar complex, and wind plans on the coast (TRENDS Research & Advisory, 2025). The combination of these natural advantages results in one of the lowest production costs for green hydrogen in the world, and North Africa can be considered a successful solution for large-scale hydrogen production. He et al (2026) observe that the infrastructure situation has emerged as a pivotal determinant of the emergence of green hydrogen in North Africa, as internal pressures of energy and external market demand keep mounting.

Government Policies and Regulatory Frameworks

Governments of North Africa tend to use fiscal policies to promote renewable energy. Some of such policies include tax incentives (that is, value-added tax), the exclusion of customs and import duty, and capital depreciation/allowances. As an example, the New Investment Law published by Egypt in 2017 offers incentives to investments in projects related to renewable energy, including a 30% deduction of the net taxable profits during the initial 7 years of the life of a project and reduced customs duties (5 percent to 2 percent on machinery and equipment) (IRENA, 2023). Projects are also exempt from payment of land taxes. The PV components are not charged any importation fees or value-added tax in Sudan, and the Investment Act 2021, amended in 2021, offers additional incentives to investors.

Tunisia is also moving towards diversification, as the environment is being put into consideration, and the prices of oil and gas are declining. According to Zahraoui et al. (2021), in February 2011, the country started introducing renewable energy (RE) into its energy mix with the help of the Renewable Energy Development and Energy Efficiency Program (PENREE). The initial objective of the program plan is to have 12 GW of RE installed in the country by 2011-2030 and 10 GW of RE exported. The program has a target of 40 percent RE share of energy by 2030.

In Tunisia, there is also a special fund called the Energy Transition Fund, which concerns renewable sources of energy and energy efficiency projects (IRENA, 2023). The fund was established in 2013 and was increased in 2017. In addition to its original purpose of providing grants, it also invests in renewable energy projects using both finance and equity. One of the strategies that is being pursued, as provided in the National Energy Strategy, is the promotion of renewable energy in Morocco to achieve a diversified energy mix with a bias towards renewable energy. According to Laaroussi et al. (2023), it implies the introduction of a large-scale renewable energy project, like the NOOR 1 solar project located in Ouarzazate. In addition to that, Morocco has implemented various policies and subsidies to simplify using renewable energy, including the Feed-In Tariff policy, whereby a set price is offered to electricity produced by a renewable source (Laaroussi et al., 2023). The idea of this system is to encourage investment in renewable energy, that is, in the NOOR 1 solar project.

The next bold agenda that the Government of Tunisia (GoT) has set forth to pursue is to boost its production of renewable energy. The GoT aims at raising the proportion of renewable energy in electricity to 35 percent by 2030, as compared to the current 3 percent (World Bank, 2024). They also include viability and rollout studies in Algeria, as well as established a new ministry of energy transition and renewable energies and a new state-owned renewable energy corporation (International Trade Administration, n.d.). As part of a new Presidential initiative on energy transition in progress, and with several reforms about to be finalized and released, Algeria can be poised to fill the gap in installed renewable energy capacity between itself and its less endowed peers, and to bring to a close its resource curse.

Benefits of Renewable Energy Investment

The potential monetary gains highly influence the entrepreneurial decision-making process during investment decisions (Poszwa, 2021). Renewable energy sources are among the components of sustainable development in the modern world and modern civilization (Dirma et al., 2024). They play a crucial role in the economy, growth rate, social and economic wellbeing of the country, as well as enhancing technology, security, and economic stability. Dirma et al. (2024) claim that the investments in renewable energy are very welcome and are a bold viewpoint that promotes the development of the sector and exports the energy to other countries.

The issue of the global switch to renewable energy, which is predicted to lead to job creation, an increase in GDP, decreased health-care spending, and technological advances, is one of the most substantial economic changes of the twenty-first century that is not confined to environmental protection (Bhuiya et al., 2025). Proper investment in renewable energy and other technologies of energy transition can also contribute to better economic development in North Africa. Numerous discussions are on the effects the energy transition could have on gross domestic product (GDP). The World Energy Transition Outlook (WETO) predicts that the quicker the transition, the more positive the effect on the world GDP would be, 2.4 percent on average by 2030 (Federal Ministry for Economic Affairs and Climate Action, 2022). With a rapid increase in the number of countries that are pledging to have net-zero emissions, the importance of comprehending the entire spectrum of financial benefits of using renewable energy cannot be overstated to guide policies and investments.

The investment in renewable energy in North Africa might also promote economic efficiency. Renewable energy investment may promote energy economic efficiency under the endogenous growth theory through two core effects: technological innovation and knowledge spillovers (Ren et al., 2025). In theoretical terms, the renewable energy sector is very knowledge-intensive. Its investment trend is not merely reflecting the accumulation of physical capital, but also creating a technological revolution or accumulation of knowledge capital by stimulating specialized human capital and by creating and enhancing modular technologies, thereby moving the line outwards.

Challenges Facing Renewable Energy Investment

Risks that affect renewable investments are not only financial risks but also operational and construction costs and revenue risks, construction architecture mistakes in financial structures, risk of the legal system at the time, and ecological and social risks (Cutrone et al., 2024). Various challenges, the cause of which can be regulatory uncertainty and changes in policies, grid integration, and regulatory procedures, may be viewed as the sources of challenges in financing renewable energy projects. The perceived risk by the investors and lenders can also be heightened because of the uncertain or fluctuating regulations that will lead to problems in financing or problems (Kaushik & Garg, 2024). Open, good, and consistent regulations play a key role in developing investor confidence and introducing renewable energy investments.

Another barrier to the adoption of renewable energy within North Africa is weaknesses in the transmission grid; they complicate the integration of renewable energy into the energy system of certain countries. As an example, there would be no energy storage solution and grid management technology, which would lead to the inability to balance repetitive production of renewable energy (Anku, 2025). Having a skilled workforce is a challenge, as it makes project implementation and maintenance more difficult. The lack of cooperation among organizations to implement renewable energy (RE) policies is another key challenge in developing RE projects (Business & Research, 2021). Governments and large funders usually make decisions based on outdated opinions and do not understand the transformations that have occurred in the market regarding renewable energy segments, contributing to the late entry of renewable energy.

Future Outlook

In 2021, the world spent USD 434 billion on renewable energy (including solar and wind power) in total, but Africa got the least portion of renewable energy investments, 0.6 percent (RES4Africa, 2023). This implies that while the decision to switch to a global energy infrastructure would be greatly desirable among the investors, the funding and investment might not necessarily be where it is most necessary, and what the energy infrastructure of the future would need is a reasonable amount of investment (IEA, 2020). In North Africa, power generation capacity, power networks, and power transmission should be given priority, and investment should be made in these areas to make sure that the energy systems that can facilitate future economic growth are in place. Without the existence of concessional providers of public finance, neither will the capital to fund the energy future of Africa be available (IEA, 2023). The development finance institutions serve a significant purpose not only in

pulling in private finance, but also in providing vital grant and concessional finance, including to new markets or new technologies.

It is also necessary to have a comprehensive multi-year strategy in North Africa to encourage sustainable investment in renewables in an integrated manner, taking into account the safety of supply, its effectiveness, cost, and eco-sustainability. Such an approach needs to be developed through a participatory, open process and communicated publicly and widely (UNCTDA, n.d.). Moreover, the vision for renewable energy in North Africa also involves modernizing the power system and increasing flexibility, which would be ambitious. As the number of solar and wind farms continues to grow, higher-capacity transmission lines are required to connect them to urban demand centers (Mahjoubi, 2025). In the region, power distribution infrastructure should be highly resilient to support not only higher demand for electric power but also the increased volume of distributed solar PV power generation.

Conclusion

The key opportunities that North African economies have in developing the renewable energy sector are the high level of natural resources, yet there are key weaknesses in institutions that have undermined renewable energy within the region. Other countries are already undertaking major investments in renewable energy through the right government policies and major renewable energy projects, such as Morocco and Egypt. The need to roll out renewable energy in North African Countries is riddled with challenges, but it also presents a tremendous opportunity to reform the region. Having a rich supply of natural resources, good policy support, and international cooperation, NAC is able to move in the direction of a more energy-secure and sustainable future.

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