

ERF Policy Brief

Employment Generation Capacity of Renewable Energy in MENA

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About the authors

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In a nutshell

- The adoption of green energy technologies necessitates the establishment of new supporting and downstream industries, leading to job creation across various sectors.
- Investments in green energy initiatives have stimulated research and development (R&D) activities that support process innovation and technological advancements.
- Green energy projects entail the production and installation of renewable energy equipment.
- Establishing robust local supply chains and manufacturing capabilities can significantly contribute to job creation.
- Renewable energy production expands the potential of moving downstream and off-stream to the manufacturing of electric vehicles (EVs), a prospect that is already being rooted in several countries in the region.
- Promoting energy efficiency measures and retrofitting existing infrastructure for improved energy performance can also generate employment opportunities.
- The transition to green energy necessitates a skilled workforce capable of meeting the demands of the evolving energy landscape.
- Embracing renewable energy technologies presents an opportunity for the region to diversify its economy, mitigate the possible negative impacts of digitalization and artificial intelligence on existing jobs, reduce its carbon footprint, and create employment across various sectors.
- The transition to renewable energy can be conceived as a social project to capitalize on the net socioeconomic and environmental benefits of an equitable transition plan to renewable and green energy.
- Renewable energy jobs are often unevenly distributed, whether geographically or among the different segments and classes of society.
- Breaking away from traditional sectors, especially in green energy, presents opportunities for job creation and economic growth.

Renewable energy and job creation

In recent decades, the global shift to renewable energy sources—solar, wind, biomass, green hydrogen, and hydro—has not only reduced greenhouse gas emissions but has also significantly impacted employment generation, income expansion, and many social outcomes. With dramatic cost reductions in renewable energy production and major advancements in integrating renewables into electric grids, renewable energy is expanding and will continue to expand the employment generation capacities of most countries in the Middle East and North Africa (MENA) region, thereby addressing its characteristically high unemployment rates. It will also offer new opportunities for its youth and women.

Globally, the renewable energy sector has become a major employer, creating high-quality jobs compared to the traditional energy sector. Every dollar invested in renewables generates three times more jobs than in fossil fuels. The International Energy Agency (IEA) predicts a net increase of 14 million jobs in the green energy sector by 2030, offsetting potential losses in fossil fuel production. Under the International Renewable Energy Agency's (IRENA) "Transforming Energy Scenario," the number of renewable energy jobs worldwide could more than triple, reaching 42 million jobs by 2050, while energy-efficiency jobs would grow six-fold, employing over 21 million more people. Globally, renewable energy jobs have already reached 11 million in 2018, increasing from 10.3 million in 2017. However, they are primarily concentrated in solar photovoltaic (PV), bioenergy, and wind power, suggesting that efforts are now needed for balanced geographic, class, gender, and age representation.

Recent evidence suggests that the renewable energy sector is labor intensive, requiring skilled workers across many occupations and sectors. One of the main reasons for the job growth in the renewable energy sector is the increasing demand for clean energy. As more countries shift toward renewable energy, the demand for renewable energy technologies, products, and services will continue to grow, creating job opportunities in a wide range of sectors. For example, the installation of solar panels requires skilled workers such as electricians, engineers, general technicians, and construction workers. Similarly, the installation and operation and maintenance of wind turbines require engineers, technicians, and construction workers with specialized skills.

The installation of solar panels and wind turbines, along with the operation and maintenance of renewable

energy systems, demands specialized skills. According to IRENA, the installation of solar PV systems creates more than twice as many jobs per unit of electricity generated compared to fossil fuels. In addition to creating new jobs, the renewable energy sector also offers higher-quality jobs compared to the traditional energy sector. Many renewable energy jobs are skill-intensive and require advanced education and training; this is particularly the case for jobs in the solar, wind, and green hydrogen power industries that require special technical skills and knowledge. Moreover, renewable energy jobs offer better pay and benefits than traditional energy jobs, contributing to higher labor incomes and better-quality jobs.

Geographically, renewable energy jobs are not evenly distributed; in many countries, the renewable energy sector is concentrated in certain regions. Solar power is generated in areas with wide exposure to the sun and wind turbines installed near water bodies and mountains. This concentration of renewable energy jobs can create regional disparities in employment opportunities and economic growth. A few countries and regions are taking steps to address this issue by implementing policies and programs to promote renewable energy development and deployment in underrepresented areas. The localization of power generation, the manufacturing of parts, and the downstream development of electric vehicles (EVs) hold the promise to disperse production and employment into many regions and areas, thereby correcting the observed geographical concentration of renewable energy production.

MENA countries to rebase the growth of their economies

Collier (2019) argues that as oil rents decline and fossil fuel assets turn into stranded assets, some MENA countries face the urgent need to reshape their economic structures. The four-decade dependence on fossil fuel rents has failed to generate sufficient employment opportunities to sustain high living standards. Now is the opportune time for comprehensive restructuring and proposing a new development strategy focused on building innovative clusters of firms linked to vocational training, particularly in the new comparative advantage of MENA in renewable energy. This shift is envisaged to underpin a social project and cultural revolution involving all sectors of the economy to collaboratively pursue transformation in a way that differs from a simple transition to renewable energy.

Transitioning from a rent-seeking to a skill-based economy requires massive cultural and institutional



changes. Collier contends that building productivity at 21st-century levels involves creating new clusters of innovative firms. Training the local workforce with the needed skills is crucial, requiring nuanced public policies that involve firms in collaboration with colleges and local authorities. However, such a transformation cannot be meticulously planned due to its complexity and uniqueness. The localization of authority becomes necessary, with businesses forming associations and governments shifting from national- to governorate-level authority. This requires a process of rapid social learning through experimentation, adapting to unforeseen events, and remaining resilient to shocks.

This gives rise to the need to organize the local workforce into teams within firms and clusters, fostering economies of scale and specialization. Unlike the prevalent situation in the MENA region where many workers operate independently in small informal enterprises or the public sector, successful clusters in advanced economies depend on firms collaborating in cities. Examples from cities such as London and Qiaoto highlight the interdependence and specialization that arise from clustering. Training plays a critical role in equipping the local workforce with the necessary skills. In sum, a successful transition requires key elements, such as:

- **Building Productive Clusters:** The creation of innovative business clusters linked to vocational training to enhance productivity and innovation.
- **Team-based Workforce:** Organizing workers into teams to achieve economies of scale and specialization, emphasizing the role of firms in organizing workers.
- **Public Policy for Skills:** Public policy must incentivize investments as well as firm-specific skills, proposing a levy on firms for skill acquisition.
- **Localization:** A shift is needed from centralized to governorate-level authority to facilitate effective training, infrastructure development, and collaboration between local businesses and governments.
- **Linking Firms to Education:** Direct linkages between firms and university research departments must be developed, emphasizing the importance of local autonomy for universities.
- **Cultural and Institutional Shifts:** Cultural and institutional changes are important for a successful transition, acknowledging the uniqueness of MENA countries. Effective and consistent communication is important given the role of narratives and visible actions in gradually changing societal ideas and norms. The process, according to Collier, involves shifting self-respect from being to doing, thereby

attaching prestige to productive achievements rather than positions in bureaucracy.

MENA countries need to learn from the successful East Asian transformations and embrace uncertain change given the unsustainability of their current structures. In conclusion, while MENA's unique context demands a specific narrative, a step-by-step approach to transformation that avoids overload and focuses on tangible short-term wins is essential. The region needs to adopt a culture of experimentation and learning from small-scale social experiments. The emphasis is on institutional and cultural changes tailored to the unique context of each MENA country, but the challenge lies in creating knowledge networks to spread lessons effectively. The transition to renewable energy affords the region the impetus to undertake this transformation to a productive economy while simultaneously developing a sustainable and clean environment.

Advancing renewable energy in MENA: A comparative advantage

In energy policy studies, the sector is often analyzed in isolation of the rest of the economy, overlooking broader impacts. Recognizing the two-way interdependence with the economy is crucial for sustainability. While assessing the benefit or cost of energy activities involves measuring their impact on aggregate output and employment, a comprehensive evaluation should consider various aspects. The transition to renewable energy offers primary benefits such as direct energy savings and multiple socioeconomic and environmental advantages. Recent policy debates emphasize trade-offs between low-carbon energy technologies and broader social goals, focusing on employment and the involvement of women, youth, and disadvantaged groups. Employment is a focal point in government energy transition plans due to rising poverty levels and environmental concerns. In the context of the MENA region's high social inequality, the potential of renewable energy to create jobs is a crucial consideration, offering opportunities for economic diversification.

The MENA region, characterized by abundant solar radiation and strong wind nodes, is uniquely positioned to harness renewable energy as a transformative force. Beyond the environmental benefits, the adoption of renewable energy carries intrinsic advantages that extend to economic development, job creation, and social well-being. Renewable energy sources, driven by natural endowments and technological advancements, offer a robust alternative to fossil fuels. Considerations supporting this transition include:



- About 80 percent of the global population resides in countries dependent on fossil fuel imports, emphasizing the vulnerability of conventional energy sources.
- Unlike fossil fuels, renewable energy is universally available, with the potential to meet 90 percent of global electricity needs by 2050, as estimated by RENA.
- The declining costs of renewable energy technologies, exemplified by an 85 percent reduction in solar power costs between 2010 and 2020, position them as the most economical power option globally.
- In MENA countries, which are characterized by high unemployment rates, particularly among youth and women, the renewable energy sector emerges as a crucial source of employment, offering sustainable opportunities for diverse skill sets.
- Air pollution, causing over 13 million avoidable deaths yearly, emphasizes the urgent need for clean energy adoption, as pollutants mainly stem from vehicle emissions and electricity generators.

Employment impacts of energy production by type of fuel in the MENA region

A few existing references offer estimates of the potential future employment capacity of renewable

energy. Only IMF-generated elasticity coefficients cover all energy types, allowing for the estimation of gross and net employment impacts, incorporating indirect and induced effects. The employment-generating potential of the elasticity coefficients takes into account most of the value chains involved in generating electricity, such as construction, installation, manufacturing, and operations and maintenance. They consider a diverse set of countries at different development stages, including realized energy efficiency impacts, and encompass various value chains involved in electricity generation.

We benchmark the current employment created by electricity generation in Egypt, Jordan, Lebanon, Morocco, Sudan, and Tunisia to form the basis for renewable energy employment projections. With a 30 percent renewable energy target in 2030 across the six target countries in the MENA region, around 1.2 million gross employment opportunities could be anticipated. Net total employment, accounting for renewable energy displacing natural gas, is estimated at approximately 525,824 person years in 2030 and 1,051,647 person years in 2050. Energy efficiency projects will contribute a total of 89,377 jobs in 2030, nearly doubling in 2050 with a 30 percent energy efficiency target (Figure 1). Expanding the focus to the entire MENA region, a significant total employment capacity of over 2.5 million person years in 2030 and five million in 2050 is projected, encompassing both electricity generation and realized efficiencies.

Figure 1. Employment impact of renewable energy and efficiency, 2030

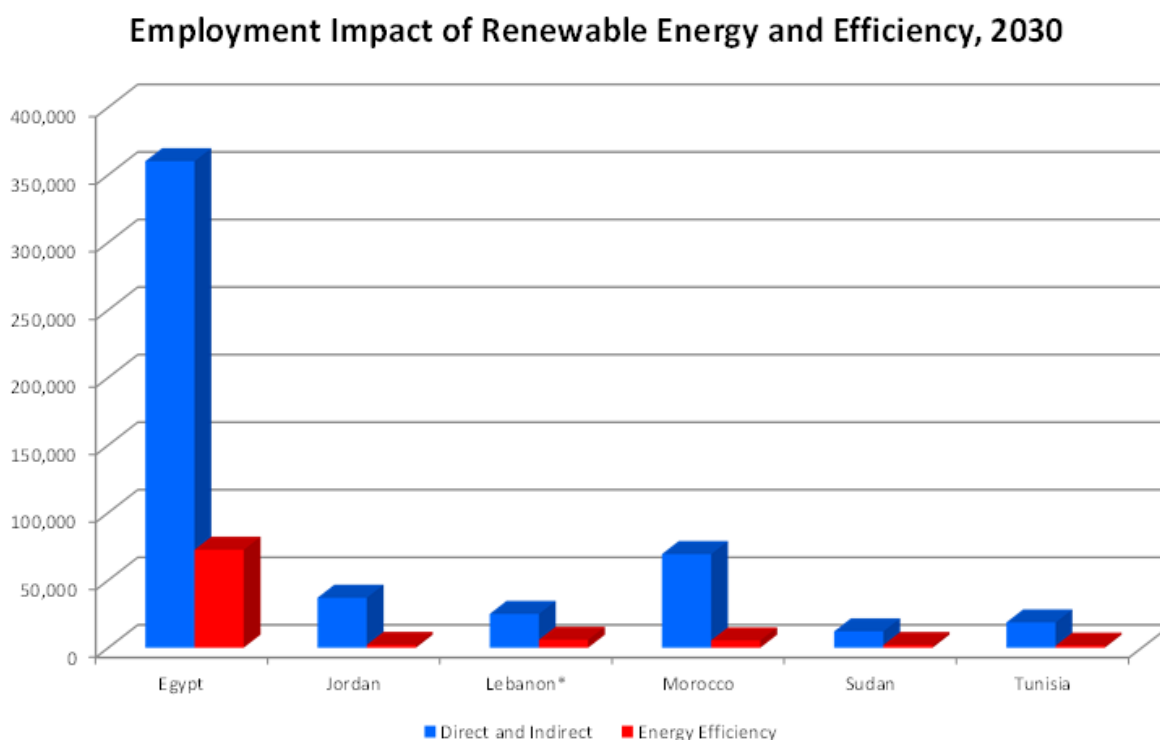
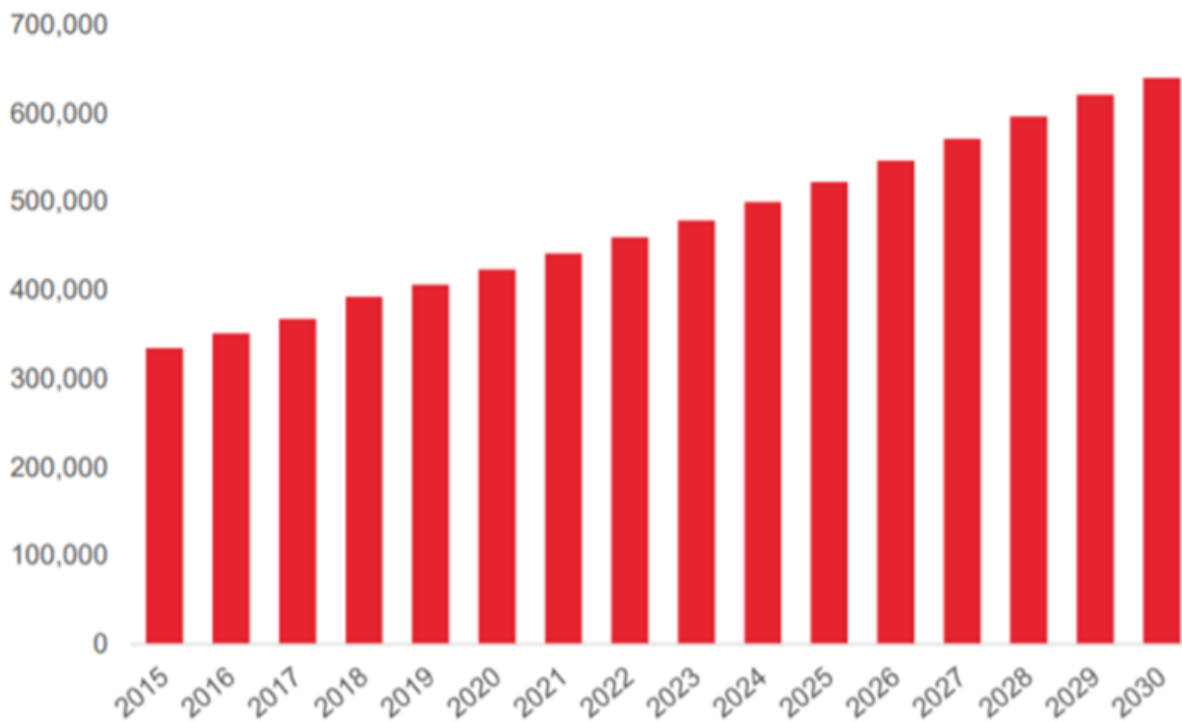


Figure 2. Projected installed generating capacity needs in the MENA region (GW)



The total installed electricity generating capacity in the MENA region in 2020 was estimated at about 420 gigawatts. By 2030, this is expected to increase by 40 percent, reaching 589 gigawatts (Figure 2). The projected employment generation capacity in 2030 is based on a 30 percent renewable energy share in electricity generation for the region. This highlights the potential of an even more substantial increase in employment generation capacity.

The employment projections presented above indicate a massive increase in the MENA region's employment generation capacity, particularly against the backdrop of its high unemployment rates. However, these estimates become even more impressive when factoring in the substantial opportunities arising from renewable energy, paving the way for the establishment of a thriving EV industry and even a hydrogen-driven fertilizer industry. Morocco is already producing one million EVs, while Saudi Arabia has partnered with Lucent Industries and is targeting a similar volume. The United Arab Emirates has teamed up with a Chinese firm currently producing 55,000 vehicles that could be ramped up to multiples of this volume, and Egypt is on the course to produce a large number of EVs for home use and exports. These opportunities could not have existed without renewable energy and MENA countries' determination to realize their nationally determined contributions (NDCs).

The MENA region's journey toward renewable energy represents more than a mere shift in power sources; it's a multifaceted endeavor integrating economic, environmental, and social dimensions. Renewable energy deployment should align with social inclusion and equity goals by addressing issues of unemployment, particularly in poor areas, and environmental degradation. Energy policies should account for their impact on macroeconomic indicators, moving beyond simplistic measures like GDP and employment to assess broader societal outcomes.

Conclusion

Currently, there is a pronounced global inclination toward transitioning to renewable energy, with solar, wind, biomass, and hydro technologies becoming widespread over the past decades. Beyond curbing greenhouse gas emissions, this shift has substantially impacted employment, incomes, and societal outcomes. This policy brief delves into the employment ramifications of renewable energy in the MENA region, revealing its transformative effects on the job market, especially in alleviating high unemployment rates, creating opportunities for the region's youth and women, and offering the prospect of diversifying the highly undiversified MENA economies. The global renewable energy sector has emerged as a significant employer,



not only generating new job prospects but also offering higher-quality employment compared to the traditional energy sector. This holds the promise for a similar future for the MENA region.

The anticipation of increased employment opportunities in the green energy sector across the MENA region, including the GCC countries rich in fossil fuels, is a credible and welcome expectation. By raising the renewable energy share to 30 percent in their energy mix, the six MENA countries mentioned above could potentially generate 1.2 million jobs, with gross employment estimates projecting 611,423 person years in 2030 and 1,222,845 person years in 2050. Net total employment, accounting for the displacement of natural gas-generated electricity, is estimated at 525,824 person-years in 2030 and 1,051,647 person years in 2050. Alternatively, considering renewable energy as fully incremental, it could sustain the entire 1.22 million person years of expected employment. Leveraging the MENA region's abundant solar and wind resources, we estimate a substantial employment generation capacity of over 2.5 million person years in 2030 and more than five million person years in 2050 for both renewable energy generation and the associated value chains.

The incorporation of renewable energy opportunities could further enhance employment prospects, especially when considering the symbiotic relationship with EV manufacturing. Notable examples include Morocco, Saudi Arabia, the UAE, and Egypt, which are actively engaged in EV production, catalyzed by the region's commitment to renewable energy and their NDCs. The MENA region's embrace of renewable energy and EV manufacturing presents a transformative opportunity. The success of this vision hinges on the implementation of supportive policies, incentives, and strategic investments to propel the region into a leadership role in the global transition to sustainable energy. Moreover, it offers a pathway to economic resilience, job creation, and environmental sustainability.

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ERF at a Glance: *The Economic Research Forum (ERF) is a regional network dedicated to promoting high-quality economic research for sustainable development in the Arab countries, Iran and Turkey. Established in 1993, ERF's core objectives are to build a strong research capacity in the region; to encourage the production of independent, high-quality research; and to disseminate research output to a wide and diverse audience. To achieve these objectives, ERF's portfolio of activities includes managing carefully selected regional research initiatives; providing training and mentoring to junior researchers; and disseminating the research findings through seminars, conferences and a variety of publications. The network is headquartered in Egypt but its affiliates come primarily from different countries in the region.*

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