



Harnessing Solar Energy in Iraq

Current Landscape and Future Prospects

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Introduction

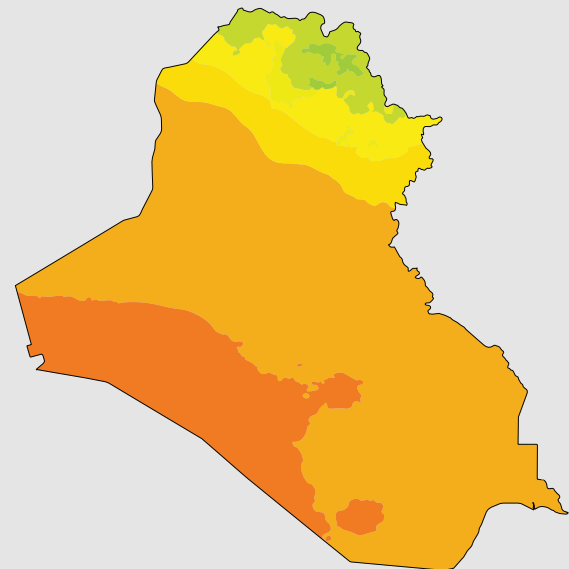
With over 300 sunny days per year, solar power plays a crucial role in Iraq's renewable energy strategy. To diversify the energy mix, lower carbon emissions, and address frequent power outages, the Iraqi government has introduced various initiatives to develop solar projects. These efforts are not just environmentally necessary, they are economically and strategically vital. Iraq continues to face persistent electricity shortages and a heavy dependence on fossil fuels, both of which threaten long-term energy security and economic resilience. Solar energy offers a practical and sustainable solution. Despite political instability and underdeveloped infrastructure, the steady growth of solar energy projects signals a shift toward a more sustainable energy future.

This study primarily aims to examine the state of solar energy in Iraq, including its practical applications, government-led projects in partnership with international organizations, initiatives by NGOs, existing policies promoting solar adoption, and major solar energy providers in the country.

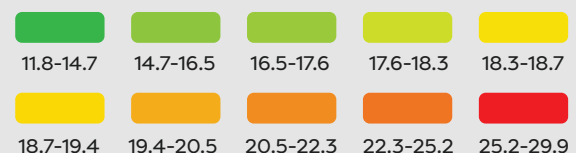
The Current State of Solar Energy In Iraq

Despite Iraq's vast solar energy potential, the adoption of solar photovoltaic systems has been relatively slow. It's essential to note that solar irradiance varies significantly across different regions of the country. While northern areas receive an average of approximately 11.8 MJ/m² per day, the southwestern regions can reach up to 22.5 MJ/m² per day. The figure below provides a more detailed map of Iraq's solar potential [1].

Although these increases are significant, they fall short of reflecting Iraq's vast solar potential, resulting in a missed opportunity for sustainable energy development. This highlights the need for stronger policies and greater investment to leverage the country's renewable energy resources fully.



**Average of Horizontal Solar Radiation
(MJ/m²/day)**



The Potential solar irradiance in Iraq using data collected over three years from 2020 to 2022.

Despite Iraq's significant solar potential, the development of solar energy infrastructure has fallen behind expectations. The growth of solar PV capacity has been slow compared to the country's capabilities. In 2014, Iraq had an installed capacity of only 37 MW, which remained unchanged for several years. It wasn't until 2022 that the capacity increased slightly to 42 MW, a figure that has remained the same in 2024 [2].

Energy Mix of Iraq

Although Iraq has outlined plans to diversify its energy mix, oil remains the dominant source, accounting for 67.32% of electricity production. Natural gas follows with a 30.48% share, while hydropower contributes a modest 2.05%. Solar energy, however, makes up just 0.16% of the total energy mix [3]. This means that a staggering 97.8% of Iraq's electricity still comes from fossil fuels, with only 2.2% generated from low-carbon sources.

Solar Power Applications

Despite Iraq's infrastructure, political, and financial challenges, several solar power applications hold great potential for widespread implementation. These solutions could significantly contribute to meeting the country's growing energy demand, reducing its reliance on fossil fuels, and promoting environmental sustainability. Some key applications include:

1. Solar Photovoltaic (PV) Power Plants

Large-scale solar PV power plants can reduce Iraq's reliance on oil and natural gas by generating electricity for the national grid. These plants can be placed in areas with high solar irradiance, like Al Muthanna and Najaf. A notable example is the 750 MW solar plant under development in Al Muthanna.

2. Off-Grid Solar Systems

Off-grid solar systems are perfect for areas with limited or no access to the national grid. Comprising solar panels, inverter systems, and battery storage, they provide reliable electricity to rural homes, schools, and healthcare centers, reducing dependence on diesel generators. NGOs like GIZ have installed these systems, improving living conditions and ensuring vital services, like healthcare and education, continue without frequent power disruptions in remote locations.

3. Solar-Powered Water Pumps for Irrigation

Solar-powered water pumps are a key application of solar energy in Iraq's agriculture sector. These pumps provide an effective solution to water scarcity, using clean energy, especially in areas with unreliable electricity. It was announced that projects integrating solar energy with modern irrigation systems will be funded by organizations like the UNDP and U.S. Embassy. This will boost agricultural productivity and reduce reliance on fuel-powered pumps.

4. Solar Water Heaters

Solar water heating systems are cost-effective for both households and businesses in Iraq. They harness solar energy to heat water, reducing the need for electricity or natural gas. Widespread use of solar water heaters can significantly cut energy consumption in the residential and hospitality sectors. However, awareness and training programs are necessary to speed up adoption.

5. Solar Street Lighting

Solar-powered street lights can be used in both urban and rural areas to provide reliable, low-maintenance lighting during frequent power outages. Equipped with solar panels and storage batteries, these systems can improve public safety, ease the load on the national grid, and lower operational and maintenance costs.

6. Solar Energy for Industrial Applications

The oil and gas industry is increasingly using solar energy to reduce operating costs and environmental impact. Shell is launching a new project in southern Iraq to incorporate solar power into heavy industrial operations, particularly at Basrah Gas Company. This initiative aims to reduce gas flaring, a major environmental issue, at Iraq's facilities.

7. Solar-Powered Desalination Plants

Solar-powered desalination plants in Iraq's water-scarce regions offer a sustainable solution to convert seawater or brackish water into drinkable water. Using renewable energy for desalination provides a long-term fix to the country's water shortage, particularly in the southern areas along the Arabian Gulf.

8. Solar Rooftop Systems

Globally, the installation of solar PV systems on residential, commercial, and government buildings is growing, and Iraq can follow this trend. Rooftop solar systems supply clean energy directly to buildings, lowering electricity costs and easing the demand on the national grid. Various government and private sector initiatives are encouraging rooftop solar to boost energy efficiency in urban areas.

Current Off-Grid Market Demand for Solar Panels

The Faihaa Field 2.5 MW Solar Power Plant, located in Block 9, about 50 km north of Basra City, is one of Iraq's first off-grid solar installations. Invested and commissioned by Kuwait Energy Basra Limited, it is a 2.5 MWp solar photovoltaic power plant with a 2.5 MWh battery energy storage system [4]. Off-grid solar panels are rapidly growing in response to chronic electricity shortages and limited grid access in rural areas.

The Iraqi government has approved several initiatives to install solar systems in residential areas to alleviate pressure on the national grid and improve electricity access [5]. As investment permits for solar projects are finalized, both residential and commercial sectors are expected to drive higher demand for off-grid solar solutions.

In isolated villages, nine solar stations now supply daily running water to residents. A total of 156 m² of solar panels were installed across 21 villages, providing solar power to 342 people and ensuring they have access to running water.

Welthungerhilfe's project, benefiting 14,000 returnees, provides smallholder farmers with solar-powered irrigation systems that cut costs by 70%, along with solar-powered refrigeration to preserve fresh farm products [6].

Current and Potential On-Grid Market Demand for Solar Panels

Despite financing challenges and political instability, initiatives like the \$685 million program from Iraq's central bank to support small-scale renewable energy projects are showing potential; although progress is slow, it has great potential [7]. The country's ambitious plan is to install 12 GW of solar power by 2030, covering 33% of its electricity needs, including 7.5 GW already allocated for various projects, and a 1 GW solar plant starting construction in late 2024 and expected to connect to the grid by early 2027 [8]. While selling solar electricity back to the grid is not yet common, the regulatory framework for net metering and feed-in tariffs is developing, which may boost solar demand [9].

Current Major On-Grid Solar PV Projects in Iraq

The Iraqi government is intensifying efforts to integrate renewable energy into the national grid while aiming to reduce gas flaring from oil operations. This strategy addresses power shortages and lowers the country's carbon footprint. Iraq plans to meet one-third of its electricity needs from renewable sources by 2030, aligning with its commitments to reduce greenhouse gas emissions and dependency on imported energy [10]. In 2022 and beyond, Iraq's Ministry of Electricity introduced plans and tenders for the development of several solar power projects in collaboration with international companies.

Below are the major projects that demonstrate Iraq's intent to leverage its abundant solar resources to secure a sustainable energy future. These projects are part of Iraq's strategy to meet its renewable energy targets and diversify its energy mix, aiming to reach 10–12 GW of renewable energy by 2030 [10].

1. TotalEnergies 1-GW Solar Plant (Basra)

One of the most significant solar projects in Iraq is being developed by French energy giant TotalEnergies in Basra. This 1-GW solar PV plant is part of a broader \$27 billion energy deal, which also includes oil and gas infrastructure projects. The plant will be built in phases, with completion expected

by 2025, and will provide clean electricity to 350,000 homes. This marks Iraq's first large-scale utility solar facility and a major step forward in its energy transition [11, 12].

2. QatarEnergy and TotalEnergies Solar Project

In a strategic partnership, QatarEnergy and TotalEnergies are co-developing a solar PV project in southern Iraq, which will generate up to 1.25 GW of solar power, boosting Iraq's renewable energy capacity. The project is expected to become operational between 2025 and 2027 [13].

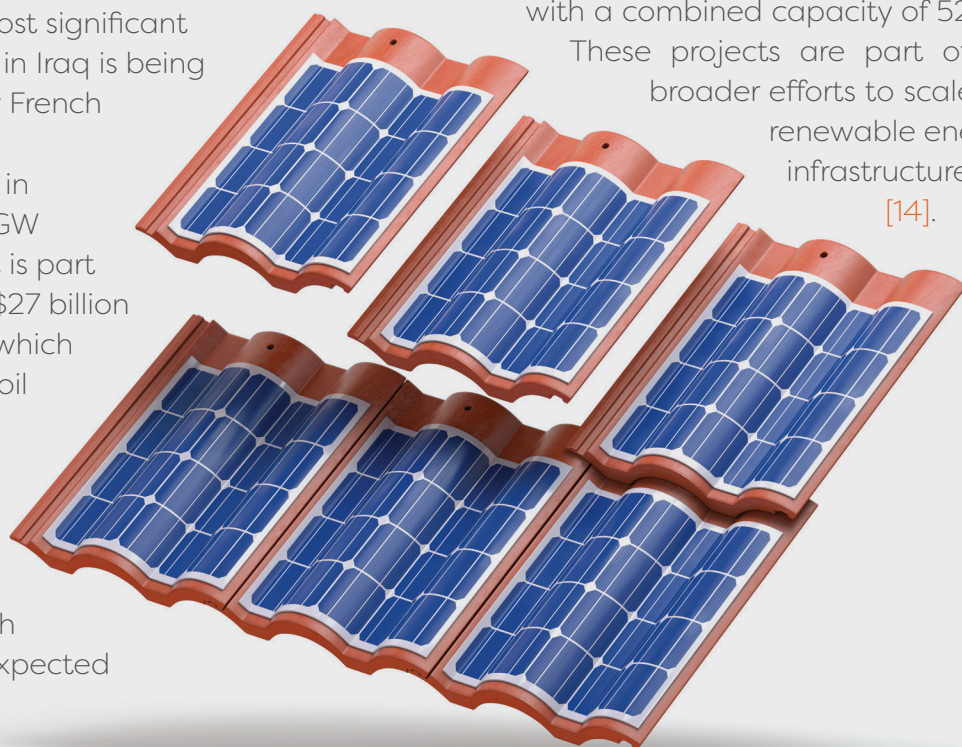
3. 750-MW Solar Plant (Muthanna)

Iraq has invited Saudi Arabian utilities major Acwa Power to finalise an agreement for the construction of a 1,000 megawatt (MW) solar energy plant in Najaf governorate.

4. 525-MW Solar Projects by Al-Bilal Group

Iraqi firm Al-Bilal Group is leading the development of two solar power projects, with a combined capacity of 525 MW.

These projects are part of Iraq's broader efforts to scale up its renewable energy infrastructure [14].



5. 750 MW Solar Power Project by Power China

The Iraqi government has approved a 750 MW solar power project to be developed by the Chinese state-owned conglomerate, Power Construction Corp of China (Power China), in Al Muthanna Governorate, southern Iraq. The project will be constructed in two phases, with the first phase delivering 250 MW. In 2021, Power China reached an agreement with the Iraqi government to develop 2 GW of solar capacity across the country [15].

6. Masdar's 1 GW Solar Projects:

Abu Dhabi's Masdar, in collaboration with Iraq's Ministry of Electricity and National Investment Commission, is developing five solar photovoltaic (PV) projects across Iraq with a total capacity of 1GW [16, 17]. These include:

- A 450 MW plant in Dhi Qar (southern Iraq).
- A 250 MW plant in Ramadi (central Iraq).
- A 100 MW plant in Mosul (north).
- A 100 MW plant in Amarah (southeast).
- Another 100 MW plant in Ramadi.

Projects and Initiatives Led By International NGOs In Iraq

UNDP Solar Projects: The United Nations Development Programme (UNDP) plays a key role in promoting solar energy in Iraq. Working alongside the Government of Iraq and other partners, UNDP has hosted workshops on Open Solar Contracts to improve investment conditions for solar projects. Additionally, they support the implementation of solar solutions for water management and other renewable energy applications, helping to reduce greenhouse gas emissions [18, 19].

USAID-Funded Projects: USAID has funded several solar energy projects in Iraq, focusing on rebuilding infrastructure in post-conflict areas. These initiatives aim to provide sustainable energy solutions that enhance energy access and boost economic resilience. By supporting solar energy, USAID is helping to address power shortages, improve living conditions, and foster long-term development in areas affected by conflict [20].

Solar Initiatives by the ICRC: The ICRC has installed solar panels in various health facilities and hospitals across Iraq, particularly in conflict-affected areas, ensuring uninterrupted health services where electricity access is unreliable. In 2020, the Iraqi Red Crescent Society launched a program to install eight solar-powered reverse osmosis water treatment units, providing clean drinking water to 20,000 people. The ICRC is offering both financial and technical support for these initiatives [21].

Welthungerhilfe (WHH) Solar Projects: WHH has launched solar energy projects in northern Iraq, including the Sinjar and Tal Afar districts, aimed at improving agriculture and food security. They have installed solar-powered water pumps for irrigation in rural areas, offering farmers a reliable and sustainable energy source to boost crop yields. These projects help reduce reliance on diesel generators and the unstable national grid [22].

GIZ brings in experts, policymakers, and the private sector: GIZ has undertaken various projects in Iraq to support solar energy and renewable solutions. In 2021, it prioritized the photovoltaic sector for employment and conducted a survey to recommend strategies for its growth. GIZ is now exploring solar energy usage in public buildings in Anbar, considering various installation methods. Additionally, they are conducting a study on Green Finance to facilitate investment in renewable energy [23].

Capacity Building and Training Programs

Iraq, therefore, with the help of international NGOs, has embarked on different initiatives through training and development programs in order to build its capacity in solar energy. Some of these include:

1. SolAware – Solar Energy for a Decarbonised Future – Knowledge Transfer and Capacity Building

This collaborative project between the University of Mosul and the University of Teesside aims to empower Iraqis to adopt solar solutions. It has provided educational materials on solar energy for university courses and organized outreach campaigns to raise awareness about the benefits of transitioning to solar power. The initiative also focuses on strengthening research capacity in solar technology cooperation between the two institutions [24].

2. United Nations Development Programme (UNDP) Initiatives

- United Nations Development Programme (UNDP) Initiatives for Solar Photovoltaic Energy: Running from 2014 to 2020 with a budget of \$2.2 million, this project aimed to enhance sustainable energy services in Iraq by addressing legal, regulatory, and technical barriers to solar adoption. It included collaborations with the Iraqi government, universities, and the private sector to create policies, technical standards, and legislative reforms [25].
- Promoting Clean Energy in Iraq: UNDP held consultations and training workshops to promote solar energy, focusing on developing local expertise and capacity [26].

3. GIZ (German Corporation for International Cooperation) Training Programs

GIZ has helped set up three photovoltaic training centers in Baghdad, Basrah, and Sulaymaniyah. These centers offer equipment and capacity-building for trainers, preparing future experts in PV installation and maintenance. Additionally, GIZ has conducted various courses to train qualified professionals across Iraq and assessed the needs of MSMEs to identify suitable renewable energy solutions [27].

4. Renewables Academy AG - RENAC Solar Power Iraq

RENAC's program plays a crucial role in enhancing the capacity and offering mentorship to Energy Investment Companies in their consultancy tasks. By focusing on solar technology, the program seeks to build local expertise that will contribute significantly to the growth and development of the renewable energy sector in Iraq. This initiative aims to empower local professionals and organizations, facilitating a sustainable and efficient energy future for the country [28].

5. U.S. Embassy Initiatives

The U.S. Embassy in Baghdad announced an open competition inviting organizations to integrate solar energy into modern irrigation techniques. The aim is to empower Iraq's agricultural potential by improving water management practices through the use of solar-powered irrigation systems. This initiative supports sustainable farming methods and helps address the challenges of water scarcity in the region [29].

6. United Nations World Food Programme (WFP) Collaboration

WFP partnered with the University of Sulaymaniyah to equip the Career Development Centre with a solar power system, addressing electricity shortages. This initiative ensures the continued support of youth by offering training in digital skills, English, and entrepreneurship, thereby promoting sustainable development and empowering future generations [30].

Policies Promoting Renewable Energy in Iraq

In 2018, Iraq introduced the National Renewable Energy Policy and Strategy (NREPS) [31] to promote the expansion of renewable energy. The policy outlines Iraq's goal to achieve 10% renewable energy in its total energy mix by 2028 [32]. It emphasizes solar and wind energy development, alongside efforts to boost research and make renewable technologies more efficient and cost-effective. NREPS provides detailed objectives, regulatory revisions, financial incentives and strategies needed to grow the renewable energy sector [33].

To attract private sector participation and foreign investment, the Iraqi government has introduced supportive financial measures, including feed-in tariffs, which offer a fixed price for renewable energy supplied to the national grid. This model ensures long-term price stability, boosting the financial viability of renewable energy projects.

Additionally, the government provides tax discounts, customs duty exemptions, and other incentives to companies developing renewable energy, aiming to reduce investment risks and facilitate large-scale energy projects [34].



The Power Purchase Agreement (PPA) model is another pillar of Iraq's renewable energy architecture. PPAs provide specific legal and financial provisions for energy from private developers to buy and sell to the national grid [35]. These agreements provide developers with guaranteed revenue, creating a stable and predictable market for renewable energy. This policy plays a crucial role in driving private investment and supporting the growth of the renewable sector in the country.

Iraq is leveraging international cooperation to accelerate renewable energy projects. By joining IRENA, an organization promoting collaboration and scientific exchange on renewable energy technologies, Iraq gains access to shared knowledge, global climate initiatives, technology transfer, and financial opportunities from developed nations within the group [36]. Additionally, Iraq is collaborating globally to adopt best practices and advanced technologies for a fair transition toward a sustainable energy future.

Iraq's economy faces serious threats from low international crude oil prices and pollution. Its heavy dependence on oil and gas makes shifting to renewable energy extremely difficult without risking economic collapse. As one of the world's largest oil exporters, Iraq relies heavily on oil revenues, making a sudden transition unsustainable. However, the country is laying the foundation for gradual change through strategic incentives, international partnerships, and regulatory reforms. Overcoming these structural and

economic challenges will be crucial to achieving its renewable energy ambitions.

Iraq's renewable energy policy is still in its early stages compared to countries like Germany, Denmark, Sweden, China, Costa Rica, and Norway, which have set more ambitious targets. While Iraq aims for 10% renewable energy by 2030, Costa Rica is targeting 100% by the same year, and Sweden plans to achieve full renewable integration by 2040. These nations have adopted comprehensive long-term policies, demonstrating a deeper commitment to renewable energy expansion and integration [37].

Important to note is that current policy mechanisms in Iraq, such as feed-in tariffs and solar tendering procedure mechanisms, are somewhat limited. Other countries present much broader frameworks for electric utility quotas, net metering regulations, and other varied focuses on renewable sources than the current system offers in Iraq.



Solar Companies in Iraq

The growth of Iraq's solar energy market has been accompanied by the emergence of a diverse group of companies offering a wide range of solar-related services. This section provides an overview of the most visible solar energy companies operating nationwide. While the companies listed may not represent every solar business in Iraq, they are among the most viable ventures, identified through their solar products, online presence, and verified locations on Google Maps.

Makers of Baghdad has identified a total of 78 companies across Iraq. The majority are headquartered in Erbil (29 businesses) and Baghdad (26 businesses), reflecting the concentration of renewable energy activity in these urban centers.

These ventures are categorized in this study based on the services they provide:

- **Manufacturers:** These are companies that produce solar products locally. In Iraq, only 16 companies fall under this category, indicating a limited but emerging manufacturing base.

- **Providers:** 67 companies import solar panels and related equipment from international suppliers and sell them directly to consumers.
- **Installation Services:** 54 companies offer professional installation services, which include assessing the site, determining the appropriate system capacity and type, and setting up the system for consumers.
- **Maintenance Services:** After installation, 39 companies continue to support clients through maintenance services, ensuring long-term system performance and addressing any technical issues.
- **Software Providers:** A smaller group of 11 companies provides software solutions that allow real-time monitoring and remote management of solar systems. These systems can detect faults, optimize performance, and issue alerts, offering enhanced control and reliability.

This landscape reflects a dynamic and evolving sector, with a growing number of companies offering end-to-end solar solutions. While manufacturing is still in its early stages, the rise of providers and service-oriented companies demonstrates a clear demand for solar technology and infrastructure, driven by Iraq's urgent energy needs and increasing awareness of sustainable energy solutions.



1. Northern Region

The Northern Region includes Erbil, Sulaymaniyah, Duhok, and Ninawa. With 38 companies, this region has the highest concentration of solar energy ventures in Iraq. Erbil stands out as the national leader in terms of quantity and diversity of services, including several software providers and manufacturers. Sulaymaniyah also hosts advanced companies that provide integrated solutions from installation to remote monitoring. The northern region leads in technology integration and service innovation, with Duhok and Ninawa playing smaller but growing roles.

Venture Name	Provider	Installer	Maintenance	Manufacturer	Software Provider	Location
ARK Vision	✓	✓	✗	✗	✗	Erbil
Alhadbaa Company for Contracting & General Trading Ltd	✓	✓	✓	✗	✗	Erbil
BeTel eENERGY	✓	✓	✓	✗	✗	Erbil
Big Power Solar Energy	✓	✗	✗	✓	✗	Sulaym-aniyah
Infinity Green Power	✓	✓	✓	✗	✗	Erbil
Iraq Solar Energy	✓	✓	✗	✗	✓	Sulaym-aniyah
KESK	✓	✓	✗	✗	✗	Erbil
Karini Tav Company	✓	✓	✗	✗	✓	Duhok
Megawatt Solar	✓	✓	✓	✗	✗	Ninawa
MEGA Sun	✓	✓	✗	✗	✗	Erbil
Managing Of Future Eng Company - MOF Eng	✓	✓	✓	✗	✗	Sulaym-aniyah
Northern Power Limited Company (NPC)	✓	✓	✗	✗	✓	Sulaym-aniyah
NORTH POWER COMPANY LTD	✓	✓	✗	✗	✗	Erbil
Prostar Iraq	✓	✓	✓	✗	✗	Erbil
Power Management Company (PMC)	✓	✓	✓	✗	✗	Erbil
PELK Energy	✓	✗	✗	✓	✗	Erbil
Qaya energy	✓	✓	✓	✗	✗	Sulaym-aniyah

Venture Name	Provider	Installer	Maintenance	Manufacturer	Software Provider	Location
BI-POWER SOLUTIONS	✓	✓	✗	✓	✗	Erbil
BlueRay Energy	✓	✓	✓	✗	✓	Erbil
Energco Iraq	✓	✓	✓	✓	✗	Erbil
Felicity Solar Iraq	✓	✓	✓	✗	✓	Erbil
Gigawatt Company	✓	✗	✗	✗	✗	Duhok
Gimini Group	✓	✓	✓	✗	✗	Erbil
Ideal Solar Energy	✓	✓	✓	✓	✗	Erbil
Solar House-Iraq	✓	✓	✓	✓	✗	Erbil
Solar Green Agate	✓	✓	✓	✓	✗	Erbil
Solar Service Energy	✓	✓	✗	✗	✗	Erbil
Solar-Iraq Energy	✓	✓	✗	✗	✓	Sulaym-anayah
Solotech	✓	✓	✗	✗	✗	Erbil
Suness Solar Battery Iraq	✓	✗	✗	✓	✗	Erbil
Sunlid Solar	✓	✗	✗	✓	✗	Erbil
Uzay Electric Co	✓	✓	✓	✓	✗	Erbil
Varin Energy	✓	✓	✓	✗	✗	Erbil
Volt Guide for Power and Control Solutions	✓	✓	✗	✗	✗	Erbil
Voyage Energy	✓	✓	✓	✗	✗	Erbil
Zandicons	✓	✓	✓	✗	✗	Erbil

2. Middle Region

The Middle Region, encompassing Baghdad, Najaf, Karbala, Salah Al-Din, and Al-Qadisiyyah, is home to 34 solar companies. Baghdad dominates the region with 26 companies, offering a broad range of services, especially in provision and installation. Compared to the Northern Region, the Middle Region shows less emphasis on software-based solutions but demonstrates strong market coverage and access to urban and semi-urban consumers.

Venture Name	Provider	Installer	Maintenance	Manufacturer	Software Provider	Location
Al-Makhzoumi for renewable solar energy	✓	✗	✗	✗	✗	Najaf
Alwadi Alakhdar company	✓	✓	✓	✗	✗	Baghdad
Al-Aman Company	✓	✓	✓	✓	✓	Al-Qadisiyyah
Alfurat Solar Ilc	✓	✓	✓	✗	✗	Baghdad
Al- Nabaa	✓	✓	✓	✗	✗	Baghdad
Al Waidh Power	✓	✓	✓	✗	✗	Baghdad
Aswar	✓	✓	✓	✗	✗	Baghdad
Altaraib co	✓	✗	✗	✗	✗	Baghdad
Alzahra Solar	✓	✗	✗	✗	✗	Karbala
Al-Wadaq Group for Information Technologies and Security Solutions	✓	✗	✗	✗	✗	Najaf
Alzahra Solar	✓	✗	✗	✗	✗	Karbala
Barakat Al Nour Energy Projects	✓	✗	✗	✗	✗	Baghdad
Bilad Utu for Energy Solutions	✓	✗	✗	✗	✗	Baghdad
Bluestorm	✓	✗	✗	✗	✗	Baghdad
Barakat Al Nour Energy Projects	✓	✗	✗	✗	✗	Baghdad
Delta Middle East Ltd	✓	✓	✓	✗	✗	Najaf
EBT	✓	✗	✗	✗	✗	Baghdad
Free Lights Company	✓	✗	✗	✗	✗	Baghdad
Green Power	✓	✓	✗	✗	✗	Salah Al-Din
GlobalTek iq	✓	✓	✓	✗	✓	Baghdad
Helio Solar Energy & Smart Solutions	✓	✓	✗	✓	✗	Baghdad
International Solar Energy Company	✓	✓	✓	✗	✗	Baghdad

Venture Name	Provider	Installer	Maintenance	Manufacturer	Software Provider	Location
Kol Al-Manafith for Renewable Energy	✓	✗	✓	✗	✓	Baghdad
NUPADER	✓	✓	✓	✗	✗	Baghdad
Powerzone Solar Energy	✓	✗	✗	✗	✗	Baghdad
Qimah Al Safinah	✓	✗	✗	✗	✗	Baghdad
QHC Solar	✓	✓	✓	✗	✗	Baghdad
SOLAR Planet	✓	✓	✗	✗	✗	Baghdad
Shamas Almaarifa	✓	✗	✗	✗	✗	Baghdad
Solarnet- IQ	✓	✗	✗	✗	✗	Baghdad
Sunaa Al Ibdar Co.Ltd	✓	✓	✓	✓	✗	Baghdad
The Sun	✓	✗	✗	✗	✗	Baghdad
Tanweer Energy Solutions	✓	✓	✓	✗	✓	Baghdad

3. Southern Region

The Southern Region includes Basra and Dhi Qar and is home to 6 companies. Although smaller in number, several southern companies stand out for their industrial focus and technical capabilities. Basra, given its strategic role in the oil and gas sector, has companies that offer more advanced technical services, including software-based system management and manufacturing. This region reflects growing industrial demand for solar energy solutions.

Venture Name	Provider	Installer	Maintenance	Manufacturer	Software Provider	Location
Basra Future Energy	✗	✓	✓	✓	✓	Basra
Briq Al Qimma Solar Energy Company	✓	✓	✗	✗	✗	Basra
Energy House Iraq	✓	✗	✗	✗	✓	Basra
Noor Renewable Energy LTD	✓	✓	✓	✗	✗	Basra
Power Maxma	✓	✓	✓	✓	✗	Basra
Rafah Thi Qar Company	✓	✓	✗	✗	✗	Dhi Qar
SGS Iraq	✓	✓	✓	✓	✗	Basra

Recommendations

Countries like Germany and Denmark have adopted extensive renewable energy policies, offering incentives for both large and small-scale solar projects, enforcing utility obligations, and supporting various renewable sources like biomass, hydropower, and geothermal energy.

Several best practices from these countries could be availed by Iraq to further reinforce its policies of renewable energy, including:

- 1. Clear, long-term renewable energy targets:** Aligning Iraq's goals with global ambitions by setting clear, more aggressive targets.
- 2. Diversifying energy sources:** Expanding beyond solar and wind to include other forms of renewable energy such as biomass and hydropower.
- 3. Public investments, grants, and subsidies:** Establishing government-backed financial support to lower the cost of renewable energy projects and attract private investment.
- 4. Startup Incubation and Access to Finance Programs:** Iraq could benefit from startup innovation in the field of solar energy. By providing startup incubation programs and access to finance initiatives, many startups will emerge to offer different innovative solutions and create more awareness of adopting off-grid solar energy solutions among Iraqis.
- 5. Robust net metering and billing regulations:** Introducing mechanisms that encourage individuals and businesses to generate renewable energy and sell excess power back to the grid.

Moreover, cooperation with countries like Costa Rica, Sweden, and Germany would allow Iraq the opportunity to acquire knowledge transfer from these countries regarding their experience in developing an integrated renewable energy approach. This will, in turn, enable Iraq to develop a renewable energy policy framework best suited for its unique energy landscape, enabling it to exploit its rich solar potential while diversifying into other renewable sources.



Lastly, this table provides a targeted gap analysis on the development of solar power in Iraq, focusing on major challenges and proposed actions in five categories: Energy Capacity, Technical Infrastructure, Human Capital, Regulatory Framework, and Market Development. It identifies underutilized solar resources, insufficient technical and human resources, poor regulatory backup, and an underdeveloped market. For every gap, there is an accompanying brief recommendation that will act as a guide for stakeholders in speeding up adoption and developing a sustainable energy future in Iraq.

Category	Gap Identified	Recommendation Actions
Energy Capacity	Significant underutilization of solar potential	- Scale up installation projects - Increase investment in infrastructure - Streamline project approvals
Technical Infrastructure	Inadequate technical capabilities	- Establish testing facilities - Develop integration systems - Create maintenance centers
Human Capital	Significant skills shortage	- Expand training programs - Develop certifications - International partnerships
Regulatory Framework	Underdeveloped policy framework	- Implement net metering - Develop feed-in tariffs - Create investment incentives
Market Development	Underdeveloped market ecosystem	- Support local manufacturing - Strengthen distribution networks - Improve quality control

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