Tunisia

Solar investment opportunities

SolarPower Europe

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Project Information: The SolarPower Europe Global Markets Workstream was launched in March 2018 and has since then become an active working group with more than 150 experts from more than 70 companies. The objective of the Workstream is to identify opportunities for business and cooperation and thereby contribute to the energy transition in emerging markets outside Europe.

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Foreword

Tunisia has enormous solar potential with its significant global horizontal irradiation, improved investment framework, and highly educated and skilled talent pool to support the ambitious *Plan Solaire Tunisien*. However, until now, the country has fallen short of the intermediate targets that it set itself. More so now than ever, the focus is on how to achieve the objectives of the *Plan Solaire Tunisien* and drive the Tunisian energy transition forward.

The SolarPower Europe Global Markets Workstream launched in March 2018 to identify new avenues for business and cooperation globally and contribute to the global energy transition. Since its creation, the workstream has continued to grow and now comprises 150 experts from more than 70 countries, with a significant portfolio of investment reports on emerging markets around the world.

This report builds upon the first edition on solar investment opportunities in Tunisia. This update contains the latest economic and political developments in the country, and updated figures for Tunisia's new solar capacity, electricity tariffs, and energy mix. Moreover, the recommendations have been updated to take into account the changing dynamics of the Tunisian energy sector.

This update of 2020's Tunisia report is the eleventh in a series of SolarPower Europe market reports that include: Mozambique, Senegal, Côte d'Ivoire, Myanmar, Kazakhstan, India, Tunisia, Latin America, Algeria, and the Middle East. These reports have enabled fruitful discussions between SolarPower Europe's members and key energy sector stakeholders in the respective countries, including public and private sector representatives as well as international organisations. All the reports can be downloaded from www.solarpowereurope.org, free of charge.

In addition to the market reports, in the past year, the workstream has produced a number of input papers for the European Commission on EU energy diplomacy and the external dimension of the European Green Deal. We are also cooperating with the International Renewable Energy Agency (IRENA), the International Solar Alliance, the Global Solar Council, and cooperation programmes such as GET.invest to support the scale-up of solar energy in emerging markets.

If you would like to be part of our activities, discover new solar business opportunities, and have a say in shaping EU global policy, join SolarPower Europe's Emerging Markets Workstream.

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1 Context

Tozeur photovoltaic power plant, Tunisia. © KfW-Bildarchiv/Jonas Wresch

TABLE 1 MACROECONOMIC DATA FOR TUNISIA

Official languages	Arabic (Minority Berber languages and French also spoken unofficially)
Capital	Tunis
Currency	Tunisian Dinar
Surface area (2018)	163,610 km^2
Population (2021)	11,935,764
Population density (2021)	77 people/km^2
GDP (2021)	US$ 46.84 billion
GDP per capita (2021)	US$ 3,924.3
GDP growth (2021)	3.3%
Internet connections (2020)	72% of population
Mobile phone connections (2020)	126 subscriptions per 100 people

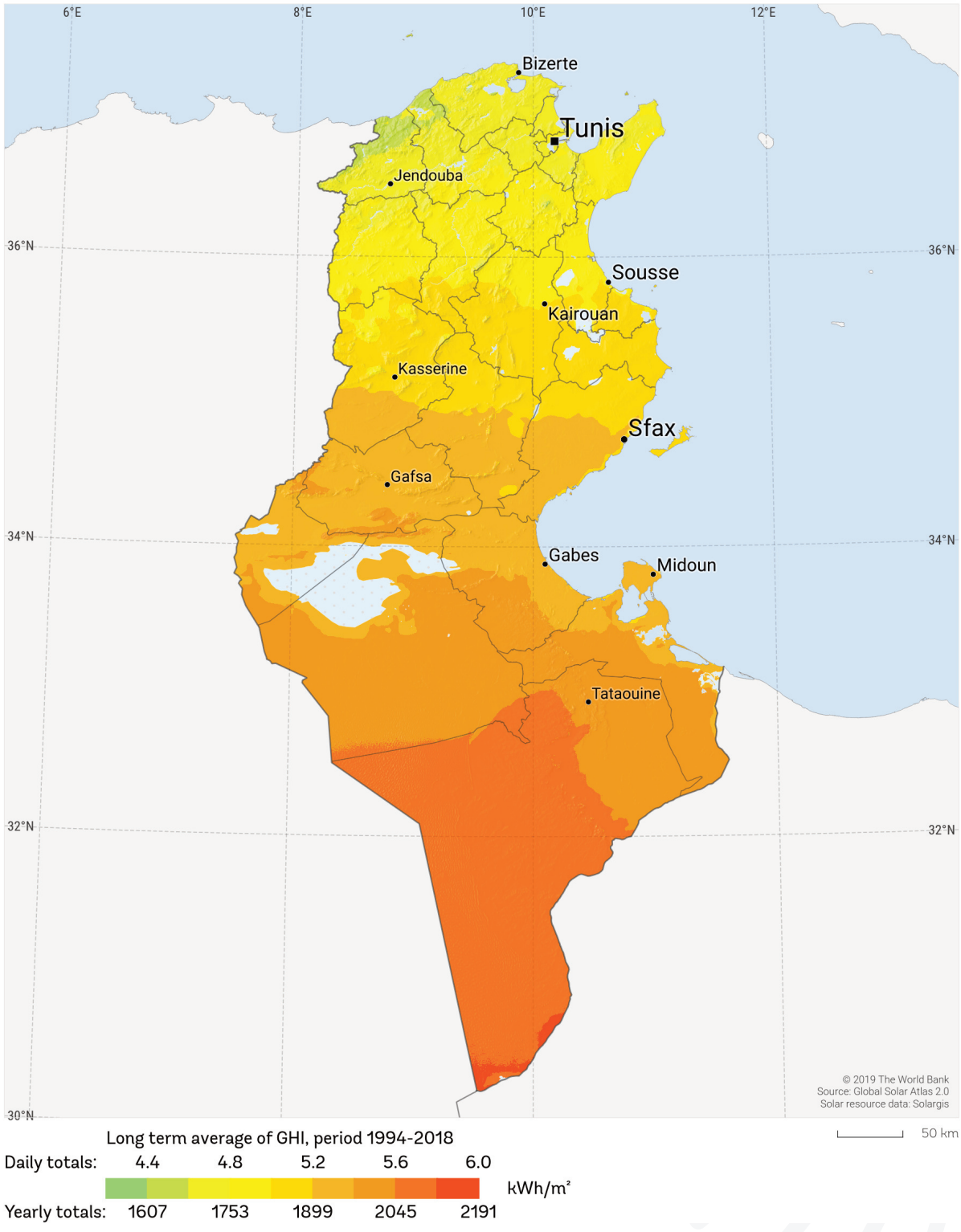
SOURCE: World Bank Group, 2018, 2020, 2021.

1.1. Energy geography

Tunisia has an abundance of energy resources. Alongside its potential for solar and wind power, it also possesses natural reserves of oil and gas. Tunisia's traditional reliance on these natural reserves to fulfil its energy needs is coming under increasing strain with energy production shrinking markedly (nearly a 40% decrease since 2010) and demand increasing (power consumption is growing at a rate of 5% annually). This has led to Tunisia becoming largely dependent on imported energy. In 2021, approximately 98% of Tunisia's electricity was generated from natural gas, of which 45% was imported, predominantly from Algeria (MIME, 2021).

Tunisia has strong solar potential and the country's average global horizontal irradiation stands at 5.30 kWh/m^2/day (1,934.5 kWh/m^2/year). This value varies across the country, peaking at over 2,000 kWh/m^2/year in the southern part of the country. This results in 1,895 kWh/kWp of power production. These framework conditions means that Tunisia has all the natural resources required for an attractive market. Similarly, the cost competitiveness of producing electricity from solar energy makes it an efficient option for reducing Tunisia's dependence on imported energy and presents a significant development opportunity.

FIGURE 1 GLOBAL HORIZONTAL IRRADIATION MAP OF TUNISIA



SOURCE: SolarGis 2022.

1.2. Demographics

Tunisia has a population of over 11.9 million inhabitants with a median age of 32.8, the oldest in the region (25.5 for North African countries and 31.0 for the world), and with a lower-than-average population growth of +1% in 2021 (compared to the African average of 2.6%).

Tunisia had a population density rate of 77 people/km_2 in 2021. Most of the population lives in urban areas (70%) but the rate of urbanisation has slowed markedly over time (1.4% in 2021 against 3.7% in 1990). In parallel, the urban population growth rate is stagnating (-0.1% in 2021). This can be explained by the combined effect of low annual population growth (+1% in 2021) and the low fertility rate (2.2 births per woman in 2020).

Most of the population is concentrated along the Mediterranean coast, particularly in the regions of Ben Arous, Nabeul, Sousse, Sfax and Tunis.

1.3. Macroeconomic context

With a GDP of US$ 46.84 billion in 2021, Tunisia's GDP places it in between Jordan (US$ 45.24 billion) and the Democratic Republic of Congo (US$ 54 billion) and its GDP per capita above Egypt and Sri Lanka (US$ 3,924.3 for Tunisia, US$ 3,876.4 for Egypt and US$ 3,814.7 for Sri Lanka). Compared to other African countries, the GDP per capita of Tunisia is higher, ranking among the ten top countries in Africa. In terms of growth, Tunisia shows promise, with an improving GDP growth rate over the past few years, from 1% in 2015 to a projected rate of 2.2% in 2022. It is expected to slow to 1.8% in 2025 (IMF, 2021).

The key sectors of the Tunisian economy are (CIA World Factbook, 2019):

- Agriculture (10.1% of GDP) (2017 est.)
- Industry (26.2% of GDP, mainly textile exports)
- Services (63.8% of GDP, essentially information and communication, technologies, and tourism)

The Russian invasion of Ukraine and subsequent increases in commodity prices have put additional pressure on the Tunisian economy since the beginning of 2022. Declining local production of hydrocarbons, combined with rising demand for energy and staple crops has further widened the trade deficit, which reached 8.1% of GDP by the end of the first half of the year.

Inflation spiked from 6.7% in January 2022 to 8.1% in June 2022, and the public budget deficit is forecasted to reach 9.1% in 2022 by the World Bank, compared to 7.4% in 2021. This led the Tunisian Central bank to raise interest rates by 75 bps to 7% in May 2022 while pursuing local funding as access to international financing remains difficult. Moody's and Fitch credit rating agencies both classed Tunisia as poor quality and a very high credit risk respectively in 2021 and 2022.

The degradation of Tunisia's trade balance has put additional pressure on public finances, notably by means of subsidy spending. However, this had a reduced impact on the economy in 2022, as the travel and tourism industries recovered to pre-pandemic levels, boosting GDP growth to 2.7% in 2022, according to the World Bank

In the face of the current challenging global economic conditions, the Tunisian economy's recovery remains fragile. The structural reforms proposed by the IMF, will be key to setting the country on a solid growth path once more.

1.4. Business environment

The Doing Business Index is published annually by the World Bank and offers a general picture of the efficiency of the country's economic system. It measures the impact of regulatory and fiscal discipline on business activities and the ease/difficulty of doing business in the country through the analysis of selected criteria such as fiscal discipline, access to credit, international trade, tax, register of property titles, and investor protection.

Holding the 80th place in the *Ease of Doing Business* ranking in 2019, Tunisia is the fifth country within the MENA region and ranks between Oman (78th) and Qatar (83rd). In the evaluation of Tunisia's business environment, "Paying Taxes" is the most important barrier for the investors' initiative. The total tax and contribution rate of 60% of the profit in Tunisia is extremely high compared to an average of 32.7% in MENA and Africa and 39.8% in OECD countries.

To improve the business environment, Tunisia launched the *Plan de Développement* (its national development plan) 2016-2020 . This plan included a new investment regulation that led to the creation of the *Conseil Supérieur de l'Investissement* (High Council for Investment). This body ensures the removal of obstacles and the flexibility of administrative channels for investors. This plan grants tax benefits to foreign investors over 10 years as well as the possibility of acquiring real estate and exploiting agricultural land (without being able to become owner). It also simplifies procedures defined by the Central Bank of Tunisia (BCT) concerning the transfer of profits made and certain assets. The plan provides for the creation of an investment fund to finance infrastructure and major projects in disadvantaged regions. Currently, the Ministry of Economy and Planning is developing a new plan for 2023-2025 and a comprehensive Vision Tunisie 2035. To date, the government has committed to further reducing barriers to investment including legal provisions for foreign ownership of companies and assets and simplified administrative procedures for exchanging foreign currency and securing lines of credit.

According to SACE, the average credit risk of Tunisia is high, with a score of 79/100. Liquidity and bank treasury are an issue in Tunisia. This leads to scarcity of capital and/or high interest rates (TMM), which in turn can penalise the profitability of energy projects.

1.5. Political and social context

Following elections in 2019, Kais Saied, an independent social conservative, supported by the Islamic-oriented party Ennahdha, was elected for President in a peaceful democratic process. In response to economic difficulties in the country, and the rising number of COVID-19 cases, President Saied froze parliament on 25 July 2021. On 29 September 2021, President Saied announced that he had appointed Najla Bouden as the country's new Prime Minister. Bouden is also Tunisia's and the Arab world's first female Prime Minister. In a further move to address the ongoing political turmoil in Tunisia, President Saied organised a national referendum on a new Tunisian constitution on 25 July 2022. The vote was in favour of the new constitution which rebalances powers between parliament and the President, and reforms the judicial system.

In June 2022, the Government issued a comprehensive National Reform Programme. The Tunisian authorities have also been discussing a new Extended Fund Facility with the IMF to secure a US$ 4 billion rescue package to support the country's economic policies and reforms since 2021. The deal, which is expected before the end of 2022, is conditional upon the formal agreement of labour unions to the reform programme, the use of funds to reform the economy (including food and energy subsidy cuts, public sector wages and the restructuring of state-owned companies) instead of recurrent expenditure, and the proposal of a clear implementation timeline for the programme from the Government.

The IMF confirmed its continued support for reform in Tunisia following the approval, by referendum, on July 25, of the new constitution. On August 12, Prime Minister Najla Bouden, UGTT labour union chief Noureddine Taboubi and UTICA commerce union chief Samir Majoul officially agreed on a "social contract" to address the country's issues.

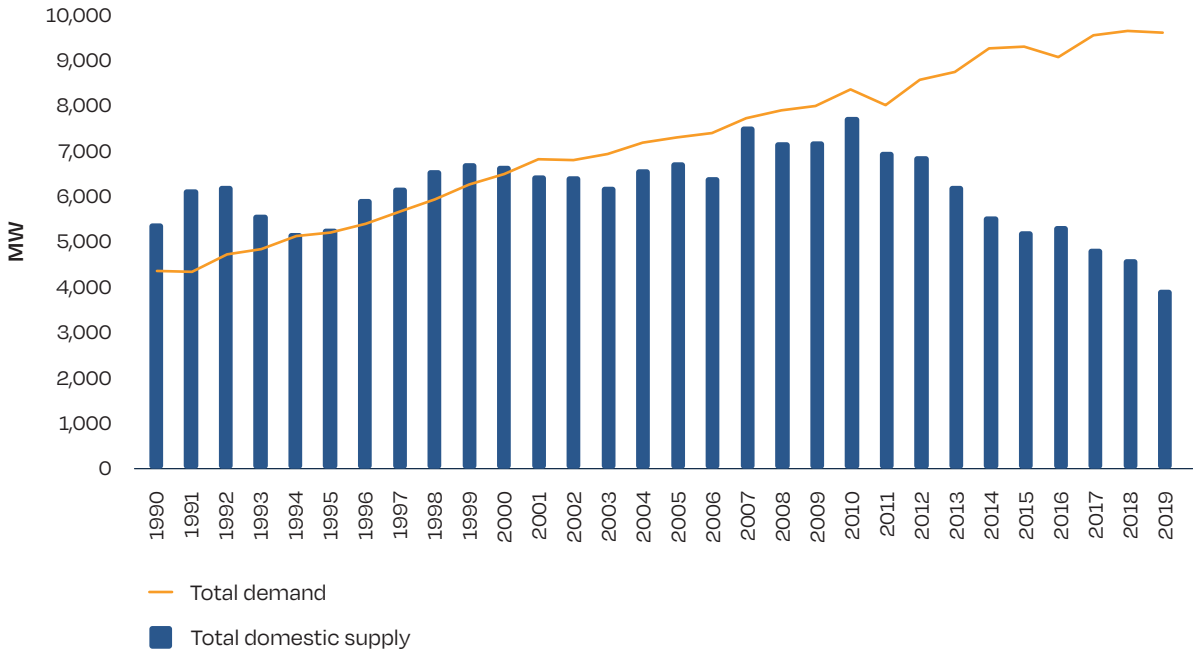
2 Electricity market

Tozeur photovoltaic power plant, Tunisia. © KfW-Bildarchiv/Jonas Wresch

2.1. Energy and electricity sectoral overviews

Tunisia has a wealth of energy resources at its disposal. Historically, it has relied predominantly on its natural reserves of oil and gas to supply domestic its energy demand and serve its export market. However, over the last decade, the energy production of Tunisia has strongly decreased, while demand for energy within the country has continued to increase. Between 2010-2019, the primary energy demand increased approximately 16%, whilst production dwindled by 43%. This resulted in Tunisia transitioning from a largely energy independent country (95% energy independent in 2010) to relying predominantly on neighbouring countries, such as Algeria, to supply its energy needs (49% energy independent in 2022). This energy deficit, coupled with the Tunisian Dinar's (TND) depreciation has had a significant impact on the country's current account balance.

FIGURE 2 TUNISIA'S TOTAL DOMESTIC SUPPLY VERSUS TOTAL DEMAND 1990-2019



SOURCE: IRENA, Renewables Readiness Assessment Tunisia, 2021. Data from MISME, 2019

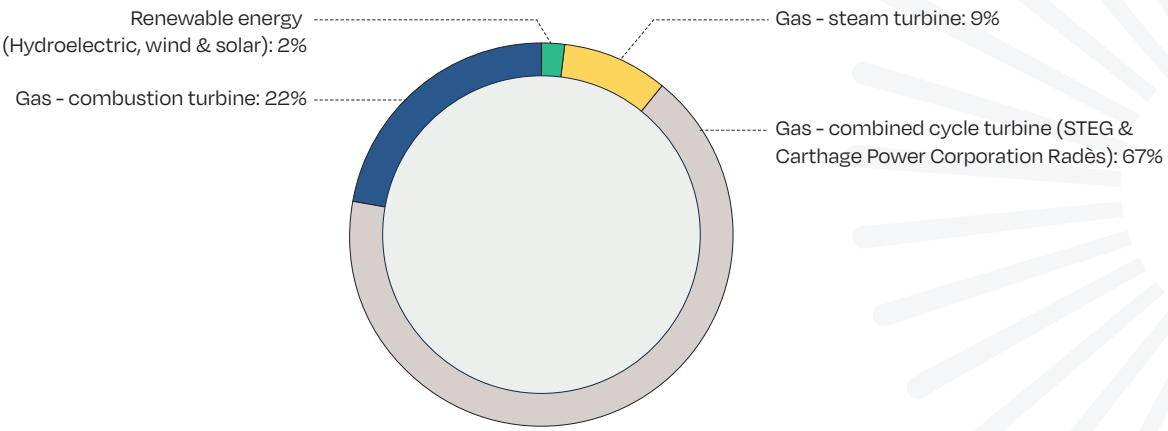
The increasing dependence on imported energy has led to policymakers seeking to exploit Tunisia's enormous solar potential. The country is endowed with an average global horizontal irradiation of around 1,850 kWh/m^2/year. The overall horizontal solar irradiation exceeds 1,900 kWh/m^2/year in the southern half of the country and is more than 2,045 kWh/m^2/year in the region of Tataouine. In addition, despite surging manufacturing and transportation costs, utility-scale solar PV remains the least expensive option for adding new electricity capacity in terms of LCOE, even more so amid rising natural gas and coal prices.

The evolution of the Tunisian electricity sector follows the same broad trends as the energy sector. After several decades of being a net energy exporter, oil and gas production has been in decline as electricity consumption has been increasing steadily (5.21 TWh in 1990, rising to 21.18 TWh in 2021). Rising electricity demand also contributed significantly to Tunisia's transition to a net energy importer in 1999. According to the *Agence Nationale pour la Maîtrise de l'Énergie* (ANME), in 2019 Tunisia had an energy deficit of around 5,672 ktoe (49% of the total energy consumption), equal to around 20% of the country's total trade balance deficit. The situation improved slightly in 2020, driven largely by a COVID-related drop in consumption, but demand rose by 3.1% in 2021 as economic activity picked up once more. However, this did not result in an increase in imports of Algerian gas, which fell from 3,098 ktoe in 2020, to 2,551 ktoe in 2021 (STEG, 2022). This can largely be explained by a marked increase in gas production by STEG owned power plants, from 1,829 ktoe in 2020, to 2,162 ktoe in 2021 (STEG, 2022). Nevertheless, the situation remains precarious and has led to energy security problems and power outages during major summer heat peaks.

In 2021, 97.2% of the electricity produced came from fossil fuels (20.72 TWh), with only 2.8% from renewable energy sources (STEG, 2022). In 2021, Tunisia had a total installed capacity of around 5.94 GW, with 5.47 GW owned by the *Société Tunisienne de l'Electricité et du Gaz* (STEG) and 471 MW owned by the *Carthage Power Corporation*. Moreover, in 2021, the Government of Tunisia launched a tender for the construction of at least one 470-550 MW combined-cycle power plant in Skhira (south Tunisia) as an IPP, further adding to the country's conventional power generation capacity (STEG 2020). This project is yet to be awarded to a developer.

Renewable energies have also started to grow in the country with an installed capacity of around 322 MW, broken down as follows: wind (240 MW), hydro (62MW) and solar (20 MW) (STEG, 2022).

FIGURE 3 TUNISIA'S ELECTRICITY MIX IN %, BY TYPE, 2021



SOURCE: STEG Annual Report, 2021.

In the wake of the 2020 COVID pandemic, Tunisia updated its 2009 *Plan Solaire Tunisien* (PST), further strengthening the role of renewable energy and energy efficiency, making them a key part of the country's recovery plans, and seeking to reduce fuel imports and improve energy independence. Overall, by 2030 Tunisia aims to reduce primary energy demand by 30%, while increasing the share of electricity production from renewable energy to 30%, thanks to 3.6 GW of incrementally installed capacity – to be achieved with investments up to € 3 billion (IRENA 2021). These targets were further updated in July 2022, when the Ministry of Industry, Mines and Energy revised the national targets for renewable energy, increasing the share of renewables in energy production to 35% by 2030.

2.2. Electricity infrastructure

The energy system in Tunisia is vertically integrated. The Société Tunisienne de l'Électricité et du Gaz (STEG) is the state-owned, vertically integrated energy utility company, which has the following missions:

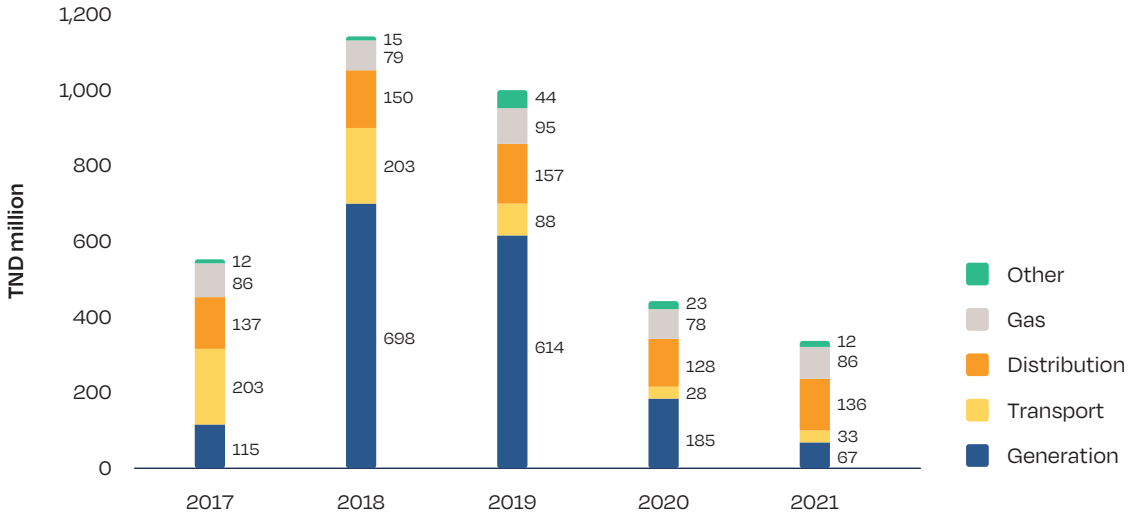
- The electrification of the country
- The development of a natural gas network
- The construction of electricity and gas infrastructure

STEG is responsible for the production of electricity and Liquefied Petroleum Gas (LPG), as well as for the transmission and distribution of electricity and natural gas.

Generation

As of the present, Tunisia mostly relies on STEG, its national energy utility, to produce most of the electricity in the country (92.1%), while the Carthage Power Company owns the other 7.9% . However, the weight of IPPs should increase in the next few years with the Tunisian Government increasingly supporting private developers to develop renewable assets, an ambition laid out in the PST. STEG owns a diversified production portfolio, which is divided into 25 production units (gas turbines, steam turbines, combined cycle, hydraulic, solar and wind power) with an installed capacity of around 5.47 GW in 2021 (STEG, 2022). STEG's renewable energy power plants include two 10 MW solar plants (Tozeur 1 and Tozeur 2) which started commercial operation in April and June 2022, respectively (MIME, 2022).

FIGURE 4 INVESTMENTS IN THE TUNISIAN ELECTRICITY SECTOR



SOURCE: STEG, 2022.

FIGURE 5 TUNISIAN ELECTRICITY GRID INFRASTRUCTURE

SOURCE: STEG, 2018.

Thanks to interconnections between the two countries, Tunisia buys part of the surplus produced by Algerian power plants, with an exchange threshold of 200 MW . Tunisia also has interconnections with Libya, which has comparatively better infrastructure, though it may have been neglected for some time due to conflicts. A 600 MW interconnection (project ELMED) between Tunisia and Italy is being developed and should be completed by 2027 , financing agreements have already been signed by the Tunisian Government and the World Bank and the relevant studies were concluded in 2021 (STEG, 2022). Extensions of existing and planned connections (with Italy, Algeria and Libya) are also being considered. Developing interconnections with neighbouring countries and Europe is considered a key factor by Tunisian authorities and STEG to enable higher shares of solar and wind generation in the electricity mix.

Transport

Investments in the transmission network peaked in 2017/2018, decreasing between 2019 and 2021. This translated into a network growth of 5.3% in 2017-18, (mostly in 150kV and 90kV network), reaching 6985 km in 2019, before decreasing slightly to 6,793 km in 2020 (due to the decommissioning of some lines). There was no further development of the transmission network in 2021 and the distribution is as follows:

- 210 km of 400 kV transmission network
- 2,902 km of 225 kV transmission network
- 2,331 km of 150 kV transmission network
- 1,360 km of 90 kV transmission network

Investments and several feasibility studies have been completed to prepare the grid to integrate decentralised generation from renewable energy sources. Over the next few years, a significant strengthening of the 400kV network is expected with the construction of new connections between the South and the North of the country.

Distribution

At the end of 2020, STEG operated and maintained a network of 183,189 km of Medium and Low Voltage lines. The network continues to expand with a growth of 1.5% compared to 2019 (180,419 km) (STEG, 2020).

The positive distribution of the network has seen the electrification rate grow to 99.8% . Following the country's independence in 1962, rural electrification has consistently been one of the priorities of the various national development plans. A rural electrification plan was launched in the 1970s. In 1973, half of the country's population lived in rural areas and only 6% of them were connected to the electricity grid. Thirty years later, the electrification rate was 99.8% (The World Bank, 2022).

2.3. Actors, tariffs, and regulatory framework

The different institutions that structure the energy sector in Tunisia are:

- The Ministry of **Industry, Mines and Energy**, (*Ministère de l'Industrie, des Mines et de l'Énergie*), MIME: responsible for electricity infrastructure, planning and the implementation of national policy in the field of electricity, energy efficiency and renewable energy. MIME has also regulatory oversight, and monitors supply/demand evolution, as Tunisia still lacks an independent regulator.
- The **Directorate General for Electricity and Renewable Energy** of the MIME: responsible for implementing state policy in the renewable energy sector and examining requests for private production and self-consumption of electricity from renewable energy.
- The **National Agency for Energy Conseration** (*Agence Nationale pour la Maîtrise de l'Energie*), **ANME**: a public institution in charge of implementing the state's policy in terms of energy efficiency and the promotion of renewable energies.
- The **Société Tunisienne de l'Electricité et du Gaz, STEG**: the state-owned energy utility company, which has a monopoly on production, transport and distribution of energy (see above).
- The **High Commission for Independent Power Production** (*Commission Supérieure de la Production Indépendante d'Electricité*): established under Law No. 96-27, was organised as an inter-ministerial body responsible for deciding on the procedures and selection criteria for the public tender process to (i) select independent power producers (IPP); (ii) award contracts to IPPs; (iii) pass rulings on granting tax incentives to IPP investors, the benefits from which are to be granted to the developers of concessions; as well as any other matter relating to independent power production.

- The Interdepartmental Commission for Independent Power Production (*Commission Interdépartementale de la Production Indépendante d'Electricité*): an inter-ministerial body serving as a de facto regulator. It is responsible for suggesting the terms and conditions to be granted to IPP concession developers, reviewing the reports and examination of tenders submitted for decision to the High Commission for Independent Power Production, monitoring the negotiations for concession awards and securing public subsidies on a case-by-case basis. Moreover, the Interdepartmental Commission for Independent Power Production is responsible for proposing the extension of concession benefits and overseeing matters relevant to the implementation of projects submitted by the Ministry of Energy, Mines and Renewable Energies.
- The Technical Commission for Renewable Energy (*Commission Technique des Energies Renouvelables (*CTER)): approves power generation projects from renewable sources, subject to the system of authorisation under the Ministry of Energy, Mines and Renewable Energies while approving extensions to the validity of authorisations. In addition, CTER is the entity responsible for verifying the feasibility of developing private renewable projects on lands belonging to the state domain. It also examines all queries and concerns relevant to the production of electricity from renewable energy resources.
- Gesellschaft für Internationale Zusammenarbeit (GIZ): GIZ is the German development cooperation agency. It has been supporting the PST and providing capacity building to enhance the capabilities and understanding of renewable energy of domestic financiers, industrial players, policymakers and public authorities.
- European Bank for Reconstruction and Development (EBRD): The EBRD is also very active in Tunisia, organising technical capacity building for STEG, and providing liquidity for a sovereign guarantee. It has also provided debt financing to two 50 MW solar projects, won by Scatec under the concession regime.
- Agence Française de Développement (AFD): Creation of a credit line Sunref, providing better conditions than regular financing and offering possible grants with UBCI, UIB, Amen Bank and BH Bank, with facilities comprised between € 10 and 20 million. AFD are also providing financial and technical assistance to STEG for the development of a smart grid in Sfax.
- International Financial Corporation (IFC): Loan of € 40 million to Attijari Bank to support climate related projects and smaller business. It has also been approached by the Tunisian government to provide financing for a 100 MW project under the country's concession regime.
- United Nations Development Programme (UNDP): Support of the PST as part of their Nationally Appropriate Mitigation Actions (NAMA) activities. Recently, they have sought to accelerate the country's progress towards to its Nationally Determined Contribution (NDC) through a five-year project, started in 2021, which focuses on capacity development, improvement of governance structures, and mobilisation of investments.
- European Commission (EU): Funding of the Tozeur PV Plant (10 MW) for € 1.5 million, "Energy Transition Goal" Programme, support for the improvement and operationalisation of regulatory and technical measures to develop renewable energies with regards to grid reinforcement and the implementation of an independent regulating authority of the electricity sector. Tunisia is also in the scope of the EU External Investment Plan (EIP), which has a specific focus on de-risking renewable energy projects. The EU is also providing subsidies for ANME-led energy efficiency and renewable energy projects.

Other institutions such as the Green Climate Fund (GCF), the Islamic Development Bank (IsDB), the European Investment Bank (EIB), the German development bank (KfW), and the African Development Bank (AfDB) also have renewable energy related activities in Tunisia.

Although announced in June 2018 and despite the World Bank's recommendations, there is no independent regulatory authority (World Bank, 2019). It has been recognised that the creation of such an authority could speed up the development of renewable energies in the country as it would streamline decision-making and be authoritative with regards to regulatory matters that bear political significance. The independent regulator would also offer more clarity on the legal energy framework as well as arbitration on the access conditions to the networks, prices, and investments.

Tunisia's electricity tariff system is complex and still subsidised. For general low voltage, the tariffs depend on monthly consumption and the consumer's sector.

Tunisia also offers a large range of incentives and subsidies for renewable energy projects. These include:

- *Fonds tunisien de l'Investissement* (Tunisian Investment Fund, FTI): a public fund created in 2016, which provides grants to projects in some specific sectors including renewable energy. The FTI can also invest in equity in some projects.
- *Project d'Intérêt National* (Project of National Interest): qualification criteria on investment size (> € 16 million) or job creation (500 jobs). The project stipulates grants and tax reductions, following the approval of the *Conseil Supérieur d'Investissement*. In the framework of this project, the state also might finance a part of infrastructure work.
- *Fonds de Transition Energétique* (Energy Transition Fund, FTE): offers grants, equity financing and improved loan terms to firms willing to invest in renewable energies (mostly for self-consumption projects).
- Fiscal support, reduced VAT on "renewable energy components", and lower customs tariffs are available for renewable energy projects if there is no local equivalent available. There is also a reduced corporate income tax, depending on the firm's income and location of the project (no tax for a few years, then reduced corporate income tax).
- Regional development: qualification criteria on investment size (> € 4.5 million). The government offers grants for projects developed in some regions of Tunisia, subject to the approval of a specific commission.

2.4. New developments for solar power

To tackle the problem of energy dependence and to combat climate change, Tunisia launched the PST in 2009, a tool designed to increase the share of

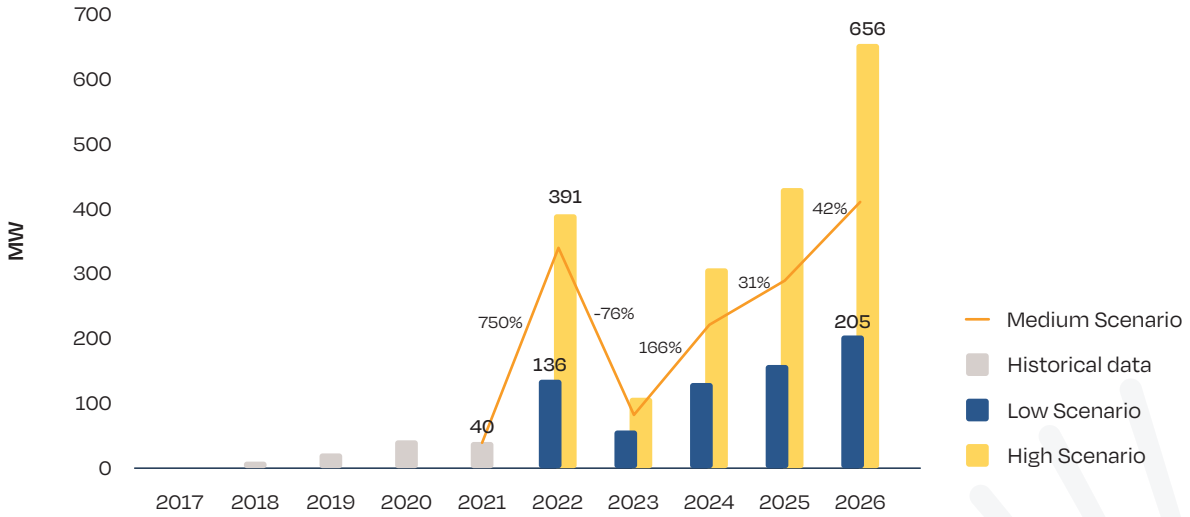
TABLE 2 TUNISIAN ELECTRICITY PRICES

		POWER FEES (€ CENTS/KW/MONTH)	ENERGY PRICE (€ CENTS/KWH)			
			DAY	PEAK MORNING SUMMER	PEAK EVENING	NIGHT
Tariffs HV	Regular Price	309	7	11	10	6
	Emergency	161	8	12	11	6
Tariffs MV	Regular Price	154	9			
	Outside core hours	340	9	13	11	7
	Pumping for Irrigation	-	11	NA	Erased	9
	Irrigation	-	8	Erased	10	6
	Emergency	185	10	14	13	8

Source: STEG 2022.

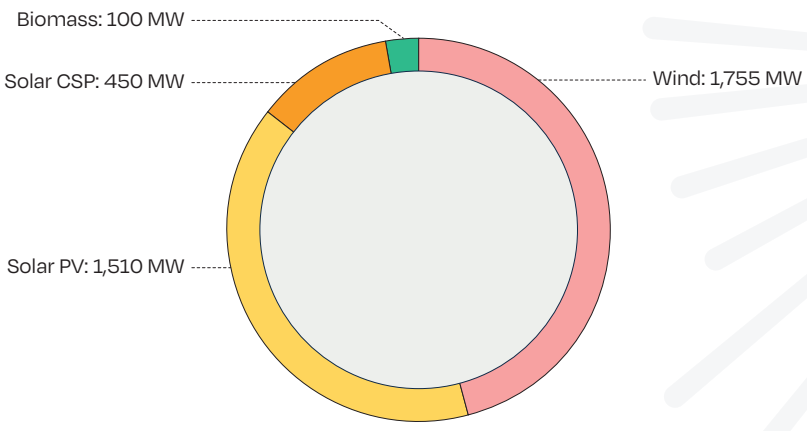
renewables in the final electricity mix. This was then updated by ANME in 2015 and adopted by the government in July 2016. To achieve the country's updated objectives, the 2015 update of the PST established a target for total installed renewable energy capacity at 1,860 megawatts (MW) by 2023 and 3,815 MW by 2030. The total necessary investment between 2016 and 2030 was estimated at 15 billion dinars (ca. € 4.7 billion). Originally, this was meant to equate to 30% of the national targets for renewable energy. However, this was increased in July 2022 to 35% by MIME. To achieve this new target, the Tunisian government plans to invest US$ 294 million/year to develop more than 4 GW of additional renewable energy projects by 2030 (enerdata, 2022).

FIGURE 6 TUNISIAN ANNUAL SOLAR PV MARKET - HISTORICAL DATA AND FORECAST FOR THE UPCOMING FIVE YEARS



SOURCE: SolarPower Europe, 2022.

FIGURE 7 RENEWABLE ENERGY INSTALLATION TARGET BY 2030 ACCORDING TO THE *PLAN SOLAIRE TUNISIEN*



SOURCE: ANME 2022.

To achieve these objectives, the government passed law N°12-2015 on electricity production from renewable energies in 2015. This law completes the existing regulatory framework and provides a legal framework for the development of large-scale renewable energy projects. The 12-2015 law distinguishes three main support mechanisms for renewable energy projects (GIZ, 2019):

- Electricity production for **export**: currently not used.
- Electricity production for **self-consumption ("auto-production")** and sale of surplus: mainly used by energy-intensive industries, either on-site (and planned off-site soon). The surplus is sold to STEG (Law 2009-7) within the limit of 30% of the annual energy production.
- Electricity production for the needs of the Tunisian local market sold under a Power Purchase Agreement (PPA) to be concluded between the producer and STEG for a period of 20 years, extendable for 5 years. This is divided into two regimes:
  - The **authorisation regime**: Projects below 10 MW for solar energy and 30MW in Wind, awarded upon call for tender process.
  - The **concession regime**: Projects over 10 MW for solar and over 30 MW for wind, awarded via concessions after calls for tenders.

Despite the efforts undertaken, the share of renewable energies in the electricity mix was only 5% at the end of 2020, far from the initial objectives. The barriers identified were, among other things:

- The complexity and duration of procedures for granting authorisations.
- The absence of an independent regulatory authority for the electricity sector.
- The legal impossibility for project developers to sell electricity from renewable energies to large electricity consumers.
- The challenge for renewable energy investors to access sites owned by the state.

Subsequently, a set of measures to accelerate the implementation of renewable energy electricity generation projects was presented and approved by the Ministerial Council on 28 February 2018.

Law N°12-2015 was amended by the law N. 47-2019 (dated 29/5/2019), with adjustments to allow for corporate PPAs. This provides the right for companies adopting renewables for self-production to sell electricity to other consumers or companies, without trespassing the 30% threshold of annual production set by MIME, using the national grid network to transport this surplus electricity.

In addition, Government Decree No. 2020-105 (25/2/2020), amending and supplementing Government Decree No. 2016-1123 (24/8/2016), set the conditions and modalities of projects[1] for the production and sale of electricity from renewable energy, paving the way to the creation of project companies that sell electricity directly to eligible self-consumers.

Authorisation regime

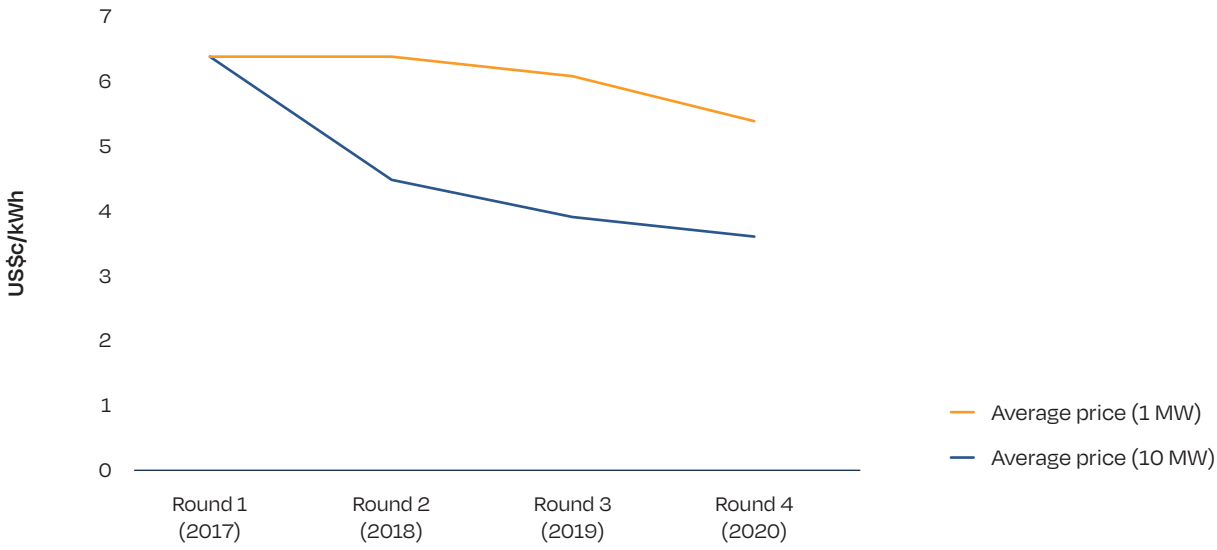
In the framework of the "authorisation regime", four rounds of call for projects have been published, all are either 1 MW or 10 MW and spread over 30 different sites in the regions of Tataouine, Kasserine, Kairouan, Sidi Bouzid, Sfax, Gafsa, Sousse and Béja.

Launched annually from May 2017, each call for projects has resulted in increasingly low average prices. From the first round of projects in 2017, one 1 MW plant has already started commercial operation, with two of the 10 MW projects due to start operations shortly. In total, seven of the ten projects from the first round have successfully formed SPVs. From the second round (May 2018), five of the 16 projects have formed SPVs. However, projects from the third and fourth rounds are either yet to be awarded or were awarded too recently to create SPVs.

The authorisation regime has faced several challenges. The challenges of securing financing affected the number of bids submitted in earlier round of tenders, despite strong interest from developers. Unattractive local financing conditions were especially prevalent in the first round of the authorisation project, meaning projects were mostly

1 The key requirement is that the entity purchasing energy shall hold shares in the energy-producing entity.

FIGURE 8 AVERAGE PRICES FOR 10 MW AND 1 MW PROJECTS UNDER THE RESPECTIVE ROUNDS OF THE AUTHORISATION REGIME



SOURCE: MIME, 2021.

won by local developers. In these cases, the tariffs were not indexed to a hard currency (e.g. US$, €), forcing developers to rely on local financing. When bids were made in November 2017, the average money market rate (TMM) was of 5.23%, and commercial interest rates of 7-7.5%. In less than two years, the TMM increased by half, reaching 7.8%. This made projects barely bankable and slowed completion. As of now, without the generous subsidies given through the Fonds tunisien de l'Investissement (FTI) and Fonds de Transition Energétique (FTE), these projects would simply not be pursuable. Conditions improved in the second round of the authorisation project, with all winning consortia, except the ones covering the 1 MW tranches, including international developers able to generate financing from abroad at more competitive and stable interest rates. This trend has largely persisted through the third and fourth rounds as well.

Concession regime

In May 2018, Tunisia launched a tender for five solar PV projects in the framework of the "concession regime" totalling 500 MW, which were also open to international companies. In November 2018, sixteen national and international developers have been pre-qualified for this tender.

In December 2019, results showed extremely low bids, below US$ 30/MWh. The Tataouine 200 MW project recorded the lowest tariff ever reached in Africa at that time with US$2.4c/kWh. Results indicated Scatec Solar (200 MW in Tataouine, 50 MW in Tozeur, 50 MW in Sidi Bouzid, US$ 2.4c/kWh), NAREVA/ENGIE (100 MW in Gafsa, US$ 2.8c/kWh) and TBEA/AMEA Power (100 MW in Kairouan; US$ 3.4c/kWh) among the lowest bidders, which were set to be awarded. The selected developers have signed power purchase agreements (PPAs) with STEG for a concession period of 20 years under a build-own-operate (BOO) model. Before entering into force, these agreements must be approved by the Assembly of People's Representatives. Between October and December 2021, the Government granted its final approval for the projects, clearing the way from awardees to complete financing and begin construction of the plants. In March of 2022 the Tunisian government ratified the PPA for TBEA/AMEA Power's 100 MW solar PV power plant in Kairouan following approval from the Assembly of People's Representatives. To date this is the only plant under the concession regime to reach this milestone (PV Magazine, 2022).

See Table 3 for a overview of the projects awarded under concession regime.

The bids promoted under the Concession regime signalled some shortcomings which deserve attention. For example, half of the prequalified bidders withdrew from the process during the tender. Among those are some of the leaders in the IPP industry. It is plausible to speculate that some of these withdrawals (especially in the case of financially solid entities) may be related to the terms of the PPA. Indeed, the European Bank for Reconstruction and Development (EBRD) assessed the PPA terms as not fully bankable (EBRD, 2018), an assessment confirmed by UNDP. The lack of state guarantees in PPAs has likely also reduced the appetite of some development finance institutions and well-known financing institutions.

TABLE 3 OVERVIEW OF THE PROJECTS AWARDED UNDER THE CONCESSION REGIME

PROJECTS	SUCCESSFUL BIDDER	AC POWER (MW)	TARIFF (DT/MWh)
Tozeur (A)	SCATEC Solar	50	79,379
Sidi Bouzid (B)	SCATEC Solar	50	79,379
Kairouan (C)	TBEA/AMEA	100	97,920
Gafsa (D)	Engie/Nareva	100	79,950
Tataouine (E)	SCATEC Solar	200	71,783

Source: MIME, 2022.

Box 1. Bankability of PPAs in Tunisia

The PPA template originally proposed by the Ministry of Industry, Mines, and Energy for the authorisation regime was found not to be completely bankable, according to international standards (EBRD, 2018). The absence of a state guarantee, as well as terms linked to changes in the law, force majeure events, and litigation mechanisms were too weak for some developers and development finance institutions. The Ministry is responsible for designing PPAs and for ensuring that they are competitive for the private sector, and attractive to investors. This is the reason why amendments were proposed between the first and second rounds of the authorisation regime.

As of today, seven of the ten projects in the first round of the authorisation regime have found their own financial resources and have recently been successfully connected, or are about to begin operation. Other projects have reached an advanced stage of development and have secured non-recourse debt financing structures.

There is no doubt that strong PPA terms can significantly impact the speed of project development. Local banks are playing an increasing role in the local renewables economy, especially in the financing of smaller 1 MW solar PV projects. There are some examples of lending mechanisms supported by the Agence Française de Développement (AFD) and rolled out locally, which allow banks to lend at better conditions than regular loans from commercial banks (e.g., Ligne SUNREF). Here, the bankability of PPAs is less of a risk, as both the amount of money involved and the size of the projects are smaller.

Despite the result of the bid rounds, the implementation phase of the projects has lagged behind the initial timeline, meaning that the private sector contribution to the country's renewable sector is yet to be fully realised.

In May 2022, the Tunisian energy minister, Naila Nouira announced that three tenders totaling 2 GW of renewable energy capacity would be published. The size of the tender is intended to reduce the reliance on imported Algerian gas (Reuters, 2022). However, currently this tender is still awaiting publication. The total investment for the three tenders is projected at US$ 1.6 billion. The tenders are reported to include several 100 MW solar PV projects (enerdata, 2022).

Thanks to the efforts described above, Tunisia has a good position in the Regulatory Indicators for Sustainable Energy (RISE), scoring above the average of African countries (overall score: 84).

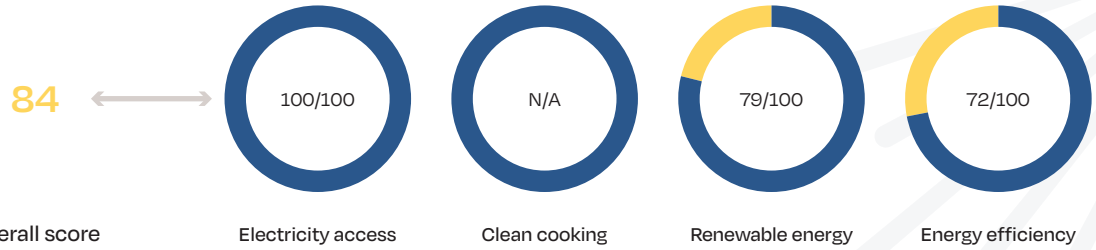
The RISE scores reflect a snapshot of a country's policies and regulations in the energy sector. The score looks at the three pillars identified by the the SEforAll initiative: Energy Access, Energy Efficiency, and Renewable Energy. Indicators are assigned to each pillar to determine scores. According to this index, Tunisia's score is 84/100 , above the average of African countries (RISE, 2022).

TABLE 4 PLANNED RENEWABLE ENERGY CAPACITY ADDITIONS BY STEG AND UNDER THE AUTHORISATION, CONCESSION, AND SELF-PRODUCTION REGIMES

REGIME	RESOURCE	2018-2021 (MW)	2022 (MW)	2023 (MW)	2024 (MW)	2025 (MW)	TOTAL (MW)
Authorisation	Solar PV	274	70	-	70	-	344
	Wind	120	-	-	-	-	120
Concession	Solar PV	500	200+300	200	200	200+300	1,900
	Wind	300	150	150	150	150	900
Self-production (low, medium and high volgate)	Solar PV	160	350				510
	Wind	0	150				150
STEG	Solar PV and Wind		380				380

Source: MIME, 2022.

FIGURE 9 REGULATORY INDICATORS FOR SUSTAINABLE ENERGY (RISE) FOR TUNISIA



SOURCE: RISE 2022.

3 Recommendations

Tozeur photovoltaic power plant, Tunisia. © KfW-Bildarchiv/Dawin Meckel/Ostkreuz

3.1. For Tunisian policymakers

Despite efforts to contain the fiscal deficit, the economic situation remains fragile, and policymakers should look to solar as a key driver of job creation and a more resilient economy.

Tunisia is heavily dependent on fossil fuels, relying mainly on imported gas to meet the primary energy demand. The increase of renewables in the energy system would make the Tunisian economy more resilient and able to cope with global fluctuations in commodities. Furthermore, renewable energies offer the undisputed advantage of being rapidly deployable, cost-effective and environmentally sustainable, providing consumers with fast, affordable and clean energy. Over the past decade, Tunisia has been resolutely committed to an energy transition strategy based on the development of renewable energies, a sector with high potential for the direct and indirect creation of stable jobs. The country must continue to build a comprehensive and stable regulatory framework, with particular attention to the secondary legislation in order to make it fully and promptly enforceable.

The targeted capacity additions and timelines communicated by MIME in 2022 should be followed.

Previously, the PST set an intermediary target of 12% of renewable energy in the energy mix by 2020. However, the country is still some way from reaching this, calling into question whether the goals of the PST were too ambitious. The updated target of 35% of renewable energy in the final energy mix has been accompanied by a detailed schedule for capacity additions between 2022-2025. To reinvigorate the market, establish stability, build confidence, and attract more investors, MIME should stick to the schedule they have set, as this provides a clear intermediate horizon for market development. Well-designed tenders will attract participants and facilitate the financial structuring of projects. Tenders should be based on clear rules and technical parameters such as size, location, permitting process, and timeline, in order to produce outcomes in line with MIME's schedule. This would help speed up project implementation and construction. Moreover, national energy planning should not only cover generation, but also investments and a roadmap for the national transmission network. In other words, there is a need to further coordinate generation and transmission programmes. This is a key element of providing visibility to investors on grid stability, as significant volumes of renewable energy are due to be integrated into the power system.

The creation of an Independent Energy Regulatory Agency is essential for the development of the renewable energy sector.

Regulatory and operational roles need to be clarified and clearly separated to avoid conflicts of interest. A Regulator should be created, to oversee the liberalisation of the electricity sector and prepare the ground for the development of interconnections and cross-border trading of electricity with neighboring countries and Europe.

The state-owned energy utility, STEG, is the sole authorised off-taker of electricity produced by private projects for local consumption, and of the surplus – up to 30% - from the self-production regime. Moreover, STEG is a member of the commission tasked with granting authorisations for renewable projects for local consumption and self-production. Finally, STEG is the grid operator responsible for ensuring overall efficiency and reliability of the Tunisian network. Thus, the organisation of the market is currently relatively simple and structured around STEG. As the market evolves and becomes more complex, an impartial Regulator could help to balance the interests of a larger number of stakeholders. The Regulator should be responsible for providing generation licenses, setting the requirements for connection to the power grid and granting third-party access to the electricity network for self-production. The Regulator may also be responsible for defining fair energy tariffs, and cost-reflective wheeling charges for third party access to the grid.

Revising the size of the utility-scale projects for future rounds of the authorisation regime could also be a good way to help them reach financial closure.

Currently, the sizes of utility-scale projects under the authorisation regime in Tunisia (up to 10MWp) tend to fall below the capacity threshold that would interest most Development Finance Institutions (DFIs). If more DFIs were involved in Tunisia, they might pool with local commercial banks and thus enhance their capabilities. As an additional benefit, DFIs would be able offer more competitive financing conditions to such projects.

The bankability of PPAs for renewable energy projects should be improved for the authorisation regime by learning from the experience with the concession regime.

Under the authorisation regime, policymakers should consider introducing a state guarantee on the electricity produced to increase the attractiveness of investments. PPA terms and conditions related to change of law, termination compensation, force majeure and dispute resolution should be revised in line with international standards, to further improve investor confidence. DFIs should be equally involved in PPAs under the authorisation regime to help replicate the progress made under the concession regime.

The financing capacities of renewable energy by local commercial banks should be further supported.

Continuing to offer subsidised financing facilities for renewable energy projects could be a useful tool. The offer of concessional loans through state-owned banks on more competitive terms (long-term financing, reduced interest rate, non-recourse, etc.), as well as co-financing mechanisms with DFIs and local commercial banks should also be explored. Such measures could significantly strengthen local capabilities to develop projects at a relatively low cost to the government.

Administrative processes for renewable energy grid connection should be further streamlined to reduce transaction costs and increase investment attractiveness.

The current challenges are mainly due to delays in receiving information and responses from the grid operator STEG and in having the grid connection constructed. Some of these challenges could be addressed by simplifying procedures, introducing a one-stop shop, possibly a simple notification system for small projects, and enhancing the use of digital tools to provide information to and communicate with project developers.

Permitting and authorisation processes should be streamlined.

Developers and investors encountered problems in obtaining the numerous permits and authorisations requested and delivered by the Ministries and public administrations, with the consequence of a significant slowdown in the development of projects. Encouraging and facilitating coordination between the Ministries and public administrations, particularly when it concerns issuing permits, authorisations, and licenses, would ensure overlaps in areas of competence could be overcome more smoothly. For instance, an independent Regulator could be dedicated to the permit and authorisation process as facilitator between the different public entities. This would speed up progress towards the PST's objectives.

Ensure long-term certainty and predictability around capacity additions

Achieving higher shares of renewable energy in the electricity mix - as well as successful integration of variable renewable energy sources such as wind and solar energy - into the national electricity grid requires an integrated long-term energy planning process. Yet, the integrated planning for the period 2017–2022 was set mainly by the Ministry of Energy with reference to the objectives of the PST. The preparatory phase of this programme should have included all the relevant stakeholders and should have considered the various aspects relating to the implementation of energy planning, such as access to land.

The long-term energy planning process must be solidified through a participatory approach involving a range of stakeholders, thereby ensuring stronger institutional buy-in and rapid resolution of possible constraints. The plan may also address electricity grid infrastructure development that will help smooth the integration of VRE into the system. The plan should provide long-term visibility on renewable energy development prospects in Tunisia.

Efforts should be focused on building the capacity of Tunisian industry players so that they can play a constructive role in achieving the goals of the PST.

Local companies should continue to be at the heart of Tunisia's energy transition. With the creation of the R&D and training technology park of Borj Cedria in 1983, Tunisia has invested early in the development of local skills that can continue to be leveraged in the context of solar project development. Moreover, consistently with the objective of opening the Tunisian market to European and international players, local companies are increasingly expected to comply with international standards that may be new to them. While concrete results in facing this challenge are being recorded, efforts should continue to be devoted to increasing cooperation with European and international partners to exchange best practices and acquire new skills, often leading to better access to financing opportunities. Key to ensuring the durability of these efforts is **developing the capacities of Tunisian renewable energy industry associations** through international cooperation on industry best practices and building advocacy capabilities. In addition, **clear and comprehensive training programmes should be developed** to help companies upskill their workforces.

Policymakers should look to create incentives to boost the participation of Tunisian companies in calls for tenders.

To help build the capacities of Tunisian companies, most notably installers, there should be incentives to encourage investors to partner with them on tenders. This could be in the form of **giving preference to tender applications that include Tunisian companies.**

Digital solutions and storage technologies should be leveraged to ensure security of supply.

Digital solutions offer effective ways to manage solar PV assets, informing decisions related to their construction, operation and maintenance that can improve efficiency and yield. Energy storage offers a way to balance the variability of renewable energy, easing grid integration whilst also ensuring adequate supply of electricity. Both technologies should be promoted by decision makers and support schemes for individuals and companies looking to invest in this technology should be developed. Similarly, the Tunisian government should look to leverage its international partnerships to encourage technology exchange and uptake.

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