UNLEASH DECENTRALISED DEVELOPMENT IN TUNISIA

Enabling the development of decentralised routes-to-market for RES in Tunisia
About

RES4Africa Foundation

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Contents

Foreword ................................................................................................................................. 5

Abstract ................................................................................................................................ 6

Introduction .......................................................................................................................... 7

Tunisian energy system in a nutshell ..................................................................................... 8

Self-consumption as key for decentralised RES development in Tunisia .............................. 11

Relevant examples of decentralised RES development from other countries ......................... 17

Unleashing Tunisia full potential for decentralised RES development ..................................... 24
List of figures and tables

Figure 1: Representation of Tunisia electricity market layout .................................................. 8
Figure 2: Expected evolution of electricity demand (TWh) ..................................................... 9
Figure 3: Evolution of generation mix in Tunisia (TWh) ........................................................ 9
Figure 4: Breakdown for 2017-2020 Renewables Energy Program (MW) .......................... 10
Figure 5: Self-consumption model ....................................................................................... 11
Figure 6: Detail of plant size for authorized MV / HV self-consumption projects ............ 12
Figure 7: Identified barriers .................................................................................................. 13
Figure 8: Considered phases of project lifecycle ................................................................. 14
Figure 9: Impact of current constraints on project lifecycle phases ................................. 15
Figure 10: Evolution of generation mix in Egypt (TWh) .................................................... 18
Figure 11: Evolution of generation mix in Chile (TWh) ....................................................... 20
Figure 12: Breakdown of RES new-built since 2013 (GW) .............................................. 21
Figure 13: Evolution of generation mix in India (PWh) ...................................................... 22
Figure 14: Evolution of captive generation capacity (plants >1MW) ................................. 23
Figure 15: Summary of recommendations for Tunisia ...................................................... 24

Table 1: Main features of the considered markets ................................................................. 17

List of acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARP</td>
<td>Assembly of the Representatives of the People</td>
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<tr>
<td>EETC</td>
<td>Egyptian Electricity Transmission Company</td>
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<tr>
<td>GW</td>
<td>Gigawatt</td>
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<tr>
<td>HV</td>
<td>High Voltage</td>
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<td>IPP</td>
<td>Independent Power Producer</td>
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<td>LV</td>
<td>Low Voltage</td>
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<td>MV</td>
<td>Medium Voltage</td>
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<tr>
<td>MW</td>
<td>Megawatt</td>
</tr>
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<td>PMGD</td>
<td>Pequeño Medio de Generación Distribuido</td>
</tr>
<tr>
<td>PPA</td>
<td>Power Purchase Agreement</td>
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<tr>
<td>PV</td>
<td>Photovoltaic</td>
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<td>PWh</td>
<td>Petawatt-hour</td>
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<td>RES</td>
<td>Renewable Energy Sources</td>
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<td>SPV</td>
<td>Special Purpose Vehicle</td>
</tr>
<tr>
<td>STEG</td>
<td>Société Tunisienne de l'Electricité et du Gaz</td>
</tr>
<tr>
<td>T&amp;D</td>
<td>Transmission and Distribution</td>
</tr>
<tr>
<td>TWh</td>
<td>Terawatt-hour</td>
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In a continued effort to back the development of renewable energy in the African continent, the RES4Africa Foundation and Afry are glad to present the results of the study examining the barriers to unleashing the development of decentralised routes-to-market for renewable energy sources in Tunisia. As a private sector and member-driven organization, the Foundation serves as a bridge between the European private sector and Tunisia’s policy, providing support at policy and regulatory level, as well as financial de-risking and capacity-building measures. Afry brings deep insights and helps enable informed decision for a sustainable green transition, providing strategic and operational advice across the value chain, underpinned by deep expertise and market insights.

The Tunisian Solar Plan is the national program aiming at reaching the renewable energy development strategy targets. The goal is to increase the total share of renewables in the electricity generation mix to 30% by 2030. To effectively do so, the country’s energy market environment could still be improved. With this study, we are proud to present our findings on Tunisia can reach its full potential in matters of decentralised RES development by opening its market towards private investors and improving the energy off-taking conditions to increase the attractiveness of the self-consumption regime.

We wish to thank all the stakeholders who participated in this study and generously provided their knowledge and insights.

We are convinced that this study can contribute to the realisation of the Tunisian Solar Plan. RES4Africa Foundation and Afry stand ready to collaborate with partners – in the public sector, private sector and civil society – to make this objective a reality.

Roberto Vigotti
Secretary General of RES4AFRICA FOUNDATION

Antonio Nodari
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Abstract

Following the approval of the Tunisian Solar Plan that set a target of 30% RES penetration on domestic generation for 2030, the Government begun a regulatory restructuring process to support the envisaged development of renewables in the country. The national strategy has brought to the introduction of new routes-to-market, tailored to increase the participation of private investors and aiming to accelerate the energy transition in the country. Particularly, a new scheme has been introduced promoting the decentralised development of RES capacity through a self-consumption mechanism. The implemented regulation envisages in principle the possibility for the end-user to rely on a third-party for the development of the plant and to use the existing transmission network to transfer the generated energy to the point of consumption, upon the payment of a wheeling tariff. The current regulatory framework could then attract the interest of Independent Power Producers (IPPs) into investing in the development of RES capacity in the country. However, the self-consumption scheme is still encountering delays to fully take-off due to the lacking of the necessary secondary regulation, which leaves uncertainties from an investor perspective during different phases of project development. This paper aims to show, also through a benchmark analysis, how the market opening towards private investors, the clarification of roles and competences of the main market stakeholder and the optimization of the mechanism for remunerating electricity surplus could help Tunisia accelerating the development of decentralised self-consumption projects, which could eventually lead to an overall improvement of the energy sector situation and to the creation of new workplaces.
**Introduction**

Tunisia has become one of the most dynamic renewable markets in the North-African region with the ambitious target of 30% RES penetration on generation by 2030 (i.e. the 30-30 target). To reach its goals the country has deeply reformed the regulatory framework for renewables, introducing new procurement rules and new routes-to-market. In addition to the public tendering procedures managed by the central authority, the Government implemented a regulatory framework allowing for the decentralised development of RES generation capacity, giving private players the opportunity to invest in the realization and operation of new renewable projects.

In Tunisia, decentralised development is fostered through a self-consumption scheme. The response to the self-consumption scheme has been limited so far and actions must be taken to ensure the success of the initiative. This paper analyses the current situation in Tunisia, also through a benchmark comparison with other countries that have a certain degree of similarity with Tunisia (Egypt, Chile and India), in order to identify and provide recommendations to help Tunisia reaching its full potential in matters of decentralised RES development.
Tunisian energy system in a nutshell

The Tunisian power sector is centralized and totally controlled by Société Tunisienne de l’Electricité et du Gaz (STEG), the national utility company. STEG fully owns and operates the transmission and distribution systems, while owning most of the domestic generation capacity and maintaining the control over its development.

The Tunisian energy sector is still subsidized, with direct subsidies on electricity prices and indirect subsidies on oil and gas prices, both used to cover the difference in price between supply costs and selling prices. In 2014, the increasing weight of energy subsidies on the State budget forced the Government to develop a plan aiming to progressively increase the electricity price by reducing the subsidies.

Following its strategy, the Government has removed the subsidies for industrial clients, producing a 35% rise in the electricity price for these consumers. The mechanism behind the review of the tariffs is not fully transparent, introducing a source of unpredictability also for private investors looking into develop new renewable projects.

In the future, the electricity sector is expected to increase its relevance in Tunisia, driven by increasing power demand. After a slowdown in recent years due to socio-economic contingencies, demand is expected to steadily grow in the next decade going from the 15.5 TWh in 2018 to 30 TWh in 2030, after which the increase of demand will continue setting around 60 TWh in 2050 (Figure 2).

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Source: AFRY Management Consulting

Figure 1 – Representation of Tunisia electricity market layout
The steep increase of demand during the next decade will surely represent a positive driver for the development of RES, which currently cover a minor role in the country’s electricity system (Figure 3). In fact, Tunisian generation mix is still highly dominated by gas-fired generation fuelled with imported gas. Renewables has grown in recent years but they still cover only the 3% of total generation, in spite of the abundancy of local resources.

To exploit local resources and enhance energy independence, Tunisian government has set ambitious RES development targets, implementing also regulatory reforms aimed at allowing the development of new capacity through both public and private investments.

The Tunisian Solar Plan sets a target of 30% RES share on total generation for 2030 (i.e. the 30-30 target), corresponding to 4.7 GW of installed capacity. Tunisia implemented regulatory reforms allowing the development of new capacity through both public and private investments. In particular, Law 2015-12 pushed to promote private investment in RES to add a valuable contribution.
to the 30-30 target by introducing three possible project development regimes:

- **100% electricity sale to STEG for national consumption;** refers to projects carried out under authorization / concession regimes approved by the Ministry of Energy, where the developer commits to sell all the electricity generated to STEG under standard contracts approved by the Ministry of Energy. Decree N° 2016-1123 limits the capacity of new projects built through the authorization process to 10 MW for solar PV and to 30 MW for wind, plants of larger scale are subjected to the concession mechanism. All projects need to obtain approval from the Ministry and from ARP¹, while sale prices are fixed and periodically revised by the Ministry if necessary.

- **Electricity export;** refers to projects carried out under concession contracts granted consistently with RES national goals. Electricity generators are charged a fee for the concession and must provide the State with a share of the electricity produced for export (or with a cash payment) according to specific concession agreement between the State and the power producer. In case new transmission lines are needed, the plant developer bears all the costs related to their realisation. The ownership of new transmission lines is then transferred to STEG, who grants developers the priority right to dispose of such line.

- **Self-consumption,** with the possibility to sell electricity surplus to STEG (described in detail in the next section).

The 30-30 initiative also fixed the following milestones as guidance for RES development:

- the installation of 1,000 MW of RES (both wind and PV) in the period 2017-2020, of which 620 MW in the private sector as shown in Figure 4;

- the installation of additional +1,250 MW of RES (both wind and PV) by 2025;

- the installation of additional +1,565 MW of RES (both wind and PV) by 2030.

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**Figure 4 – Breakdown for 2017-2020 Renewables Energy Program (MW)**

¹ Assembly of the Representatives of the People
Self-consumption as key for decentralised RES development in Tunisia

The Tunisian regulatory framework allows the decentralised development of renewable generation capacity through self-consumption. The realisation of self-consumption projects is regulated by Law N° 2015-12, which identifies two macro categories of end-users, namely Low Voltage (LV) users and High / Medium Voltage (HV / MV) users. Self-consumption for HV / MV users has ideally a large potential because HV and MV users presently cover around 50% of Tunisian demand, and such users may use self-consumption to mitigate the impact of tariff increases. Moreover, self-consumption may open opportunities also for the participation of international IPPs.

Status quo of decentralised RES development

Figure 5 provides a schematic representation of the self-consumption model implemented in Tunisia, showing that under the current regulation, the self-consumer can either coincide with the electricity producer or not.

The current scheme is defined by the dispositions of two different regulations, Law N° 2015-12 and Decree N° 2020-105. The former establishes that any local authority or public / private company operating in the industrial, agricultural or tertiary sectors that are connected to...
the HV / MV national grid can produce electricity from renewable energy for self-consumption purposes, holding also the right to sell surplus to STEG up to 30% of the total annual generation. The latter, amending the dispositions introduced by Decree N° 2016-1123, opens the self-consumption scheme to third-party participation. Consumer and power producer are allowed to create a Special Purpose Vehicle (SPV). The SPV object is limited to the production of electricity generated from renewable energies to be sold to consumers that have subscribed power needs above 2 MW. The contract between the consumer and the self-production company is standardized by the Ministry of Energy, which has not set any limits related to the participation share of the generator in the SPV.

Moreover, the current regulation envisages the possibility for both self-consumers and self-producers to benefit from the right to transport the electricity produced through the national grid, upon the payment of a wheeling tariff which are currently under review by the Ministry of Energy. This introduces the possibility to develop renewable capacity far from the consumption site, therefore opening for IPPs the possibility to participate in the self-consumption scheme.

From 2017, Tunisia has authorised the construction of more than 150 MV / HV self-production projects from RES for a cumulated capacity around 30 MW. Even considering the 70 MW of LV self-consumption projects that have been authorised so far, it can be concluded that the self-consumption scheme has definitely fallen short from the original expectations since the national strategy envisaged 210 MW of self-consumption projects already for 2020. However, the latest regulation update enabling third-party participation brought a new spark to decentralised renewable development in Tunisia, as for the first half of 2020 the average size of authorised MV / HV projects have more than doubled compared to the previous year.

*Figure 6 – Detail of plant size for authorized MV / HV self-consumption projects*
Factors slowing-down decentralised RES development in Tunisia

The implemented self-consumption regulation leaves open points and introduces barriers that might influence the realisation of new projects (Figure 7).

To better understand the factors hindering decentralised RES development, we performed an analysis taking investor’s perspective to evaluate the effect of the identified barriers over the main phases of a project lifecycle (Figure 8).

The identified barriers have been grouped according to a framework for regulatory review which have been already used in previous studies\(^2\). Such framework, which is based on investor’s perspective, focuses on the fundamental elements that create an enabling framework for the scale-up of investments in new renewable energy capacities:

- **Openness**: legislation and regulation that ensure RES development planning and long-term visibility to investors;
- **Attractiveness**: legislation and regulations that ensure competitive development and implementation of RES projects as well as fair competition among power generation technologies;
- **Readiness**: technical regulations that ensure efficient integration and management of increasing RES capacities in national power systems.

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**Bureaucracy**

Regulation is often non-transparent to potential self-consumers or difficult to be implemented. Slow-pace and complex bureaucracy due to undifferentiated procedures.

**Metering**

Limitations of the metering method adopted by STEG affect the profitability of self-consumption projects if production profile is not well aligned with consumption.

**Tariffs**

Electricity tariff evolution (for both purchase and resale) is not predictable since the rationale underlying their revision is not known.

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**Project governance**

Definition of project governance structure updated, open points still to be clarified for self-consumption business model.

**Market governance**

The absence of an independent body with a regulatory function creates uncertainty and instability in the regulation.

**Planning**

Lack of a clear and defined official strategy for both the short-term and the long-term.

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Source: AFRY Management Consulting

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The Missing Link programme, Res4Africa Foundation. [https://www.res4africa.org/missing-link/](https://www.res4africa.org/missing-link/)
The current Tunisian market structure and regulation introduce obstacles that condition the final investment decision, with the overall result of reducing the openness, attractiveness and readiness of the market towards foreign investors. Through our analysis of the Tunisian regulatory framework, we identified where investors might find difficulties when developing a RES project intended for self-consumption (Figure 9).

Despite the recent regulation updates, the project governance structure for self-consumption remains unclear due to several regulatory voids, which reduce self-consumption projects feasibility at larger scale. While the participation of a third player different to the consumer is now allowed, the regulation still leaves some open points about possible project partnerships. Opportunities for third-party developers with no link to producers (e.g. IPPs and cement manufacturers) have been announced but still need to be regulated, while plant co-ownership and schemes for leasing and / or renting the asset have not been explicitly addressed, but also don’t seem in contrast with the current legislation.
The absence of an independent body with a regulatory function and the lack of a clear and defined official strategy for both short-term and long-term create uncertainty and instability in the regulation, challenging projects even at a prefeasibility study level. The current market governance structure remains rigid, as there isn’t an independent body responsible for examining and resolving possible disputes (e.g. conflicts between STEG and the project developer, management of authorization denials, electricity sale contracts related matters like validity, execution, interpretation).

Permitting procedures represent an additional complication as they require great effort and time, especially because they are not differentiated according to plant specificities and / or applicant (e.g. public / private projects, small / large projects). The timing of procedures represents an obstacle for both private and public potential self-consumers, as the pace of procedures results in being “out of step” with the typical timing of decision-making in private companies and often not compatible with procurement procedures in public institutions.

Overall, the barriers mainly affect the possibility of clearly predicting the energy off-taking conditions, in terms of either selling and transporting the energy generated by the renewable plant. Despite the recent favourable upward trend, the electricity tariff evolution is not predictable since the tariffs are not transparently indexed to well identified economic quantities and their breakdown is unknown, making very difficult to forecast their evolution. The same applies to the wheeling tariff, which is periodically revised by the ministry of energy. However,
while an increase of electricity tariffs might be beneficial for the profitability of a self-consumption project, a rise of wheeling tariffs would have a highly negative effect. For this reasons, the unpredictability of tariffs makes a positive investment decision very difficult to be achieved.

An additional obstacle is represented by the methodology for the evaluation of surplus defined by the Ministry of Energy. According to the energy sale standard contract between HV / MV consumers and STEG, the calculation of the surplus is done by comparing self-production and consumption in each time slot of the tariff. It is evident that this limit brings enormous complications, which span from the limitation on plant size for those self-consumers who cannot guarantee sufficiently high consumption, up to the extreme case of nullifying the profitability of the project in case consumption profile is completely misaligned with the production profile.

All the above makes difficult to estimate project profitability, which reflects on the ability for the project developer to go for a positive investment decision, often causing projects to stop at birth.
Relevant examples of decentralised RES development from other countries

In order to identify valuable recommendations to help Tunisia improving the development of decentralised renewable capacity, we carried out a benchmark comparison with three other countries (Egypt, Chile and India) that have a certain degree of similarity with Tunisia. All these countries have implemented schemes oriented to develop renewable capacity through self-consumption mechanisms, including also the possibility of finance the investment through direct Power Purchase Agreement (PPA) signed with the end-users.

Table 1 summarizes the main features of the considered markets.

<table>
<thead>
<tr>
<th></th>
<th>Tunisia</th>
<th>Egypt</th>
<th>Chile</th>
<th>India</th>
</tr>
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<tbody>
<tr>
<td><strong>Market design</strong></td>
<td>Vertically integrated</td>
<td>Vertically integrated</td>
<td>Liberalised market</td>
<td>Liberalised market</td>
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<td></td>
<td></td>
<td></td>
<td>Spot market</td>
<td>Single country-wide market</td>
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<td>with 13 price zones</td>
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<tr>
<td><strong>Electricity price</strong></td>
<td>Regulated tariffs</td>
<td>Regulated, not fully cost-reflective tariffs</td>
<td>Free market for large consumers (&gt;5MW)</td>
<td>Free market for large consumers (&gt;1MW)</td>
</tr>
<tr>
<td></td>
<td>Highly subsidized electricity tariffs</td>
<td>Government progressively reducing incentives</td>
<td>Regulated tariffs for small consumers</td>
<td>Regulated tariffs for small consumers</td>
</tr>
<tr>
<td><strong>Decentralised RES routes-to-market</strong></td>
<td>Self-consumption</td>
<td>Net-metering</td>
<td>Net-metering</td>
<td>Net-metering</td>
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<td></td>
<td>Sale to STEG for local consumption</td>
<td>BOO contracts</td>
<td>Small scale distributed generators</td>
<td>Captive generation for self-consumption</td>
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<tr>
<td></td>
<td>Electricity export</td>
<td>Feed-in-Tariff</td>
<td>PPA</td>
<td>PPA</td>
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Source: AFRY Management Consulting

Table 1 – Main features of the considered markets

*3 Build-Own-Operate
**Egypt**

The Egyptian electricity market is slowly transitioning towards liberalisation, allowing participation of private investors with the final goal of speeding up RES development. The Egyptian Government is currently going through a tariff reform program aiming to gradually lift subsidies on electricity prices. The measures taken so far have brought to a progressive and significant increase of the electricity price paid by end-users. The tariff revision program, originally expected to be concluded by 2019, has been extended and it is now scheduled to be completed for 2022. Generation and T&D are still mainly provided by government-owned utilities, with only few private stakeholders involved. The generation mix is dominated by gas-fired plant, while RES penetration remains below 10%, with solar and wind combining for 2% of the total generation.

Recently, the Government pushed to unlock RES potential setting a renewable penetration target of 20% for 2022, to be raised at 45% by 2035, and introduced several schemes aiming to boost the development of renewables through a greater involvement of private investors (Renewable Energy Law - decree no 203/2014). Among these, the Egyptian Government implemented a net metering scheme for solar PV plants having nominal capacity lower than 20 MW that generate electricity for self-consumption purposes.

Under the net metering regime, all the self-produced energy is netted from the user’s consumption and the entire generated surplus can be sold to a distribution company. The surplus electricity is remunerated at a fixed Feed-in-Tariff calculated according to the recent purchase price contracted between the EETC⁴ and a solar energy producer. The payment for the electricity injected into the grid is made on annual basis.

The scheme allows the participation of a third-party, that develop and fully owns the plant with the final purpose of selling the generated electricity to the end-user. At the

![Figure 10 – Evolution of generation mix in Egypt (TWh)](source: Global data 2018)

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⁴ Egyptian Electricity Transmission Company
moment, a solar plant must be built within the end-user’s premises for participating to the self-consumption and receive the Feed-in-Tariff. According to the Ministry of Energy, wheeling would be permitted in 4 years’ time after determining the exact costs for using the network at various voltages without incentives.

Due to a current situation of oversupply, EgyptERA⁵ and the Ministry of Energy have put on hold the development of new decentralised RES capacity. However, the consumer response on this self-consumption scheme has been positive as presently there are applications for a total of 350 MW of solar projects against a total awardable capacity of 300 MW. The success of the initiative is linked to a number of factors, namely:
- the presence of the EgyptERA as independent regulator granting stability in the regulation;
- steadily increasing number of public PPA agreements between solar producer and EETC will provide a solid base for determination of cost-reflective tariffs for solar self-consumption projects;
- allowing third-party participation;
- incentives in the form of a 30% deduction of the net taxable profits for the first 7 years of the life of the project are granted to renewable self-consumption projects.

Furthermore, the Government also allowed Independent Power Producers (IPPs) to enter PPA contracts with eligible consumers and directly sell them the produced electricity. However, the development of new capacity through PPA is still at an early stage and so far represents a popular option only for energy intensive industries and oil & gas companies with Paris Agreement obligations.

### Chile

The electricity market in Chile has been liberalized since 1982, when generation and T&D were fully privatized. The outstanding potential of renewable sources and the extended participation of private investors has been driving the development of RES in Chile in the recent years, driven also by the ambitious 70% RES penetration target fixed for 2050. Currently, hydropower availability allows to reach a RES penetration above 40% of the total electricity generated. RES total installed capacity has almost doubled compared to 2012 level driven by development of Solar PV (+2.7 GW) and Onshore Wind (+1.6 GW).

The Chilean market is surely an attractive target for RES developers, who can choose among different access strategies according also to the intended project capacity. The regulation envisages a route-to-market for the decentralised development of renewable power plants, limiting the plant size to 9 MW and introducing also the possibility to use the generated electricity for self-consumption purposes. Such plants are referred as Small scale distributed generators (PMGD⁶ in the Spanish acronym) and they are currently mainly solar PV plants. Despite solar PV

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⁵ The Egyptian Electricity Utility and Consumer Protection regulatory Agency
⁶ Pequeño Medio de Generación Distribuido
PMGD plants account for 22% of the total installed solar capacity in the country, only 5% of the installed capacity under the PMGD scheme has been developed for self-consumption purposes. Among the reasons why PMGD projects have had limited success in self-consumption configuration is the restraint on relying to a third-party for developing the project.

The liberalised market allows energy intensive consumers to freely procure the electricity they need, also through direct PPA with the developer. PPAs have been extremely successful for the development of RES capacity because they support the bankability of RES projects despite high volatility and decline of electricity prices. A large portion of the new RES plants installed since 2013 has been built through corporate PPA agreements (Figure 12).

Therefore, the successful development of RES decentralised projects directly relates to the presence of a fully liberalised market, which introduces the possibility to make use of corporate PPA for directly approaching energy intensive consumers. The liberalised market ensures freedom of participation and transparency in matters of project development procedures.
Furthermore, the success of decentralised RES development in Chile is related to:
- market stability ensured by the Independent Co-ordinator of the National Electricity System, which acts as an independent legal entity established by law with the main purpose of co-ordinating the operation of all national electricity system facilities in an efficient and safe way;
- national policies that introduced emission taxes for conventional generators and minimum RES share on electricity consumption for end-users and for distribution companies, starting from 5% in 2010 to reach 10% in 2024;
- grid connection procedures designed with the final purpose of facilitating the collaboration between plant developers and distributors;
- exemption to pay transmission fees for RES plants below 20 MW and reduced transmission fees for RES plants of capacity above 20 MW.

**India**

The Indian electricity market and generation mix are continuously evolving driven by a sharp rise of demand caused mainly by the population growth experienced in the past years. With the Electricity Act of 2003, the Government started the transition towards the liberalisation of the electricity market by granting to consumers and to power generators open access to transmission and distribution facilities.

Currently, the energy mix is dominated by conventional fossil fuel based generation, which represents more than 65% of the domestic capacity (Figure 13). The Government have been pushing to unlock the country’s RES potential trough a national strategy that foresees 40% RES penetration on domestic generation capacity by 2030. The response to the
policy has been positive thus far as total RES installed capacity raised by 60% compared to 2012. The growth has been driven by development of solar PV and onshore wind, which increased by 26 GW and 18 GW respectively.

Following the Electricity Act, consumers with connected loads above 1 MW have been allowed to procure energy from the open market rather than from the electric utility monopoly. The possibility for energy intensive consumers to procure electricity at a lower price compared to the national tariffs resulted in an extended decentralised development of RES capacity in the country. In fact, India is currently one of the largest markets for corporate PPA in terms of total capacity developed. IPPs have become active in setting up renewable projects, thanks to less dependency on distribution companies and exploiting the favourable PPA contract prices, which result more attractive than the highly competitive tariff-based auctions developed under central and state schemes.

The extended decentralised development of RES capacity in India is also linked to two particular policy related measures:
- the establishment of Regulatory Commissions following the Electricity Act, created as independent bodies set up at central and state level to regulate and oversee generation, distribution and transmission of electricity;
- the introduction of renewable purchase obligations (RPO) for distributions companies and intensive energy consumers, who will have to secure 22% of their electricity use from RES by 2022, to be equally split among solar and non-solar energy.

The Indian regulation also allows the decentralised development of new generation capacity for producing electricity primarily for self-consumption purposes. In fact, a consumer can set up a captive generation plant to cover its energy
demand, having also the possibility to rely on contribution from for a third-party. The self-consumer is though required to own at least 26% equity in the project and to consume no less than 51% of the energy produced. Captive power plants represent a relevant portion of the energy mix and the cumulative captive generation capacity has been steadily growing in the recent (Figure 14).

However, the development of RES captive generation capacity has yet to reach its full potential towards contributing to RES growth. So far the success of this particular route-to-market has depended on specific policy decisions taken at State level. Federal States are indeed granted extended autonomy in matters of regulation, as they are free to implement the general directions received from the central authority. Haryana and Uttar Pradesh States continued to offer a waiver of certain transmission fees (i.e. cross-subsidy surcharge and additional surcharge) and have been emerging as important markets for renewable captive generation, with more than 1 GW of captive solar projects approved at the time of writing.

![Figure 14 – Evolution of captive generation capacity (plants >1MW)](image-url)

Source: Central Electricity Authority “Growth of electricity sector in India from 1947-2020”

*Figure 14 – Evolution of captive generation capacity (plants >1MW)*
Unleashing Tunisia full potential for decentralised RES development

The outcomes of the benchmark analysis on the selected markets have underlined that easing third-party participation in self-consumption projects is key for the successful development of decentralised RES projects, especially in markets where corporate PPAs are either not allowed or still at an early stage of development. Despite the most recent regulatory updates, Tunisia still needs to consolidate the latest advancements by implementing the necessary secondary regulation related to third-party participation in order to fully receive a positive response from the investors. For instance, it is necessary to clarify the maximum allowed equity share for private investors involved in self-consumption projects and it would be positive to also regulate the possibility for consortia participation in self-consumption schemes.

The Tunisian Government should also aim at reaching a higher level of openness towards both local and international players. This will eventually have a positive influence on Tunisian economy, which could see an overall improvement of the energy sector situation and the creation of new workplaces. To reach such achievements, Tunisia should ringfence roles and competences of the main market stakeholder by introducing an independent regulatory authority.

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**Easing third party participation is the key for the success of the development of RES projects for self-consumption**
- Implement secondary regulation related to third-party participation (e.g. clarifying the maximum allowed equity share for private investors involved in self-consumption projects)
- Ringfence roles and competences of the main stakeholder of the market, maybe introducing an independent regulatory authority
- Implement clear short- and medium-term policies and potentially require a minimum share of energy consumed/supplied from RES

**Establish transparent rationale of tariffs evolution and make pricing/metering mechanisms effective**
- Ensure cost reflectiveness of electricity and wheeling tariffs, while also making transparent the rationale behind tariffs revision
- Improve surplus metering mechanisms by lifting the limitation on surplus remuneration and/or switching to a net-metering calculation of generated surplus

**Develop a regulation framework that supports RES investments**
- Define clear grid connection and permitting procedures (e.g. simplifying process for smaller sized projects)

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**Figure 15 – Summary of recommendations for Tunisia**

Source: AFRY Management Consulting
An independent regulator would ideally oversee the proper planning of the power sector development, while also granting all market participants the open access to the Tunisian power networks.

The independent regulator would be also responsible for establishing clear methodologies for the revision of electricity and wheeling tariffs, which need to be cost reflective and more predictable in their evolution. Stable and predictable tariffs provide clear energy off-taking conditions, putting the investors in position to effectively produce a reliable assessments of the attended project profitability and therefore facilitating positive investment decisions.

Energy off-taking conditions can also be improved to increase the attractiveness of the self-consumption regime to RES developers. In fact, the method currently adopted for remunerating the generated surplus results disadvantageous whenever there is an evident mismatch between consumer demand and plant generation profiles. The situation is magnified for small-sized solar plants, which can often turn out to be undersized compared to the actual need of the end-user. The value of the generated surplus can be increased by lifting the limitation on surplus remuneration, currently set at 30% of annual generation, and/or switching to a net-metering calculation of surplus instead of a diversified balance for each tariff time slot.

Finally, permitting procedures could be made more clear and simple for investors, for instance by developing a regulation framework tailored specifically for supporting RES investments. This would increase the market readiness towards private investors and could be achieved by developing clear procedural guidelines for self-consumers. The final goal should be simplifying as much as possible the bureaucracy behind the authorization process, so to make procedures more aligned with typical timing of decision-making in both private and public companies.
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