

Unlicensed Renewable Energy Generation: A Review of Regulation and Applications in the Context of Turkey

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ABSTRACT: Turkey has stipulated that renewable energy sources (*RES*) will have at least 30% share in electricity generation by 2023. To reach this target, a renewable energy promotion law (*Law No. 5346*) was enacted in 2005 and later amended in 2011. Through Law No. 5346, Turkey has launched a feed-in tariff (*FIT*) for *RES*-based electricity with additional premium for the use of local equipment. The *FIT* is guaranteed for 10 years from the date of operation and valid only for *RES* power plants commissioned between the 18th May, 2005 and the 31th of December 2020. In addition, *RES* power plants with a capacity of up to 1 MW are exempted from licensing and establishing legal entities. There is an increasing demand to install unlicensed *RES* generators, mostly solar power plants, all over the country. At least one consumption unit must be associated with an unlicensed power plant. Excess generation from unlicensed *RES* power plants is automatically priced at the *FIT* for 10 years. Except for the *FIT* mechanism, unlicensed generators have no options to sell unconsumed electricity in the electricity market. The main difficulties lie in limited connection possibilities, the selection of plant locations, and coordination among relevant authorities. Moreover, an awareness campaign would help people to better understand the related regulation and applications.

Keywords: Unlicensed generation; distributed generation; electricity market; Turkey

JEL Classifications: L5; Q40; Q43; Q48; Q49

1. Introduction

According to the electricity strategy paper issued by the Turkish government, Turkey set targets for the share of renewable energy sources (*RES*) in the electricity generation. For example, *RES* will have at least 30% share in electricity generation by 2023 (ETKB, 2014a). To reach this target, a specific law for the promotion of *RES* (*Law No. 5346*) was enacted in 2005 and later amended in 2011 (YEGM, 2014a). Law No. 5346 has introduced a feed-in tariff (*FIT*) for *RES*-based electricity with additional premium for the use of local equipment. The *FIT* is guaranteed for 10 years from the date of operation and valid only for *RES* power plants commissioned between the 18th May, 2005 and the 31th of December 2020 (EMRA, 2014a). In addition, up to 1 MW of *RES* power plants is exempted from licensing and establishing companies. There is an increasing demand to install unlicensed *RES* generators, mostly solar power plants, all over the country.

Unlicensed electricity generation is regarded to be a new field of investment in the electricity market in Turkey. In this context, it presents opportunities for consumers and investors. The consumer considers the opportunity to generate electricity with a view to meet individual need of electricity without establishing a company and obtaining a license for the power plant from EMRA¹.

In this article, the regulations and applications about unlicensed *RES* generation in the context of Turkey are introduced, explained, and discussed in detail. Hence the main purpose of this article is to introduce unlicensed electricity generation and related regulations in Turkey, discuss its differences

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¹ EMRA is the abbreviation for Turkish energy regulator established in 2001. Its full name is Energy Market Regulatory Authority, which is an autonomous governmental organization regulating four markets such as electricity, natural gas, petroleum, and LPG markets.

from licensed generation and particularly from distributed generation, and explain the applications and challenges about unlicensed generation.

This article is organized as follows. Following the introduction section, the second section summarizes the basic features of the Turkish electricity market, including the renewable energy policy of the country. The third section provides information about the fuels and sources for electricity generation and the potential for RES in Turkey. The fourth section introduces the regulations regarding unlicensed renewable energy generation. The fifth section makes an analysis of the regulations and applications about unlicensed electricity generation. In addition, it makes suggestions to improve and promote the application of unlicensed generation in the country. The sixth, and final, section makes a summary and concludes the article.

2. Background of Electricity Market - Energy Policy Context

In terms of renewable energy policy, Turkey attributes significant importance to a) encouraging energy generation from RES² in a secure, economic and cost effective manner, b) expanding the utilization of RES of the country, and c) increasing the diversification of energy sources. In addition, reducing greenhouse gas emissions, making use of waste products and protecting the environment, and developing the related mechanical and/or electro-mechanical manufacturing sector are other main pillars of the energy policy.

Turkey has opened a new era in the electricity market in 2001. The legal basis of the new era was the Electricity Market Law, which came in effect in 2001. Later in 2013, a new law - Electricity Market Law No. 6446 - came in effect in March 30, 2013 while Law No. 4628 was amended as the organization law of EMRA. Law No. 6446 is a framework law regulating electricity market structure, market participants, third party access, market entry, monitoring, and auditing. According to the Law No. 6446, state-owned companies and relevant activities are legally unbundled. Regulated third party access is in place for network access. Market design is based on bilateral contract market complemented by a day-ahead market and a residual balancing market. In terms of limiting market share, static precautions are taken in the market. As part of this measure, any real or legal entity cannot exceed 20% of total electricity generation in the country. Moreover, no supplier can procure more than 20% of total consumption in Turkey.

All market activities must be licensed by EMRA with some exemptions. Among other power plants specified in later sections of this article, renewables with a capacity of up to 1 MW and certain cogeneration power plants are exempted from licensing obligation. Separate licenses are required for each market activity and facility. First a pre-license is given for the procurement of required approvals and permits to install a power plant. Licensees may ask for public interest decision for expropriation from EMRA. License applicants must be established as joint stock or limited liability companies in accordance with the provisions of the Turkish Commercial Code. If established as joint stock companies, all shares of the applicant company must be registered shares, except for the shares traded in the stock exchange.

The eligibility limit for 2014 is set as 4500 kWh by EMRA Board resolution, meaning that consumers with consumption above this limit are eligible to choose their suppliers. The electricity market strategy paper envisions a full retail market opening at the beginning of 2015.

Network tariffs and sales to captive customers as well as tariffs for last resort customers are regulated by EMRA. Renewable based electricity is supported through feed-in tariffs depending on technology and also an extra premium is provided for the use of local equipment. Participation to the RES support mechanism is not mandatory. However, unconsumed³ electricity from unlicensed generation is automatically priced at the FIT.

² According to the Law No. 5346, renewable energy sources are the energy sources such as hydraulic, wind, solar, geothermal, biomass, gas obtained from biomass (*including landfill gas*), and non-fossil energy sources such as wave, tidal, and stream.

³ In this article, the words "*unconsumed*", "*excess*", and "*surplus*" are used interchangeable.

3. Renewable Energy Sources for Electricity Generation

Turkey has substantial amount of renewable energy potential and the utilization rates are increasing over years. Hydraulic, wind, and solar energy resources are the major portions of renewable portfolio. Turkey's renewable energy potential and the installed capacity are given in Table 1.

Table 1. Renewable energy potential of Turkey

Source	Renewable energy potential (1)	Installed capacity (As end of 2013) (2)	Utilization rate (3)=((2)/(1)*100) (%)
Hydro	40.000 MW (140 billion kWh/year electricity)	22.289	55.7
Wind	47.849,44 MW (130 billion kWh/year electricity)	2.759,6	5.8
Geothermal	31.500 MW _t (1.500 MW is suitable for electricity generation)	295,8	19.7
Biomass	8.6 mtoe (1.5 - 2.0 billion kWh/year electricity)	154,4	na
Solar	380 billion kWh/year electricity	(*)	(*)

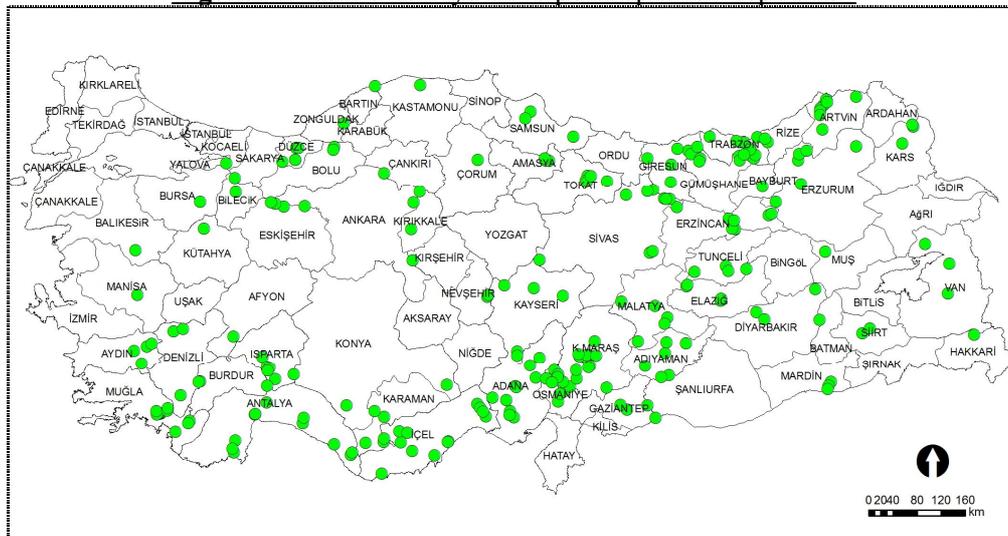
Source: Akat (2014), ETKB (2014b), YEGM (2014b), EMRA (2014). (*) Currently, there is no licensed solar power plant in operation in Turkey except for 15.4 MW unlicensed solar generators (TEIAS, 2014). na means "not applicable" because the data for the potential in MW is not available.

In addition, Turkey has established the following targets for 2023. Until 2023, the whole economically feasible hydropower potential of Turkey will be provided for electricity generation. 20,000 MW of wind power plant will be in operation. Solar power capacity will reach at least 3,000 MW. A minimum 600 MW of geothermal production will be implemented. A total of 1,500 MW_e of installed capacity for biomass energy will be realized (Akat, 2014; ETKB, 2014b; YEGM, 2014b).

3.1. Hydroelectric potential

Hydropower sources have the most significant place in the renewable energy potential of Turkey. Theoretical hydropower potential in the country is calculated at 433 billion kWh; technically feasible hydropower potential is 216 billion kWh. However, the economic potential is 140 billion kWh/year (Akat, 2014; YEGM, 2014b). The distribution of existing hydraulic power plants in operation in the country is shown in Figure 1. The green circle shows the locations of the hydraulic power plants in operation. It could be concluded that the hydraulic power plants are roughly evenly distributed throughout Turkey (Karakuş, 2013).

Figure 1. Location of hydraulic power plants in operation



Source: Karakuş (2013).

3.2. Wind energy potential

The Turkey Wind Energy Potential Atlas (REPA), which was realized in 2007 calculates that Turkey has a minimum wind energy potential of 5.000 MW in regions with annual wind speed of 8.5 m/s and higher, and around 48.000 MW with wind speed higher than 7.0 m/s (Akat, 2014: YEGM, 2014b). Details of wind energy potential in the country are given in Table 2.

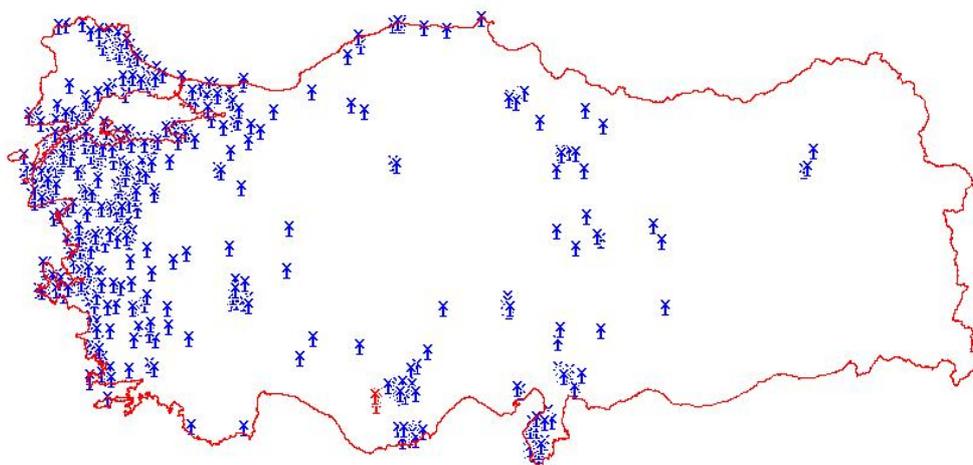
Table 2. Wind energy potential of Turkey

Resource potential	Wind class	Annual wind power density (W/m ²)	Annual wind speed (m/s)	Total capacity (MW)
Good	4	400 – 500	7.0 – 7.5	29.259,36
Excellent	5	500 – 600	7.5 – 8.0	12.994,32
Outstanding	6	600 – 800	8.0 – 9.0	5.399,92
Superb	7	> 800	> 9.0	195.84
Total capacity				47.849,44

Source: YEGM (2014b), Akat (2014), and Yaniktepe et al. (2013:107).

Total potential wind capacity is divided between 37.836 MW on-shore and 10,013 MW off-shore (YEGM, 2014b: Akat, 2014). In addition, the location of wind license applications is shown in Figure 2. As clearly seen from Figure 2, the western coastal regions of Turkey, mainly the Aegean and Marmara Sea coasts, is receiving high interest from investors.

Figure 2. Distribution of wind license applications



Source: Prepared by using data from EMRA and YEGM⁴.

3.3. Solar energy potential

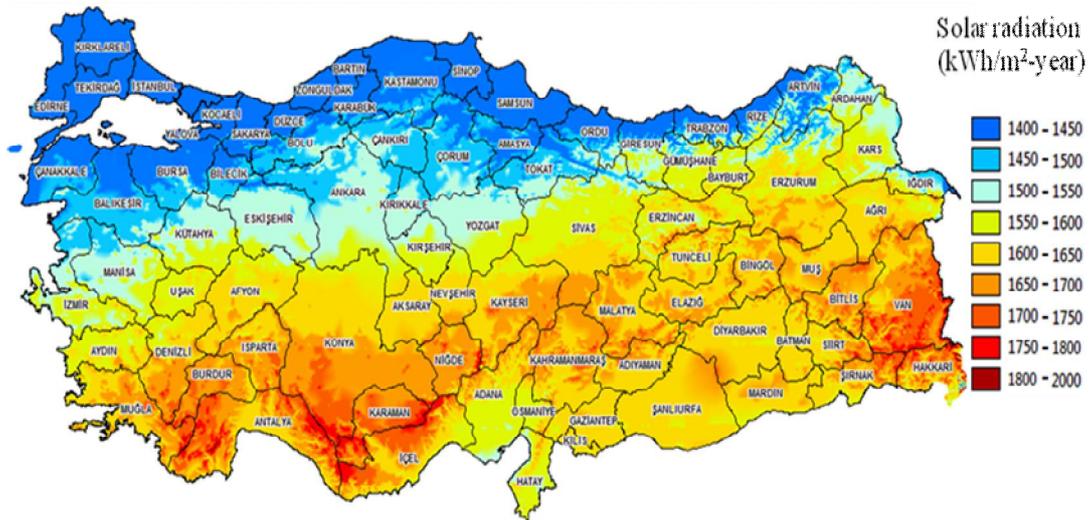
Turkey offers perfect natural conditions for solar power plants. The country is geographically located in the Mediterranean sun belt. Solar radiation values are quite similar to Spain and Portugal. As end of August 2014, total installed capacity for unlicensed solar power plants is 15.4 MW (TEIAS, 2014). This does not include the systems in forest fire watching towers, highways, communication towers, and meteorological stations.

The solar radiation values in Turkey are given in Figure 3. The Southern part of Turkey, mainly Mediterranean region and some cities in the Eastern region has the highest total solar radiation. Having a high potential for solar energy due to its geographical position, Turkey's average annual total

⁴ YEGM is the abbreviation for General Directorate of Renewable Energy of the Ministry of Energy and Natural Resources.

sunshine duration is calculated at 2,640 hours⁵, and average total radiation pressure at 1,311 kWh/m²-year⁶ (Akat, 2014; YEGM, 2014b).

Figure 3. Solar radiation in Turkey



Source: Akat (2014), YEGM (2014b).

In Turkey, it is expected that solar based electricity generation will increase with the decline in the investment cost of solar power plants and increase in their efficiency. Moreover, using the Turkey Solar Energy Potential Atlas and CSP technology, it is calculated that an annual production of 380 billion kWh is possible (Baris and Kucukali, 2012, 383).

3.4. Geothermal energy potential

Located on the Alpine-Himalayan belt, Turkey has a relatively high geothermal energy potential. The geothermal potential of the country is calculated to be 31,500 MW_t (Akat, 2014: YEGM, 2014b). Areas with potential are located in the Western Anatolia (77.9%) (Baris and Kucukali, 2012, 382). Some 55% of the geothermal rich regions in Turkey are suitable for heating purposes (Akat, 2014: YEGM, 2014b). In Turkey, 1,200 decares of greenhouses are heated using geothermal energy, and 100.000 households in 15 settlements are also heated with geothermal energy (Akat, 2014: YEGM, 2014b).

Prospecting works by MTA General Directorate⁷ which started from 2003 resulted in a geothermal energy source of 840 MW (Akat, 2014). While 1.500 MW of the geothermal energy potential is assessed to be suitable for electricity generation, the finalized data is so far 600 MW (Akat, 2014). At end of 2013, the installed power of geothermal energy reached 295.8 MW (YEGM, 2014b).

3.5. Biomass energy potential

Referring to Table 1, the amount of biogas that can be produced in Turkey, considering its animal waste potential, is reported to be 1.5 to 2 mtoe⁸. Turkey's major biomass sources include agriculture, forests, animals, and organic urban waste. While the waste potential is around 8.6 mtoe, 6 million mtoe is used for heating (Akat, 2014: YEGM, 2014b: ETKB, 2014b).

4. Unlicensed Electricity Generation

Unlicensed power generation has been made possible for interested parties in Turkey since 2010. Considering the electricity market reform in Turkey which started in 2001, unlicensed electricity production is a new activity in the market that allows consumers to carry out electricity generation. In this sense, the unlicensed generation is an important development in the country. The principles and

⁵ The corresponding daily total is 7.2 hours.

⁶ The corresponding daily total is 3.6 kWh/m².

⁷ It stands for General Directorate for Mineral Research and Exploration. It is affiliated to the Ministry of Energy and Natural Resources.

⁸ Million tons equivalent of petroleum

conditions of unlicensed power generation have been regulated by the By-Law on Unlicensed Electricity Generation in the Electricity Market (*By-Law*)⁹ which came in effect in December 3, 2010. The legal basis of this regulation is article 14 of the Law No. 6446. The main purpose of this regulation is, among other things, to provide the entrance of the small power plants to the electricity market, provide the electrical energy for consumers and, reduce the loss in electrical energy.

According to this regulation, every person, or legal entity which is an electricity subscriber may establish a power plant without obtaining license from the energy regulator - EMRA and sell the excess electricity. This regulation will be of interest particularly to universities, building complexes, and also the shopping centers. But, electricity subscribers such as apartment building management may not establish such power plants because it does not have a legal entity. Pursuant to the article 14 of the Law No. 6446 and the By-Law, the following power plants can be established with no obligation to obtain a license and establish a company (EMRA, 2014d: Dogerlioglu Attorneys at Law, 2014a):

- a) Emergency groups,
- b) Isolated power plants without connection to electricity network¹⁰,
- c) Power plants based on RES up to 1 MW¹¹,
- d) Power plants based on RES, consuming all of the generated energy without providing to the electricity network, having the generation and consumption points in the same location,
- e) Cogeneration power plants¹² with more than 80% total efficiency defined by the Ministry of Energy and Natural Resources,
- f) Micro cogeneration power plants¹³,
- g) Power plants based on municipal solid waste treatment plants and sludge disposal facilities,
- h) Power plants established on water supply lines and waste water lines run by municipalities.

4.1. Comparison with licensed and unlicensed generation

Generally speaking, two types of electricity generation are possible in Turkish electricity market under the current legal regime, except for investment models such as build-operate (BO), build-operate-transfer (BOT), and transfer of operating rights (ToOR)¹⁴. The first is the electricity generation under a generation license obtained from EMRA. The other is unlicensed generation. The key differences between the two activities are given in Table 3 below. Compared with licensed generation, unlicensed generation offers some opportunities to the related investor. For example, unlicensed generation based on wind and solar does not require measurement of some parameters for the location of power plant. In addition, there is no restriction about application date for unlicensed generation. Applications can be made to network utilities every month. But, license applications for wind and solar can only be made on a certain date determined in the secondary legislation.

However, in the legislation, there is no specific definition for distributed generation. Distributed generation is a broader concept including the large part of unlicensed generation. Power plants up to 10 MW are connected to distribution network. Power plants with capacities between 10 and 50 MW may be connected to distribution network depending on the approval of both transmission and distribution utilities. That means that power plants up to 50 MW may be connected to distribution network and regarded as distributed generation. On the other hand, as noted in Table 3, there is no capacity limit for some types of unlicensed generation, which are connected to the transmission network. However, power plants with any capacity can operate under a generation license. Figure 4 shows the relationships among different types of electricity generation.

As seen from Figure 4, in the case of Turkey, there is no clear distinction between unlicensed generation and distributed generation.

⁹ Elektrik Piyasasında Lisanssız Elektrik Üretimine İlişkin Yönetmelik, (in Turkish), available at <<http://www.epdk.org.tr/index.php/elektrik-piyasasi/mevzuat?id=1292>>.

¹⁰ It means transmission and distribution network.

¹¹ Council of Ministers is authorized to increase the limit by 5 times in accordance with Article 14 of the Law No. 6446.

¹² Cogeneration facilities are the plants that generate heat and electricity and/or mechanical energy simultaneously.

¹³ Micro cogeneration plants are power plants with a total installed capacity of 100 kilowatts and less.

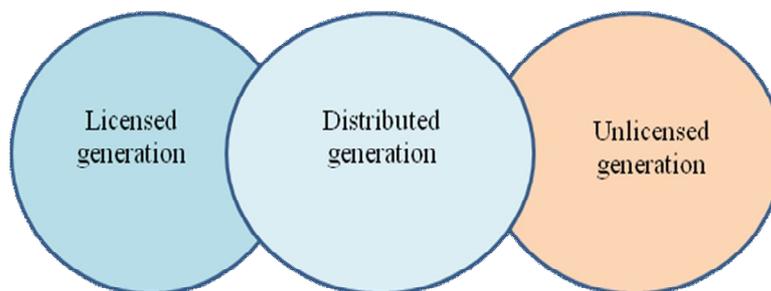
¹⁴ These power plants will be converted to generation licensees under Law No. 6446.

Table 3. Comparison of unlicensed generation with licensed generation

	<i>Licensed generation</i>	<i>Unlicensed generation</i>
Application period	At all times, but only on the date specified in the By-Law on Electricity Market Licensing for wind and solar license applications	No restriction about application date. Network utilities accept applications every month, meaning 12 times a year.
Installed capacity	No capacity limit, except for 50 MW limit for each solar power plant	Up to 1 MW for RES based power plants For other types of unlicensed generators, except for micro cogeneration, there is no capacity limit. The capacity limit for micro cogeneration is 100 kW.
Expropriation	Possible	Not possible
Incentives for electricity sale	Purchasing guarantee at FIT and extra premium for the use of domestic products. But, license holders are not obliged to sell their output in the RES support mechanism. Participation in support mechanism is voluntary.	Purchasing guarantee at FIT and extra premium for domestic product contribution. Participation in RES support mechanism is mandatory for excess electricity.
Measurement	Compulsory for wind and solar license applications	No measurement data is required to be eligible for unlicensed generation.
Share transfer	Forbidden only for pre-license holders during the term of pre-license. For other license holders, it is subject to the approval of EMRA.	No restriction. No approval from EMRA is required.
Transfer of power plant	Possible only for the power plant completed and in operation.	Possible only for the power plant completed and in operation.
Electricity trading	Possible	Forbidden, meaning that unconsumed electricity is priced at RES support mechanism. No other method of trading of excess electricity is possible.
Auditing	EMRA audits license holders and implements sanctions if necessary.	Regional distribution utilities are authorized to audit unlicensed electricity generation. EMRA implements sanctions if necessary.
Other obligations at application stage	The applicant must be a limited liability or joint stock company Minimum capital requirement Bank letter of guarantee	Any real or legal person can apply for an unlicensed electricity generation. No need of obtaining a license and establishing a company

Source: Adopted from Dogerlioglu (2014). The information is based on EMRA (2014d).

Figure 4. Different types of electricity generation.



4.2. Fundamentals of unlicensed electricity generation

According to the by-law, each unlicensed power plant must be associated with at least one consumption unit (Erdem & Erdem Law Office, 2011). It is mandatory that the consumption unit associated with the power plant must be in operation or at least must be completed and be in operation as of the date of commissioning of the power plant. Unlicensed power generation and consumption

units are required to be located within the same electricity distribution region. A consumption unit cannot be associated with more than one power plant in the same time period.

There is no limit for how much of unlicensed generation will be consumed on the consumption units associated with unlicensed power plant. Part of the electricity generation that is not consumed is priced at the accompanying FIT listed in the Law No. 5346.

The limitation on the number of consumption units for each power plant that can be established within the scope of the regulation is important. Principally, only one cogeneration facility, micro cogeneration facility or generation facility based on RES can be established for each consumption unit (Erdem & Erdem Law Office, 2011). However, if the distribution network has sufficient capacity, more than one cogeneration or power plant based on RES can be established for each consumption unit. This rule does not apply to micro cogeneration plants. Only one micro cogeneration plant can be established for each consumption unit.

Unlicensed generators are not addressed directly with the market operator and the RES support mechanism. They receive the revenue for the excess electricity every month through regional assigned retailers.

4.3. Application for connection right and evaluation criteria

The unlicensed power plants are connected to the transmission or distribution system depending on the installed capacity of the related project¹⁵. The connection application can be made by real or legal persons willing to generate electricity in power plants under the by-law, by completing the unlicensed generation connection application form. The application is made directly to transmission company, or to the relevant regional distribution utility or to the relevant Organized Industrial Zone distribution license holder. The document confirming the grant of utilization right of RES must be accompanied with the other application documents (Erdem & Erdem Law Office, 2011).

The applications are assessed against the set criteria such as the use of RES in the power plants, the eligibility of the power plant as a cogeneration plant and whether the power plant is located within same location with the consumption unit (Erdem & Erdem Law Office, 2011).

4.4. Pricing unconsumed electricity

The basic principle required by the by-law for the real and legal persons who want to generate unlicensed electricity is to generate electrical energy to meet only their own needs (Erdem & Erdem Law Office, 2011). However, if surplus electricity is generated, this amount of electricity may be consumed in consumption units belonging to the generator which is located in the same distribution region as the power plant (Erdem & Erdem Law Office, 2011). The pricing methodology of excess electricity from different unlicensed power plants is given in Table 4.

As given in detail in Table 4, the unconsumed energy in the above-mentioned units is qualified as surplus energy (Erdem & Erdem Law Office, 2011). Any excess power generated and not used by unlicensed generators is provided to the network through regional distribution utilities. Such excess power is sold at FIT specified in the Law No. 5346, and in the case of micro cogeneration facilities, at the lowest FIT specified in the Law No. 5346. In the event that the source of the surplus energy is micro cogeneration, it is purchased on the lowest FIT listed in the Law 5346 by assigned regional retailers to sell captive customers in their designated regions.

The by-law also permits consumption of the excess power in one or more consumer units within the same distribution region, but associated with the same unlicensed generator. However, power generated by an unlicensed power plant cannot be sold through bilateral agreements outside RES support mechanism. The FIT for different sources and fuels is shown in Figure 5.

The role of each participant in the pricing of different unlicensed power plants is schematically shown in Figure 6¹⁶. In Figure 5 above, G_n represents licensed RES based generators. S_n is all suppliers active in the market for a given month, and P_n refers to FIT prices. A is the support value for the electricity from unlicensed generation coming from all 21 distribution regions. Monthly payments are made directly to bank accounts of unlicensed power producers. Total value of support is collected monthly from the suppliers active in the market in proportion to the market share of the related suppliers.

¹⁵ Please refer to Table 4 for detailed information for the connection possibilities for each type of unlicensed power plants.

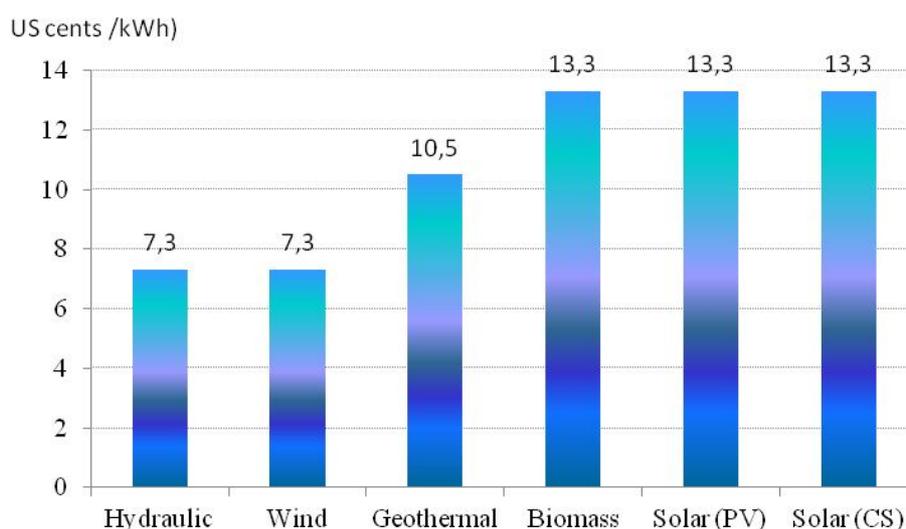
¹⁶ For further information about renewable support mechanism, please refer to Gozen (2014).

Table 4. The pricing of excess electricity from different unlicensed power plants

	Type of unlicensed power plant	Limit for installed capacity	Connection type	Pricing of unconsumed electricity
1	Emergency groups	None	Isolated	Not applicable
2	Isolated generation facilities with no connection to transmission or distribution system	None	Isolated	Not applicable
3	RES based generation plants	≤ 1 MW	Distribution	Payment at FIT for electricity and FIT for local use of equipment if applicable.
4	Micro cogeneration plants	≤ 100 kW	Distribution	Purchased by regional suppliers at the lowest FIT.
5	Cogeneration facilities with more than 80% total efficiency	None	Transmission or distribution	No payment. However, if surplus electricity is injected to network, electricity is recorded free of charge to RES support mechanism.
6	Generation power plants established to operate with municipal solid waste treatment plants and sludge disposal facilities	None	Distribution	Payment at FIT for electricity and FIT for local use of equipment if applicable.
7	RES based generation power plants, consuming all the electricity without providing to transmission or distribution system, having the production and consumption points in the same location	None	Transmission or distribution	No payment. However, if surplus electricity is injected to network, electricity is recorded free of charge to RES support mechanism.
8	Power plants established on water supply lines and waste water lines run by municipalities.	None	Distribution	Payment at FIT for electricity and FIT for local use of equipment if applicable.

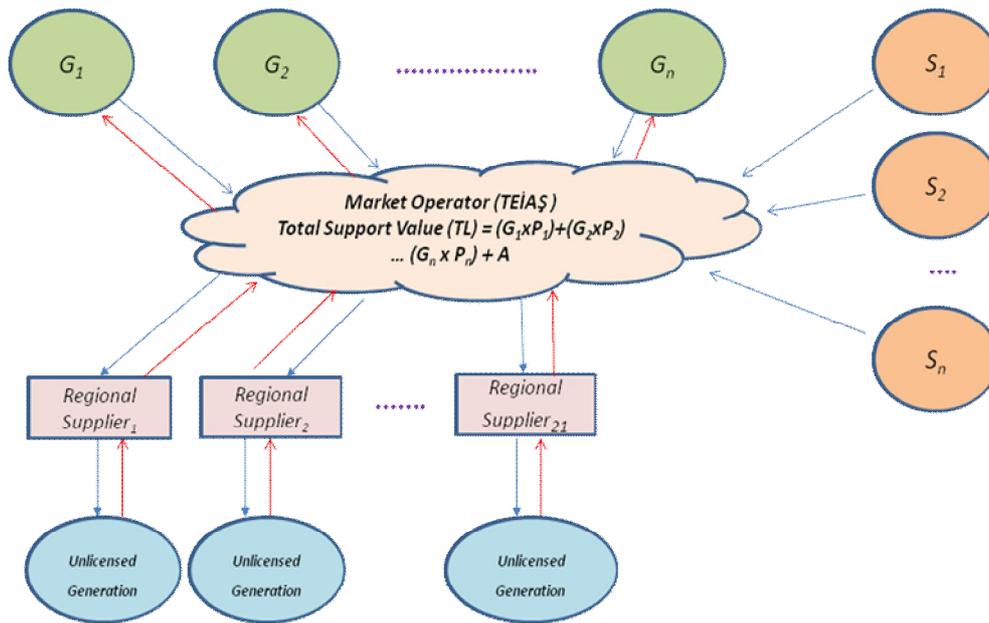
Source: EMRA (2014d).

Figure 5. The FIT for different sources and fuels.



Note: PV photovoltaic, CS concentrated solar

Figure 6. The pricing of excess electricity from RES power plants



The FIT for the use of local equipment is listed in the Law 5346 and its value ranges from 0.4 to 3.5 US cents/kWh depending on the equipment and source. Production facilities in the renewable energy sector, which will be in operation before 2021, can benefit from this application. This additional tariff is provided for a period of 5 years from the operation starting date of the power plant.

4.5. Renewable energy cooperatives

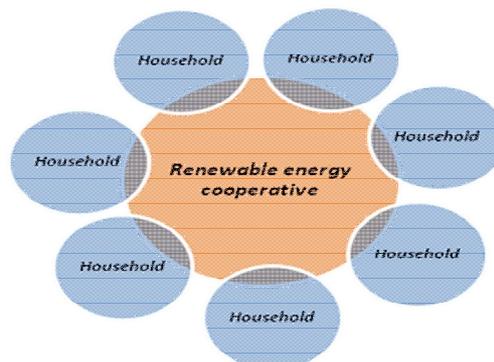
In Turkey, an article of association for electricity generation and consumption cooperatives was published in the Official Gazette No. 28855 dated December 18, 2013. The legal basis of this type of cooperatives in the electricity market is the Law No. 6446.

By setting up energy cooperatives, essentially, consumers form a cooperative, combine their consumptions and establish jointly unlicensed RES power plant. Within the framework of current legislation; however, the consumption of cooperative members shall be measured with a common meter or all consumption units registered for the cooperative must be connected to the same point or transformer in the network. In this way, cooperative members and the cooperative itself are able to satisfy their electricity needs and receive revenue for surplus energy within the scope of RES support mechanisms.

As can be seen from Figure 7 below, different real persons and/or legal entities formed by combining a cooperative entity other than the consumption of the participants must be in the same group of subscribers.

As seen from Figure 7, all cooperative members may be commercial, residential, or industrial subscribers. The main reason behind this regulation is to facilitate the meter reading of all members of the related cooperative.

Figure 7. Structure of a typical renewable energy cooperative.



5. Evaluation and Discussion

Although the history of unlicensed electricity generation is short in Turkey, there have been significant developments in this specific field of electricity market. Key results are summarized below based on the experience of the past three years since the law was implemented.

The limited connection availability is the key to the growth of unlicensed generation. The allocation of connection right to the network is regulated by the energy regulator – EMRA, but there is less capacity available for unlicensed generation.

The FIT is fixed in Law No. 5346 and is not indexed to inflation. The FIT would be favorable as long as the inflation rate is low and stable. Since the FIT is already set in the Law No. 5346 for 10 year. This is one area that requires close monitoring particularly when the inflation increases.

The intersection and overlapping of plant locations require special attention, particularly for solar and wind power plants in order to overcome conflict of interests among related parties. Generation licenses are issued by EMRA and connection rights are allocated to unlicensed generation by network utilities. This makes the situation even more chaotic and calls for a close collaboration of related institutions.

In practice, there are two groups of investors in the market. One group of investors is interested in consuming the electricity generated to improve their competitive position in their core businesses by lowering the cost of electricity. The other group is interested in selling the majority of electricity generated and realizing certain revenue. In this respect, legislation treats equally these two groups of investors. Investors who will consume all, or a large portion of electricity generated should have connection priority to network and, as a result, the procedure should be simplified for this special group of consumers.

Only consumers in the same tariff class and connected to the same point of network can participate in renewable energy cooperatives. This limits the participation to, and growth of renewable energy cooperatives.

There are no such requirements for unlicensed generation; such as measurement data, minimum equity injection, and bank letter of guaranty while these are the entrance requirements to the market for licensed electricity generation. In the future, this would result in the manipulation of regulations in such a way that unlicensed generators would apply for a license to the energy regulator without meeting the obligations of measurement data, minimum capital, and bank guarantees. This would be an unfair practice against licensed generation.

As stated earlier, according to the Law No. 6446 and the Law No. 5346, power purchase agreements are not possible for unlicensed generators. However, leasing and third party financing would be an alternative option for the sector to obtain financing. The energy regulator and policymakers should take a leadership role and clarify any uncertainties regarding the financing by alternative methods.

As noted by Gozen (2014), unlicensed power producers do not need to have marketing and sales units since the unconsumed electricity becomes automatically part of the RES support mechanism and is priced at FIT. Moreover, they do not face competition in the market. There is no risk of balancing for unlicensed power plants in the balancing and settlement market for the differences in their production. These are the main advantages of unlicensed electricity generation.

There are several organizations from which an investor is required to obtain permits and approvals. Better collaboration among them would help all stakeholders to understand the related regulation and fast-track the implementation.

Financing unlicensed RES projects is a critical issue for those who plan to lower their electricity bills or enter a new business field by establishing a RES power plant under the legal regime for unlicensed generation (Dogerlioglu Attorneys at Law, 2014b). Dogerlioglu Attorneys at Law (2014b) underlines that currently most banks are not interested in providing financial support for unlicensed energy projects. Therefore, consumers could only continue with their projects if they have enough equity or find partners. When the Turkish legislation on unlicensed electricity generation is examined from alternative financing options, such as third party financing, power purchase agreements, and leasing agreements, there are no direct regulations related to third party financing of unlicensed energy projects (Dogerlioglu Attorneys at Law, 2014b). Under the current legal regime, any real or legal entity can develop unlicensed RES power projects by equity injection or arrange credit financing or alternatively find partners in order to realise the project. However, the model of

power purchase agreements cannot be applied to unlicensed RES projects in Turkey. But third party financing and lesaing models can be applied without any doubt. The key reason is that Law No. 5346 and Law No. 6446 foresee the automatic pricing of excess electricity. In Turkey's case, contrary to bilateral trade, the excess electricity goes directly to the RES support mechanism and is valued under the mechanism.

6. Conclusions and Recommendations

Unlicensed electricity generation is the type of activity that allows consumers to perform electricity generation in the market. In this regard, unlicensed generation is an important development in Turkey. The By-Law about the Unlicensed Electricity Generation in the Electricity Market was prepared by the Energy Market Regulatory Board and became in effect in 2010. With the by-law, unlicensed electricity generation has been based on a legal framework in Turkey (Erdem & Erdem Law Office, 2011). It is expected that the pricing of unconsumed electricity at FIT will be beneficial for both generators and the state (Erdem & Erdem Law Office, 2011).

There is a high demand from investors for unlicensed electricity generation in Turkey. Solar generation leads in terms of applications. The main difficulties lie in limited connection possibilities, the selection of plant locations, and coordination among relevant authorities. Moreover, an awareness campaign would help people to better understand the related regulation and applications.

How electricity will be priced after 10 years of operation is not clear in Law No. 5346. Hence, lawmakers should spell out the future of support mechanism after 10 years of operation.

Financing unlicensed generation is an area that policymakers should pay special attention to because the facilitation of financing means will contribute to further opening of the electricity market..

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