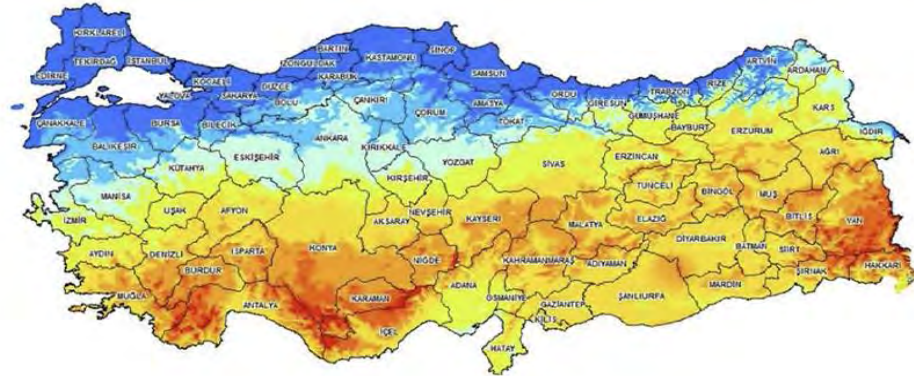


Developments in the Legislations for Solar Power Projects in Turkey

**Brief Report by
Prof. Dr. Osman SEVAIOĞLU**

Solar Power Plant in Turkey



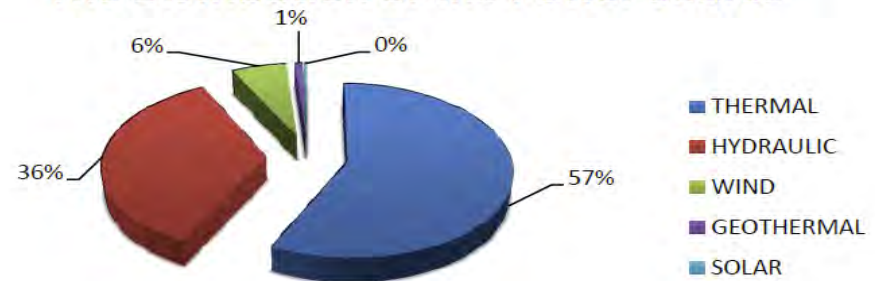
A new investment model with purchase guaranteed and the infrastructure to be prepared by the Government

| | THE CAPACITY(MW) | DESTINATION (MW) |
|------------|------------------|------------------|
| UNLICENSED | 12.073 | 15.000 |
| LICENSED | 600 | 5.000 |
| YEKA | 4.250 | 10.000 |
| TOTAL | 16.923 | 30.000 |

INSTALLED POWER(JANUARY 2016)

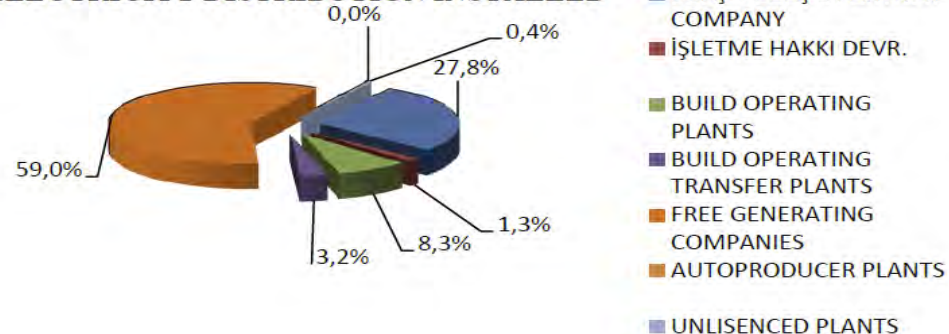
| FUEL TYPE | INSTALLED POWER(MW) | PLANT NUMBERS |
|--------------|---------------------|---------------|
| THERMAL | 41.903,0 | 449 |
| HYDRAULIC | 25.867,8 | 560 |
| WIND | 4.503,2 | 122 |
| GEOTHERMAL | 623,9 | 21 |
| SOLAR | 248,8 | 362 |
| TOTAL | 73.146,7 | 1.514 |

The Distribution of the Power Source

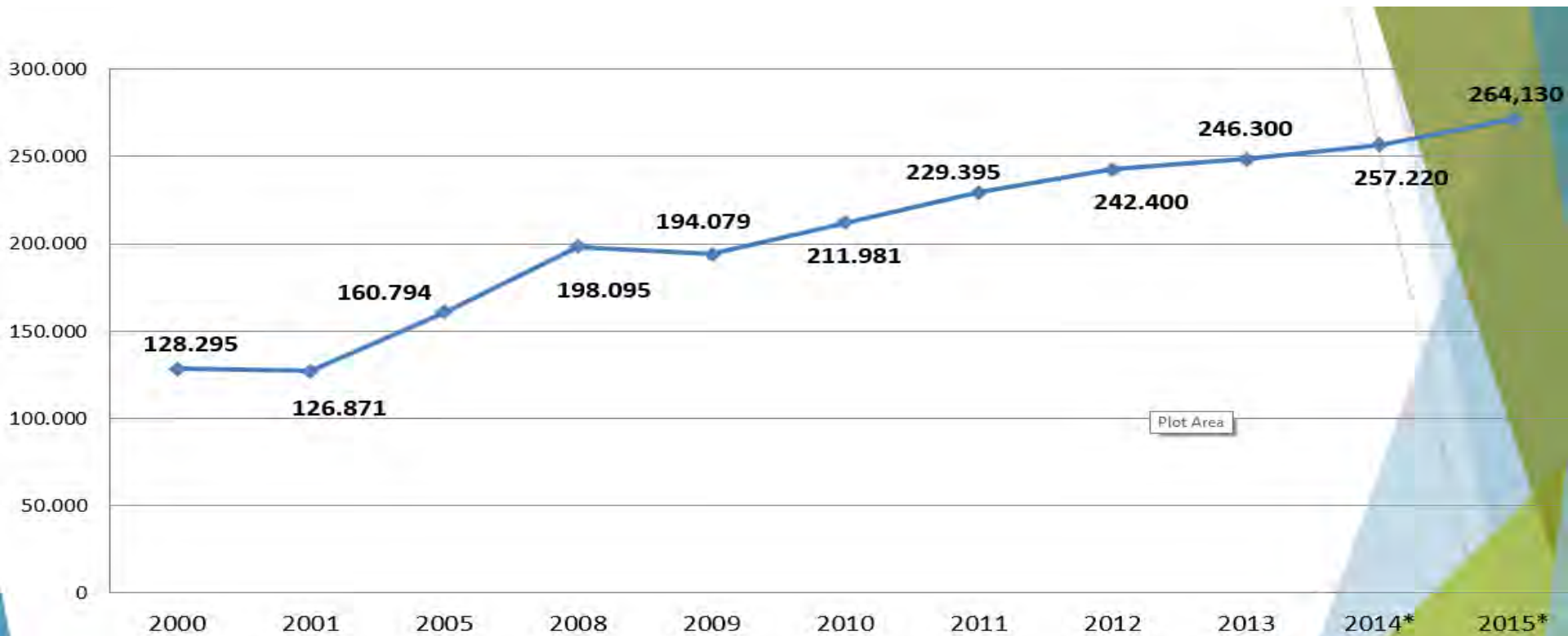


| ORGANIZATIONS | INSTALLED POWER TOTAL | ADDITIVE |
|----------------|-----------------------|--------------|
| PUBLIC | 20.322,6 | 27,8 |
| PRIVATE SECTOR | 52.824,2 | 72,2 |
| TOTAL | 73.146,7 | 100,0 |

ESTABLISHMENT OF TURKISH ELECTRICITY DISTRIBUTION INSTALLED



Demand Growth of Turkey (Million kWh)



- * 2014 Provisional Figures
- * 2015 TEİAŞ Program Target

• Source: TEİAŞ

Developments in the Legislations for Solar Power Projects in Turkey

Privatized Regions (w.r.t. Law dated: March 17, 2004)



- | | |
|-----------------------------------|--------------------------------------|
| 1. Dicle elektrik Dağıtım A.Ş. | 12. Uludağ Elektrik Dağıtım A.Ş. |
| 2. Vanşözü Elektrik Dağıtım A.Ş. | 13. Trakya Elektrik Dağıtım A.Ş. |
| 3. Anas Elektrik Dağıtım A.Ş. | 14. İstanbul Elektrik Dağıtım A.Ş. |
| 4. Çoruh Elektrik Dağıtım A.Ş. | 15. Sakarya Elektrik Dağıtım A.Ş. |
| 5. Fırat Elektrik Dağıtım A.Ş. | 16. Osmangazi Elektrik Dağıtım A.Ş. |
| 6. Çamlıbel Elektrik Dağıtım A.Ş. | 17. Boğaziçi Elektrik Dağıtım A.Ş. |
| 7. Toroslar Elektrik Dağıtım A.Ş. | 18. Kayseri Elektrik Dağıtım A.Ş. |
| 8. Menem Elektrik Dağıtım A.Ş. | 19. Menderes Elektrik Dağıtım A.Ş. |
| 9. Başkent Elektrik Dağıtım A.Ş. | 20. Göksu Elektrik Dağıtım A.Ş. |
| 10. Akdeniz Elektrik Dağıtım A.Ş. | 21. Yeşilirmak Elektrik Dağıtım A.Ş. |
| 11. Gediz Elektrik A.Ş. | |

YEKA Projects

Purchasing guarantee shall be granted to electricity generated by YEKA Plants at tariffs determined by bilateral contracts made at public auction.

The Companies are not bounded by these contracts however, they may choose to sell their energies in market,

Examples: Karapınar 1-2 ve Niğde Bor Solar power Plants,
Installed Power Capacity: 4250 MW

Resource

- 5346 YEK Law

Scope

- Public and State-owned land

YEKA Projects

Ongoing Works;

- Preparation and approval of the Plan for Reconstruction and parceling,
- Construction of the Infrastructure,
- Allocation of the fields to Investors,
- Preparation of the Environmental Impact Assessment Reports.

YEKA Projects – Karapınar 1-2



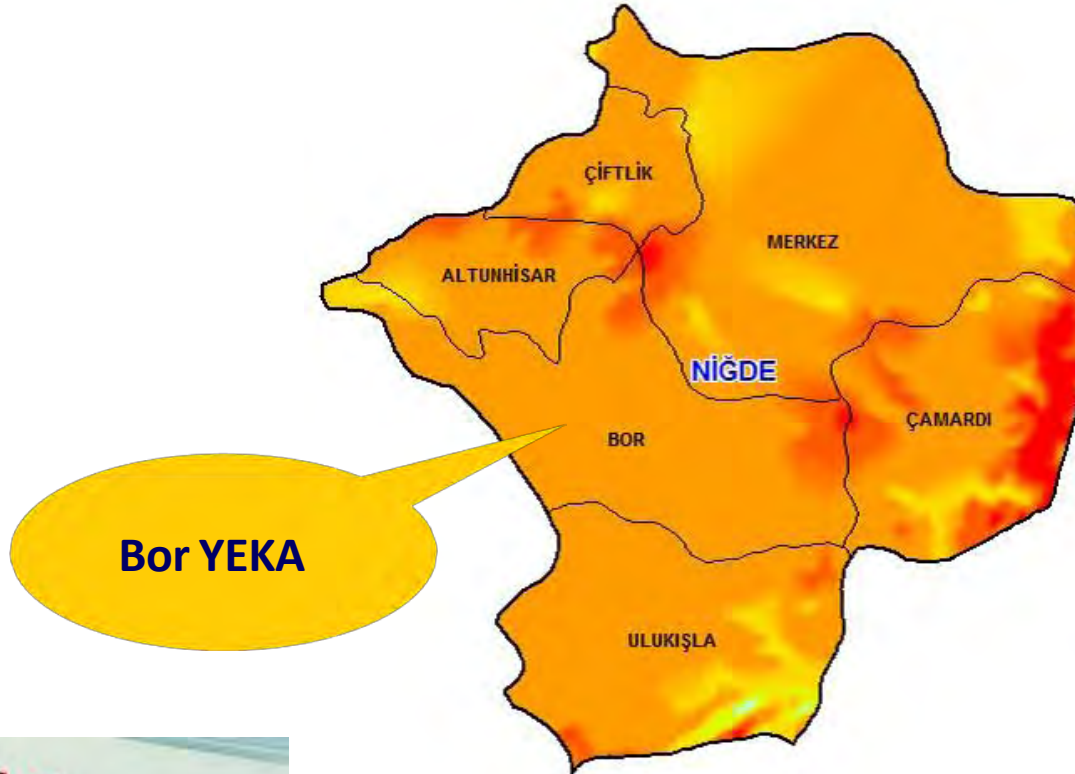
Decision is issued in 09.09.2015 dated, 29470 numbered Official Gazette

YEKA Projects – Karapınar - 1



- **Area: 27 186 m²**
- **Planned power to be Installed: 1.360 MW**

YEKA Projects – Nigde - Bor



19.11.2015 dated and 29 537 numbered Official Gazette

Law 6446 (New Electricity Market Law, 30.03.2013)

Article 14.

Activities exempted from licencing;

Energy generation from the renewable resources by plants with installed capacity not exceeding 1 MW.



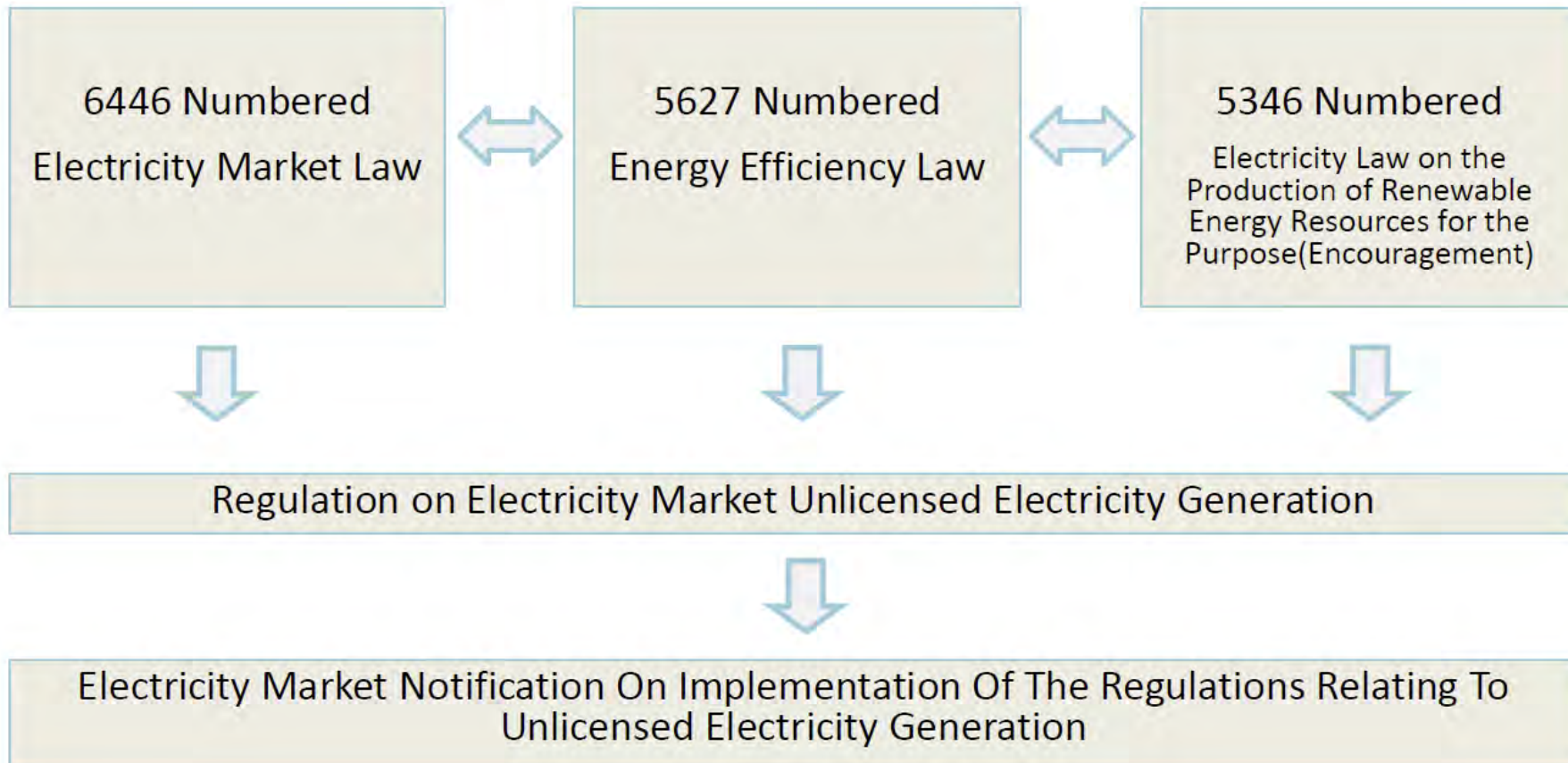
Renewable Energy Law, 5346 – YEKDEM ← Tariff Support Mechanism (30.03.2013)

Support Mechanism for Renewable Energy Generation;

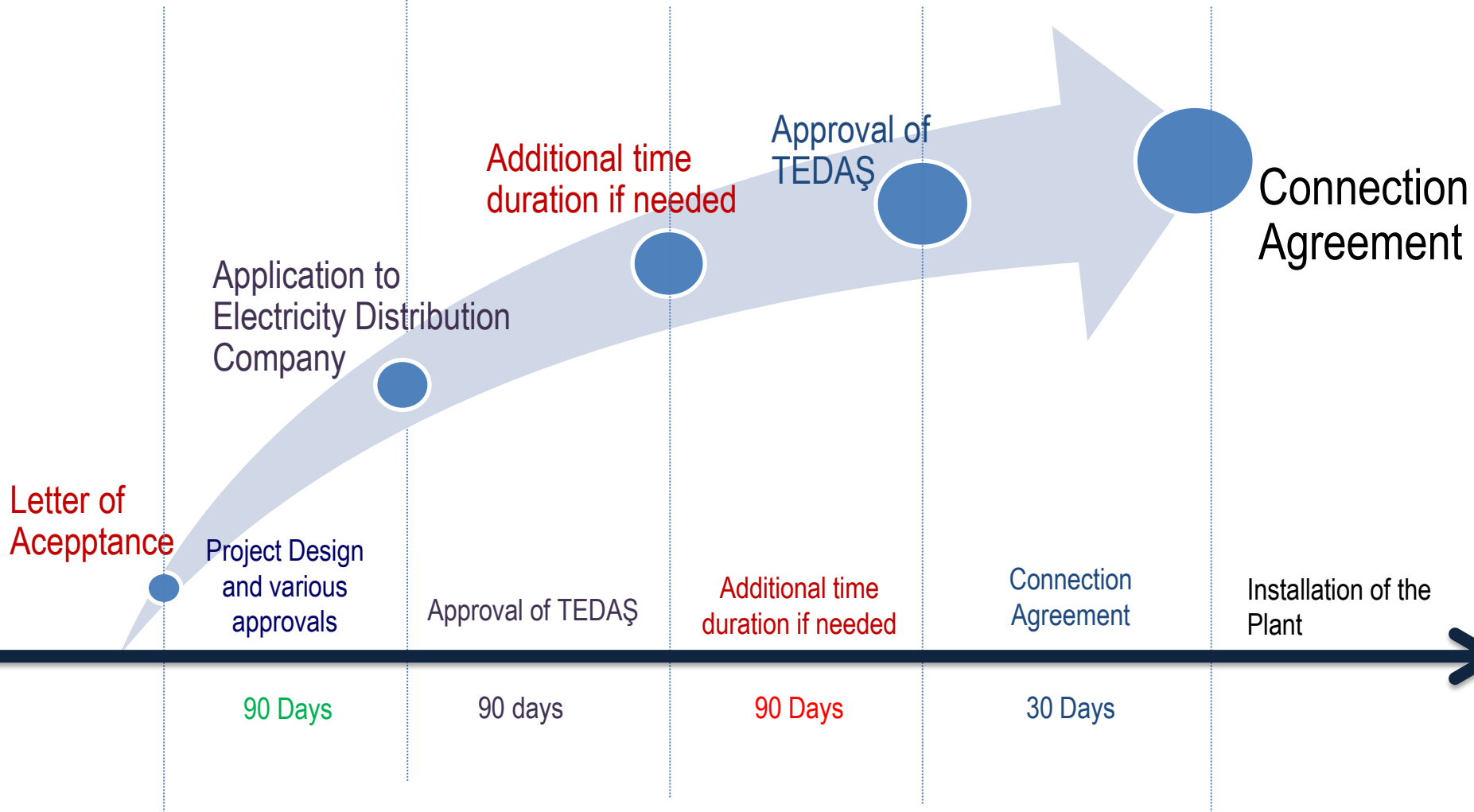
Energy generated from the renewable resources shall be purchased by the distribution company to which the plant is connected, at a price of 13.3 US Cents / kWh, for 10 years period.



UNLICENSED ELECTRICITY GENERATION(Statute)



Time Chart for Unlicensed Generation



Regulation Change -1

Installed capacity of a renewable plant to be connected to a bus should not exceed;

- (a) $1/30$ of the fault MVA of the bus for cogeneration plants,
- (b) $1/70$ of the fault MVA of the bus for others

System operator may propose alternative connection point, in case that the above limits are violated.

✓ Cancelled. (Article 12/5)



Regulation Change -2

- Direct connection to transformers and direct feeders can not be granted to unlicensed plants,
- Plants can not be connected to a distribution network other than the network that the plant is located.
- The distance between the transformer and plant can not be longer than;
 - 5 km for plants with installed capacity up to 0.5 MW,
 - 10 km for plants with installed capacity up to 1 MW

✓ Article 6/8



Regulation Change -3

- Capacity of the transformers may be increased by the distribution company, with the consent of transmission system operator,
- Capacity increases shall be announced in the web site of the Transmission System Operator.
- Applications for capacity increases can be made not earlier than 3 months

✓ Article 6/5



Regulation Change -4

- Installed power of unlicensed wind or solar power plant can not be larger than 30 times of the installed power of the consumption of the companies supplied by the plant.
- Consumption companies may be changed, but the consumption can not be reduced by changing the consumption companies.

✓ Article 6/12



Regulation Change -8

- Relatives of the members of the distribution companies can not make application for unlicensed power plants

✓ Article 31/21

- Ownership of a unlicensed power generation company can not be transferred to third parties, until the Commissioning of the plant.

✓ Article 31/20

Statistics for Unlicensed Generation

| | |
|------------------------------------|--|
| No. of Solar Project Approved | Capacity of Solar Project Approved (MW) |
| 3316 | 2596,8 MW |
| No. of Solar Projects Commissioned | Capacity of Solar Projects Commissioned (MW) |
| 495 | 360,5 MW |

Periods allowed for Completing the Installations

The installations must be completed within;

- 1 year, for those to be connected through low-voltage distribution system,
- 2 years, for those to be connected through medium-voltage distribution system,
- 3 years for hydroelectric power plants



Changes in the Regulations for Unlicensed Generation (23.03.2016)

Article 3.

Applications for unlicensed renewable energy generation projects are requested to prepare and submit the “Type Project”.

The Project must be designed primarily to meet the domestic energy demand of the applicant, with the surplus part of the generation to be sold in the market.



Changes in the Regulations for Unlicensed Generation (23.03.2016)

Article 3.

Procedures to be followed for the Connection Agreement, Letter of Acceptance and the principles for the trading of the surplus Energy to be generated shall be developed by EMRA (Energy Market Regulatory Authority)



Changes in the Regulations for Unlicensed Generation (23.03.2016)

Article 3.

At each transformer substation 5 MW reserve capacity shall be kept particularly for “Roof-mounted solar power plants with installed capacity not exceeding 10 kW” by TEİAS



Conditions

- Minimum installed capacity: 1 MW,
- No obligation for domestic consumption,
- Generated electricity can be supplied to the grid for commercial transaction,
- 600 MW capacity has been installed until now.



☐ **YEKDEM** the scope, power plants, which will enter into operation until 12/31/2020 for 10 years will be able to benefit from the price below.

Price Support Mechanism for Renewable Energy Generation

| Facility Type | Exercise Price(\$ cent/kWh) |
|---------------------|-----------------------------|
| Hydroelectric | 7,3 |
| Wind | 7,3 |
| Geothermal | 10,5 |
| Biomass (Waste Gas) | 13,3 |
| Solar | 13,3 |

Developments in the Legislations for Solar Power Projects in Turkey

YEKDEM

| Parts Manufactured In the Country | Parts | Percentage of Domestic Production (%) | Support Term added to the Tariff (US cent/kWh) |
|--|---|---|--|
| Integration of solar PV panels and structural/mechanical assembling | Support structures (mechanical fasteners, base of support, follow-up and support structure of cable channels) | 55 | 0,8 |
| | Electrical connections (cables, cable junction boxes, protection system) | 45 | |
| Invertors | Power electronics unit which converts alternating current to direct current | 100 | 0,6 |
| Sunlight focusing systems on the PV modules | Concentrating reflector or focusing featured optical material | 100 | 0,5 |

Developments in the Legislations for Solar Power Projects in Turkey

YEKDEM

| Parts Manufactured In the Country | Parts | | Percentage of Domestic Production (%) | Support Term added to the Tariff (US cent/kWh) |
|-----------------------------------|--------------------------|---|---------------------------------------|--|
| PV modules | Crystal based PV modules | Glass | 20 | 1,3 |
| | | Frame | 15 | |
| | | Cell Protective Wrap / Coating Material (Encapsulant) | 20 | |
| | | Back Sheet | 20 | |
| | | Junction box | 20 | |
| | | Current Carrier Conductive Tape | 5 | |
| | Focusing PV modules | Structure that holds cells together | 35 | |
| | | Frame | 15 | |
| | | Refrigeration unit | 50 | |

Developments in the Legislations for Solar Power Projects in Turkey

YEKDEM

| Parts Manufactured In the Country | Parts | | Percentage of Domestic Production (%) | Support Term added to the Tariff (US cent/kWh) | |
|-----------------------------------|--|---|---------------------------------------|--|--|
| Cells of the PV module | Crystal based on PV modules | The purified silicon | 25 | 3,5 | |
| | | Ingot | 15 | | |
| | | Wafer | 30 | | |
| | | Cells | 30 | | |
| | Thin Film based on PV modules | Thin-film materials | 15 | | |
| | | It stands with thin-film materials (glass, etc.). | 20 | | |
| | | Thin Film cells | 65 | | |
| | Focusing PV cells (multi-layer PVelements) | | 100 | | |

TEKNORAY SPP, Konya, (1 x 18 MW)

