



Der türkische PV Markt Status und Ausblick 2014

Electricity Sector, Support Scheme, Grid Connection

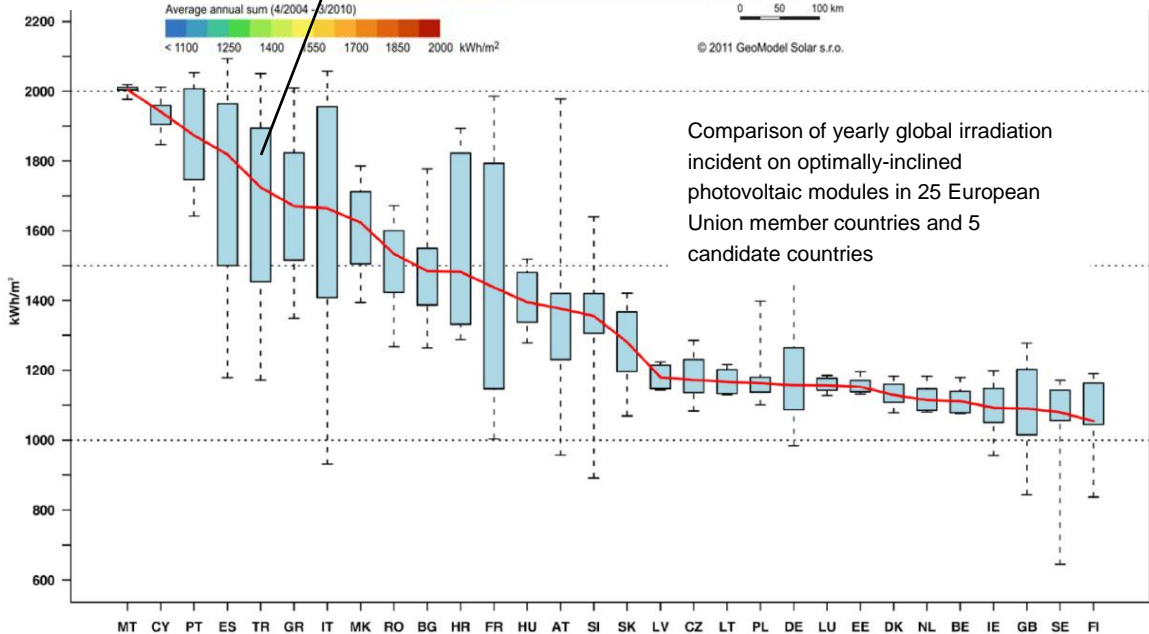
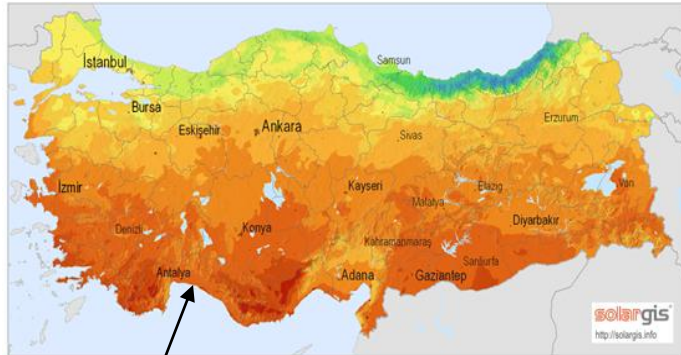
eclareon Consultants
Berlin, 18.11.2013



Agenda

- General Facts & Electricity Prices
- PV Market Development
- Support scheme and regulative framework
- Opportunities for PV Companies

Especially the Mediterranean region in the southern part of Turkey is characterized by a very high solar irradiation.



Annual average solar radiation

- 1,527 kWh/m² per year

Annual average sunlight hours

- 2,738 hours/year (7.5 hours per day)

General PV potential

- Feasible land area for PV investments:
 - 4,600 km² (irradiation >1650 kWh/m²)

Solar Water Heating

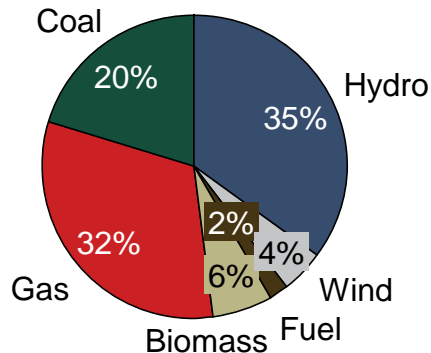
- 18 million m² flat-plate solar collectors in use
- Annual flat-plate solar collector manufacturing capacity is about 0.5 – 1M m²

Turkey's energy sector has been growing fast due to the economic growth and ongoing privatization of state-owned companies.

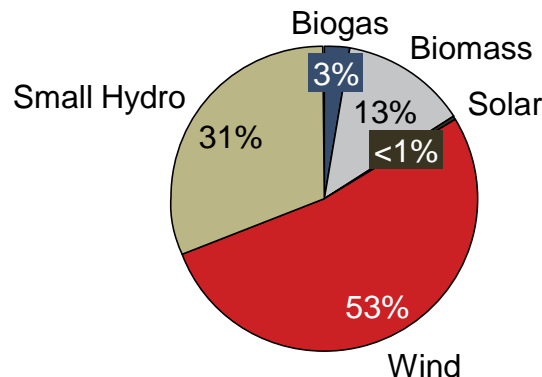
Basic Data Electricity Sector (2011)

Electricity Generation Capacity	61 GW (Sep. 2013)	Installed Power	125,000 MW
Electricity Consumption	230 TWh	RES Generation Capacity	4,200 MW
Electricity Generation	229 TWh	RES-electricity share (gross generation)	25% (Hydro 23%, Wind 2%)
Electricity exports/imports	3.6 / 4.6 TWh	Electricity Consumption (2010 – 2011)	~10% (annual increase of 6.5% projected until 2030)
Electricity Consumption per capita (2008)	Turkey: 3,070 kWh (2011) OECD: 8,486 kWh Germany: 7,148 kWh		

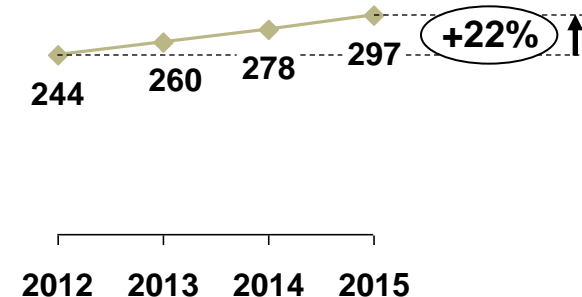
Electricity Generation by Source (Sep. 2013)



Installed RES Capacity by Technology (2012)



Forecast of Average Electricity Consumption [TWh] (2012)

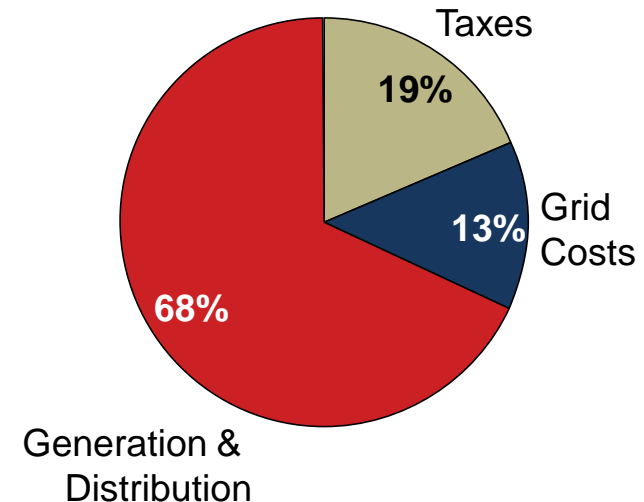


Electricity prices for all market segments are higher than PV generation costs.

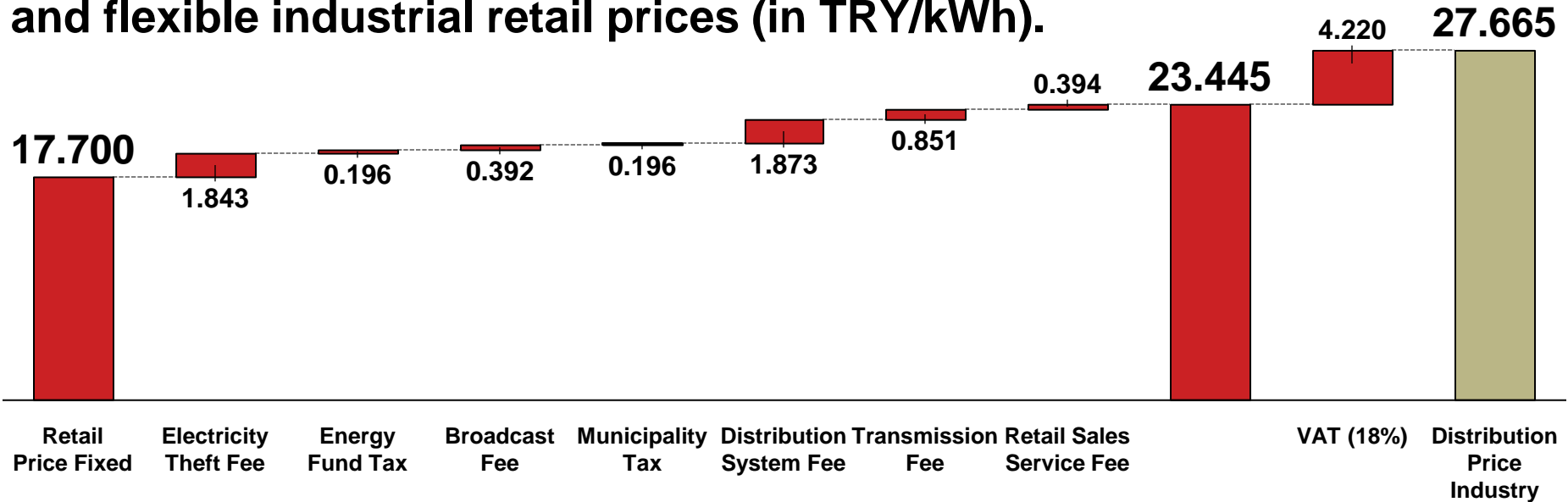
- National electricity tariffs, which are set for all end consumers, are regulated by the energy authority EPDK. The electricity price consists of production, distribution and electricity grid costs, electricity consumption tax and value-added tax.
- End consumers can choose one of two electricity tariff systems: a fixed tariff for 24 hours of a day or a flexible pricing system with different rates for day, peak and night time.
- The share of taxes in the price of electricity was 21 % for commercial consumers, 19 % for households and 15 % for industry and agriculture.
- Electricity prices increased since 2010 for all sectors except the commercial sector. Prices for industry were stable since 2012, whereas agriculture and households prices increased strongly.

Electricity prices Kuruş*/EUR cent per kWh**

Month/Year	Industry	Households	Commerce	Agriculture
01/2010 – 10/2011	23.44/11.74	26.27/13.16	32.02/16.04	22.59/11.32
10/2011 – 04/2012	25.68/10.97	28.78/12.29	32.21/13.76	25.06/10.71
04/2012 – 10/2012	28.12/12.15	31.40/13.56	33.57/14.50	27.36/11.82
10/2012 – 04/2013	28.99/12.52	34.43/14.87	36.23/15.65	30.41/13.14
04/2013 -	28.99/12.35	34.43/14.66	31.80/13.54	34.65/14.76



Industry: The additional fees and taxes remain the same for both fixed and flexible industrial retail prices (in TRY/kWh).



- **Energy Fund tax:**
 - 1% of the retail fixed price and the electricity theft fee
- **TV Broadcast fee:**
 - 2% of the retail fixed price and the electricity theft fee
 - In Turkey, the broadcast fee is added to the electricity bill
- **Municipality tax:**
 - 5% of the retail fixed price and the electricity theft fee for business agreements
 - 1% of the retail fixed price and the electricity theft fee for industry agreements

- **VAT:**
 - The VAT(18%) is added to the interim result, which contains the retail fixed price, the electricity theft fee, the energy fund tax, the broadcast fee, the municipality tax, the distribution system fee, the transmission fee and the retail sales service fee.
- **Electricity theft fee:**
 - Electricity theft is still a big issue in Turkey. With the privatization of the distribution companies, the government transfers the duty of grid expansion and the fight against electricity theft to these companies.

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Especially the unlicensed segment below 1 MWp will cause a dynamic market development in 2013/14.

PV Market Indicators

Market Size	2010: 0.5 MW	2011: 6 MW	2012: 14 MW	2013e: 30 MW
National RES & PV Target	<p>Overall Goal: Providing resource diversification with priority of domestic resources with a high share of renewable energy resources in 2023. RES target by 2023: > 30% of electricity generation:</p> <ul style="list-style-type: none"> • Complete all hydro power plants (HPPs) under construction (total 5.000 MW capacity) by the end of 2013 • Increase installed wind power capacity up to 20.000 MW by the end of 2023 • Increase installed geothermal power capacity up to 600 MW by the end of 2023 • Reach an installed capacity of at least 3000 MW in solar power by the end of 2023 			
Main Market Drivers	<ul style="list-style-type: none"> • Renewable Energy Law introduced in 2005 • Eased licensing for PV systems below 1 MWp triggers a strong market development in this segment • Goal to reduce energy imports and a priority for domestic resources triggered the promotion of RES • Increase in energy demand and rising electricity prices caused by economic growth 			
Recent changes in PV regulations	<ul style="list-style-type: none"> • Plants below 1 MWp benefit from an exempt from licensing requirements and the market cap. However, still a large amount of permissions need to be obtained. • Connection licenses for plants above 1 MWp are capped at 600 MW until 31st December 2013. An extension of the cap to 2,5GW is expected for 2015. 6 month measurement of on-site solar irradiation is required for obtaining a license. • Since the recent amendment plants below 1MWp should mainly generate for self-consumption (net-metering) but they may feed-in surplus energy to receive the FiT. 			

For systems above 1 MWp the administrative procedure still constitutes a major barrier. For smaller systems the market looks promising despite hindrances that are typical for emerging markets.

Market barriers

- 600 MW cap for projects above 1 MWp with bidding procedure that will result in even lower feed-in tariffs for large scale installations.
- Complicated administrative process with a large amount of documents, reports and legal forms to be handed in (e.g. juridical records, project information form, measurement report, single line diagram of the power plant, etc.).
- Currently there is not yet a depreciation rule for PV systems and the duration is not defined. Especially for commercial and industrial applications the depreciation mode is important for the profitability of the PV system.
- Project development costs are currently very high for small installations below 30 kWp since they need to pass through the same permission process like a 1 MWp system (e.g. signature by electrical engineer, travel costs to Ankara, structural engineering report, etc..)
- Investors currently have high expectations regarding IRR and amortization which PV currently does not deliver. Due to the growing economy there are many other attractive investment opportunities.

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The electricity tariff for many consumers is higher than the feed-in tariff which makes self-consumption systems below 1 MWp attractive.

Feed-in tariff

Remuneration	<ul style="list-style-type: none"> • 13.3 USD cent/kWh (~10 EUR cent/kWh) • Since 2011 the tariff is dollar-denominated which reduces exchange rate risks for foreign companies
Timeframe	<ul style="list-style-type: none"> • Paid for ten years from the date of operation. Current incentives valid for plants commissioned before 31st December 2015. After 2015 the FiT will be re-determined and cannot be higher than the current value.
Eligible Parties	<ul style="list-style-type: none"> • Corporate bodies that are public companies or a Limited • Operators need to apply for the license until the 31st of October to receive the tariff in the subsequent year
Market Cap	<ul style="list-style-type: none"> • For plants above 1 MWp the available licenses are capped at 600 MW, will be extended to 2,5 GW in 2015.
Additional incentives for Local Content components	<ul style="list-style-type: none"> • Mounting structure component: 0.8 USD ct/kWh • PV Module: 1.3 USD ct/kWh • PV Cells: 3.5 USD ct/kWh • Inverters: 0.6 USD ct/kWh • Total amount: 6.2 USD ct/kWh
Requirements for additional incentives	<ul style="list-style-type: none"> • Locally manufactured components need "Manufacture Status Document" • Start of electricity generation before the end of 2015 • Operators are eligible to receive additional incentives for a 5 year term after start of operation

The regulative framework for PV plants in Turkey differentiates between system below and above 1 MWp.

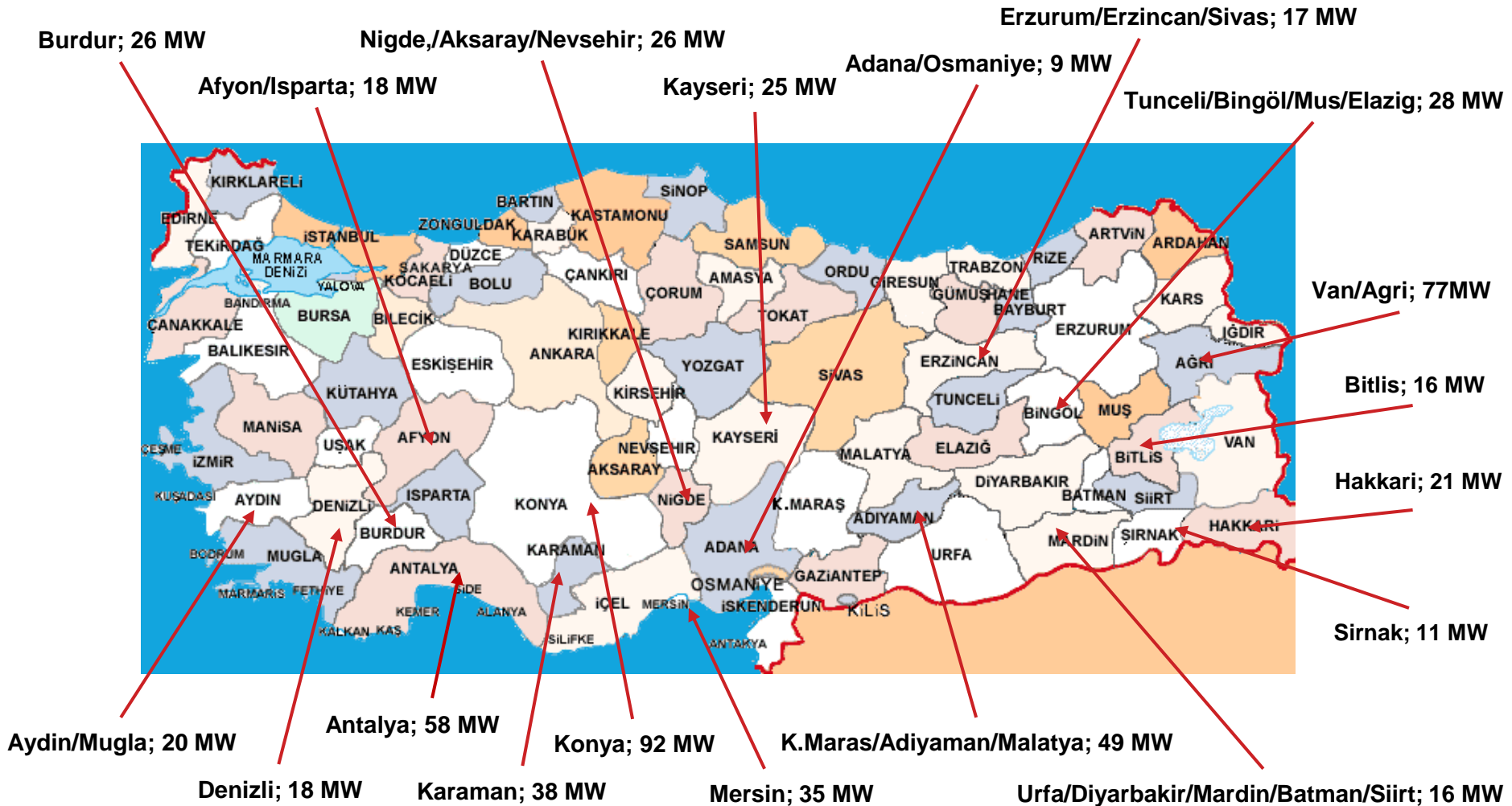
General legal Framework: plants over 1 MWp

- Under the terms of the regulations on the Electricity Market Act, **plant operators require an operator's license**
- The regulations apply to all energy sources equally and **are oriented towards general legal frameworks for independent power producers (IPPs)**, which are defined in particular by the following laws and regulations:
 - Electricity Market Act No. 6.446 of 2013
 - Regulations on the Electricity Market Act
 - The use of Renewable Energy Sources for Electricity Generation Act No. 5.346
- **Remuneration:** Electricity generation can be remunerated in accordance with the feed-in tariff

License-free plants under 1 MWp

- **License-free electricity generation:**
 - Operators of plants under 1 MWp do not need an operator's license and also do not have to register a business
 - However, operators must lodge an informal application with the local grid operator, submit documents and specify the plant's site
- **Self-suppliers:** Electricity from these plants is designed mainly to cover the generator's own needs
- **Remuneration:** Electricity generation can be remunerated in accordance with the feed-in tariff

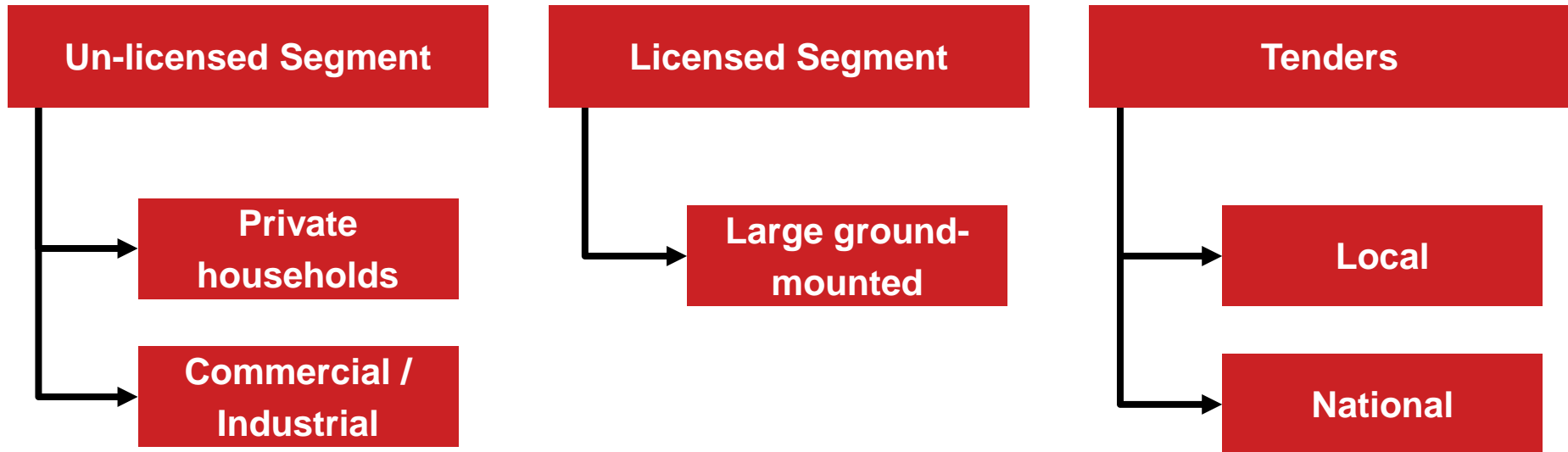
Many projects above 1 MWp are currently in the licensing pipeline for the 600 MW shown below.



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Short term, the unlicensed segment is most attractive while medium term the licensed segment is interesting for developers with cost and financing advantages.



Market Opportunities

- Short term, the “unlicensed” segment below 1 MWp is the most dynamic one in Turkey
- Based on electricity savings the commercial/industrial sector is the most attractive one
- The complicated licensing process hinders a short-term growth
- The bidding procedure is putting pressure on returns for developers
- Multi MW installations are only possible in this segment
- Currently many local public tenders are awarded
- Based on electricity demand for public institutions this segment can persist on limited scale
- No new large tender programmes on national level



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