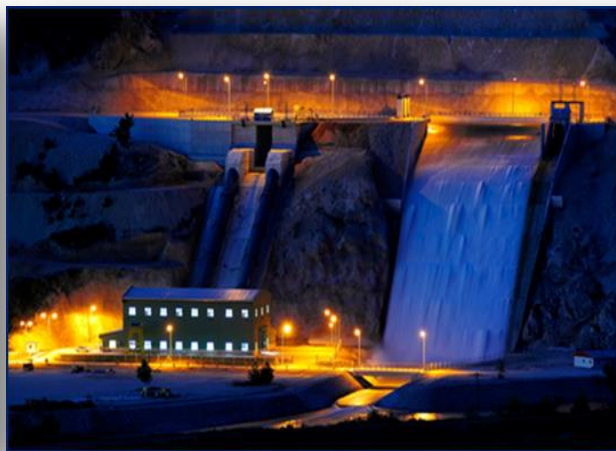


Garanti Bank

2015 Electricity Market Report

2015-2025 Projections



Disclaimer

DISCLAIMER STATEMENT

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The forecasts presented in this presentation are based on the outcomes of the TGB’s internally developed **Electricity Market Forecast Model**. These outcomes are grounded on a detailed set of assumptions including but not limited to electricity demand growth, installed capacity growth, commodity prices, technical specifications, hydrology, weather conditions, privatizations, legislation, pricing mechanism, and market conditions etc... Different set of assumptions will produce different outcomes from the model.

Electricity Market Forecast Model has been developed internally by Garanti Bank project finance department energy team in 2010. Garanti is the first and the only bank in Turkey with a forecast model, which has the capability of forecasting demand, supply, merit order and power plant EBITDAs on an hourly basis. The model is upgraded, calibrated and rerun every year with updated assumptions. The outcomes of the updated model are used to drive Garanti Bank’s strategies in the energy sector and for the financial analysis of the potential projects throughout the year.

Executive Summary

As the largest lender in project finance with a loan book of **\$13 billion** dollars, energy sector forms one of our key market segments. With a total commitment of **\$11 billion** and a current exposure of **\$6.7 billion**, energy projects account nearly half of our project finance portfolio.

At such level of exposure, monitoring the development and the outlook of the energy markets becomes a priority for ensuring the quality of our assets. In line with this we, as Garanti Bank, have been deeply analysing the sector and conducting forecasting studies about the Turkish electricity market since late 2000's.

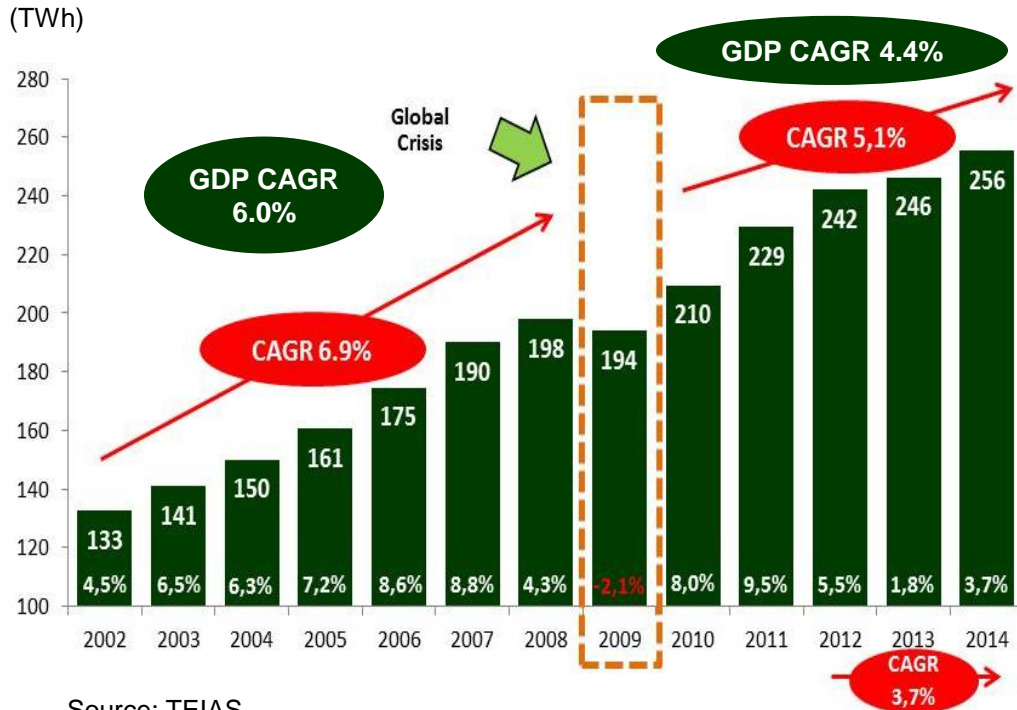
This report summarises the **10 key highlights** we have outlined from our extensive studies with regards to the historic evolution and the future development of the Turkish electricity market. Each of these conclusions are explained in depth in the following slides together with the underlying factors.

1. Demand is moving to a medium growth phase
2. Supply is growing faster than demand
3. Renewable projects will dominate the financing pipeline
4. Privatizations will have a hidden capacity increase effect
5. Reserve margin (excess capacity) will be increasing
6. Share of natural gas power plants will fall significantly
7. The system will still require CCGTs
8. Lower commodity prices will affect all IPPs (Independent power producers)
9. Oil prices will determine the long-term level of the spot electricity prices
10. Climate change policies will shape the energy markets

We believe that the Turkish electricity market will continue to be a strategic sector for the sponsors and the financiers due to sound fundamentals in the long-term. We will continue our strong support in the financing of energy projects.

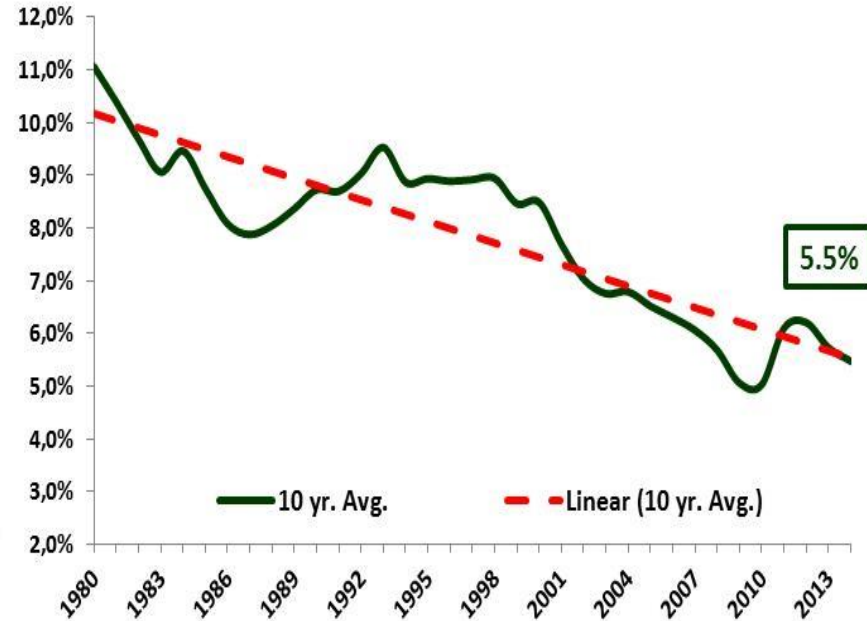
Demand is moving to a medium growth phase

Demand Growth Evolution



Source: TEIAS

- Average demand growth after global crisis fell from **6.9%** to **5.1%**.
- Last 3 years average decreased further to **3.7%**.
- 10 year moving average approaching **5.0%**.
- GDP is the most important driver of growth. CAGR after 2009 is **4.4%** vs. **6.0%** before 2009.
- All important growth drivers indicate that Turkey is moving from a high growth to medium growth phase.

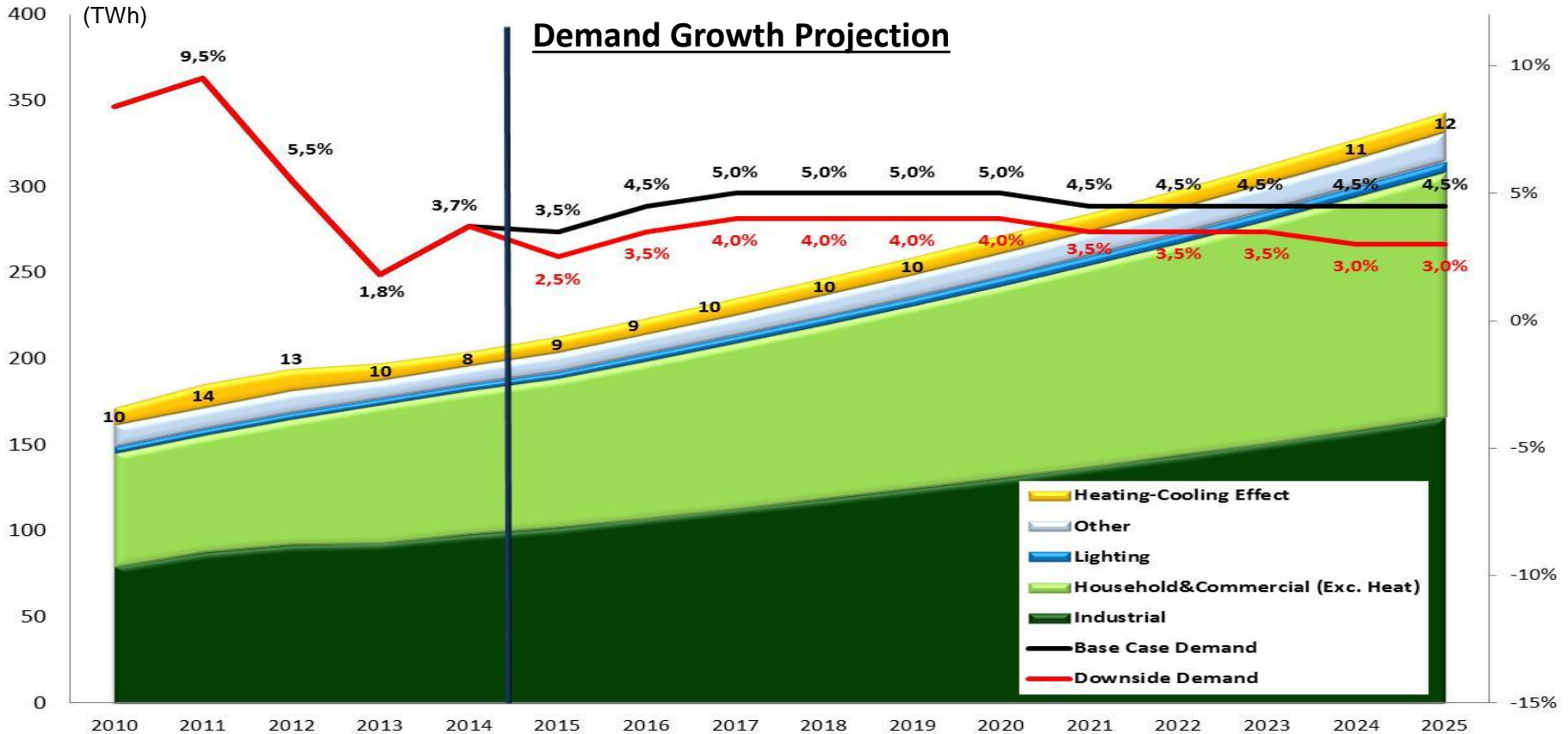


Source: TEIAS

Important Growth Drivers

1. Gross Domestic Product
2. Energy Efficiency
3. Electric Motors
4. Iron & Steel Factories
5. Service Driven Economy

We expect demand increase to levelize around 4.5-5.0% p.a.



Source: TEIAS (actual) + Garanti Bank Projections

* Demand figures don't include loss & theft and internal consumptions. Our actual forecasts include loss & theft and internal consumption.

Base Case:

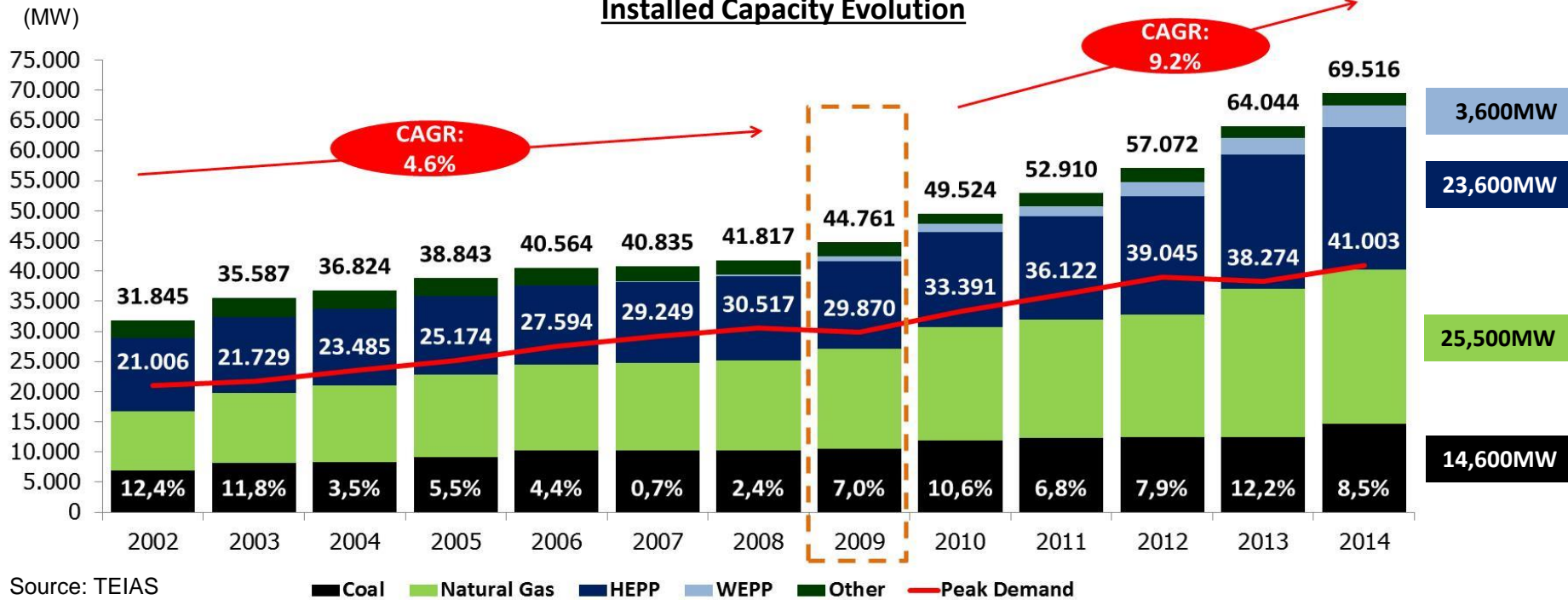
- L/T demand 2015-2025 CAGR: **4.6%**.
- GDP Assumptions: 2015-**3.25%**, 2016-2025-**4.2%**.

Downside Scenario:

- L/T demand 2015-2025 CAGR: **3.5%**.
- GDP Assumptions: 2015-**3.0%**, 2016-2025-**3.5%**.

Supply is growing faster than demand

Installed Capacity Evolution



Supply is growing faster than demand

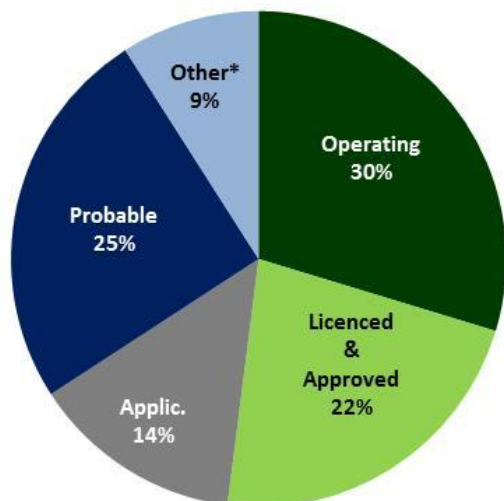
- ✿ 2014 installed capacity reached **69,516MW**.
- ✿ Gross capacity increase in 2014 is **6,300MW**.
- ✿ **800MW** of old CCGTs were decommissioned.
- ✿ Net capacity increase **5,500MW**.
- ✿ Installed cap. increased by **40%** over the last 4 years.
- ✿ Demand growth over the same period is **22%**.

All new projects are «merchant»

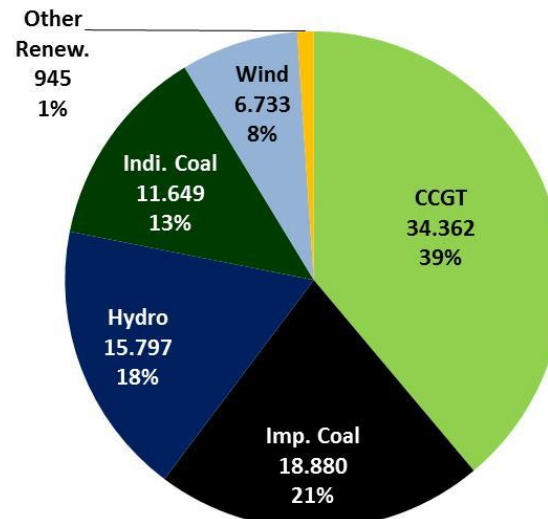
- ✿ Total installed capacity of the IPPs* exceeded **38,000MW**.
 - ✿ Share of the IPPs* reached **55%** (2003: 16%).
 - ✿ Share of state decreased to **31%** (22,000MW).
 - ✿ Share of contracted plants (BO-BOT-TOR) **14%**.
- * Independent power producers

Strong project pipeline for the coming years

Breakdown of Database
(Total: 234.000MW)



Licenced, Approved and Applications
(Total: 88.500MW)

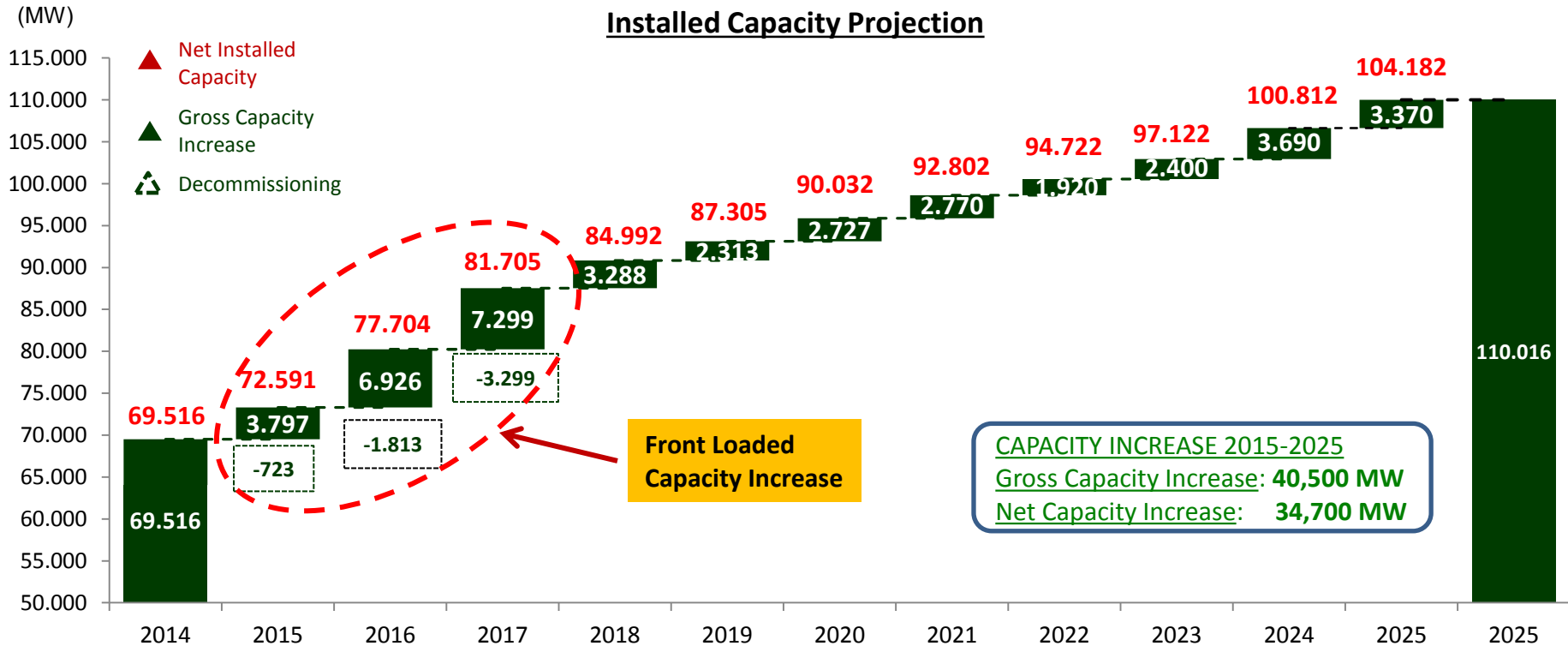


* Other includes cancelled, decommissioned projects

Source: Garanti Bank Electricity Market Forecast Supply Projections

- Capacity projections are based on TGB’s internal database. The projects are evaluated by the feasibility, cash flow profile, location, permitting stage, environmental factors, financing and sponsors’ equity strength.
- The total database comprises of ~**1.700** projects with a total installed capacity of **234.000MW**.
- **88.500MW** of the database form majority of the pipeline for the medium term.
- Project stock consists of **65.000MW** thermals. According to Garanti forecasts only around **20% (13.500MW)** of these projects will be operational in the next 10 years.
- The realization rate of the renewable projects are expected to be much higher compared to thermals.

Installed capacity will exceed 100.000 MW in 2025



Source: Garanti Bank Electricity Market Forecast, Supply Projections

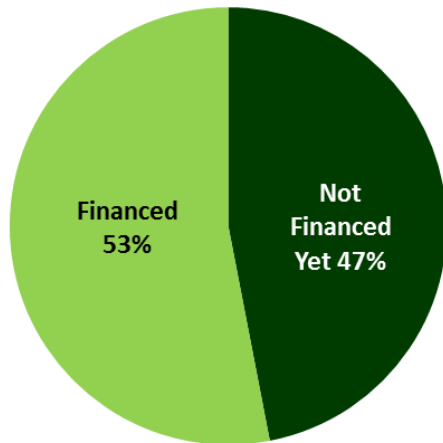
17,790 MW net capacity increase in upcoming 5 years

- Capacity increase in the last 5 years was **24,755 MW**. In next 5 years, we expect a **21,600 MW** gross increase.
- Uncompetitive power plants are being decommissioned (currently **800 MW**). In total **5,800 MW of CCGTs and fuel oil** fired power plants are expected to be decommissioned until 2018.
- CCGTs with efficiencies lower than **52%** efficiency will be taken out of the system gradually.

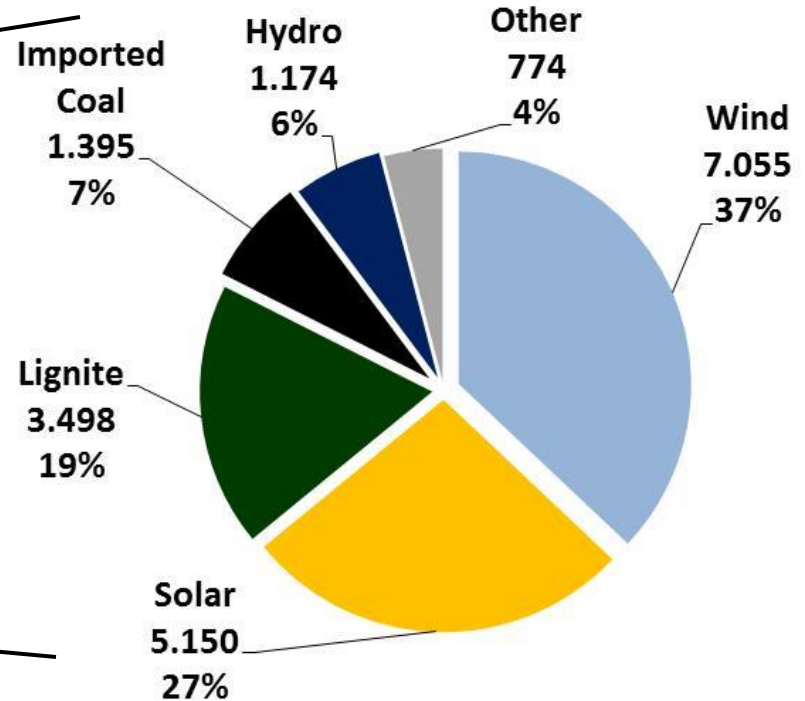
Installed capacity will reach 90,000 MW in 2020

Renewable projects will dominate the financing pipeline

More than half of the ~40,500 MW capacity has already secured financing



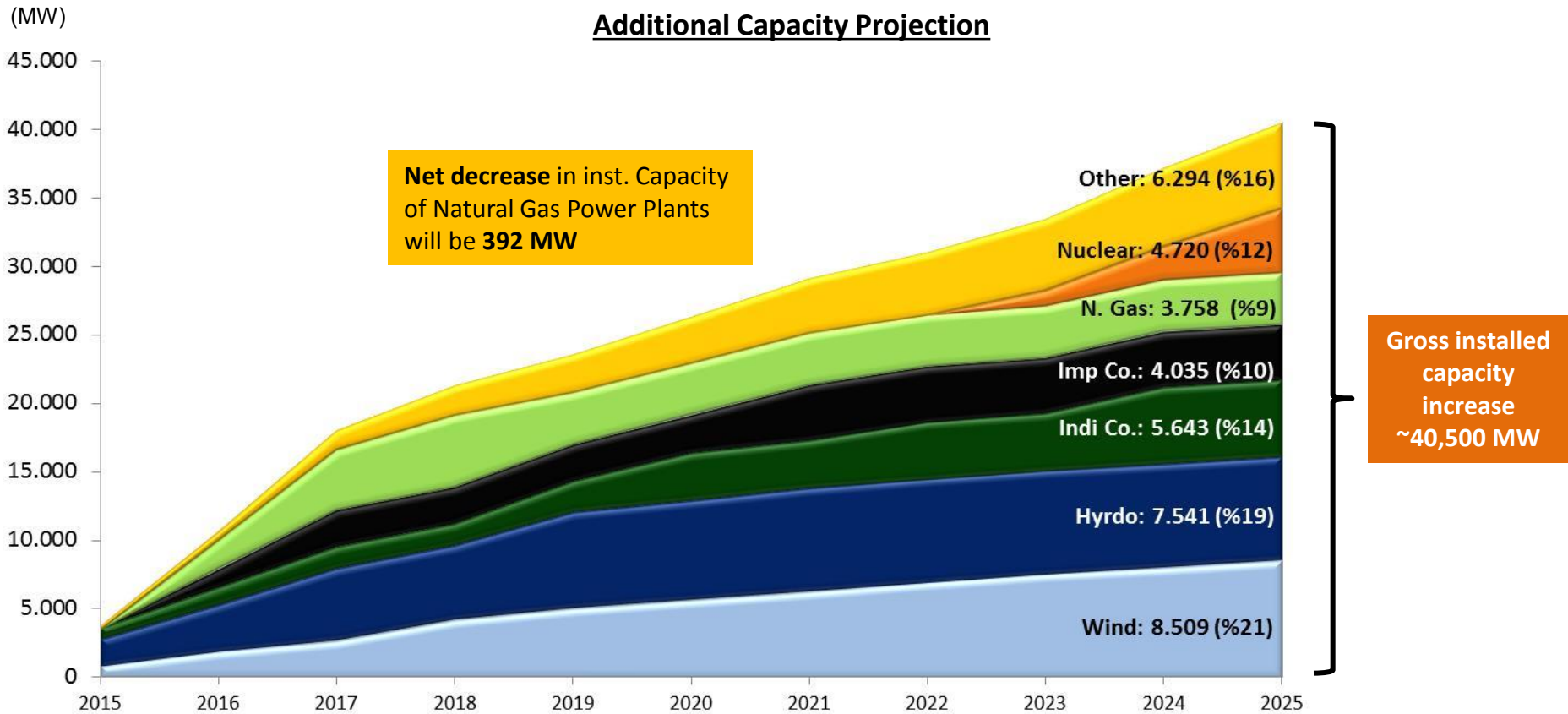
~19,000 MW still requires financing



Source: Garanti Bank Electricity Market Forecast Supply Projections

- **53%** of the projects in the pipeline have already secured financing and under construction.
- **70%** of the projects requiring financing are **renewable projects (13,400 MW)**.
- Renewable projects can easily secure financing due to hard currency feed-in tariff and available funding.

Local resources to gain momentum



Source: Garanti Bank Electricity Market Forecast Supply Projections

- Net capacity increase will be **34,700MW** taking into account **5,800MW** to be decommissioned.
- Until 2025 ~**22,500 MW** renewable and **13,500 MW** thermal projects will be installed. (gross)
- Projects utilizing local resources will make up **70%** of all projects. (~**28,000 MW**)
- Natural Gas projects to be online are already financed. (~**3,750 MW**)

New thermal power plants to be commissioned until 2020 (>450MW)

Additional Thermal Capacity Projection

New power plants to be commissioned

1-Zetes 3/ 1.320 MW	7-Bandırma II / 600 MW
2-Cenal / 1.320 MW	8-Ciner Kazan / 600 MW
3-Habaş / 850 MW	9-Kolin Soma / 510 MW
4-Gama / 840 MW	10-Tufanbeyli / 453 MW
5-Acwa / 798 MW	11-Konya Ilgın / 453 MW
6-Afşin A Ext. / 688 MW	

Indigenous Coal: **4,700 MW**
 Natural Gas: **3,700 MW**
 Total: **8,400 MW**

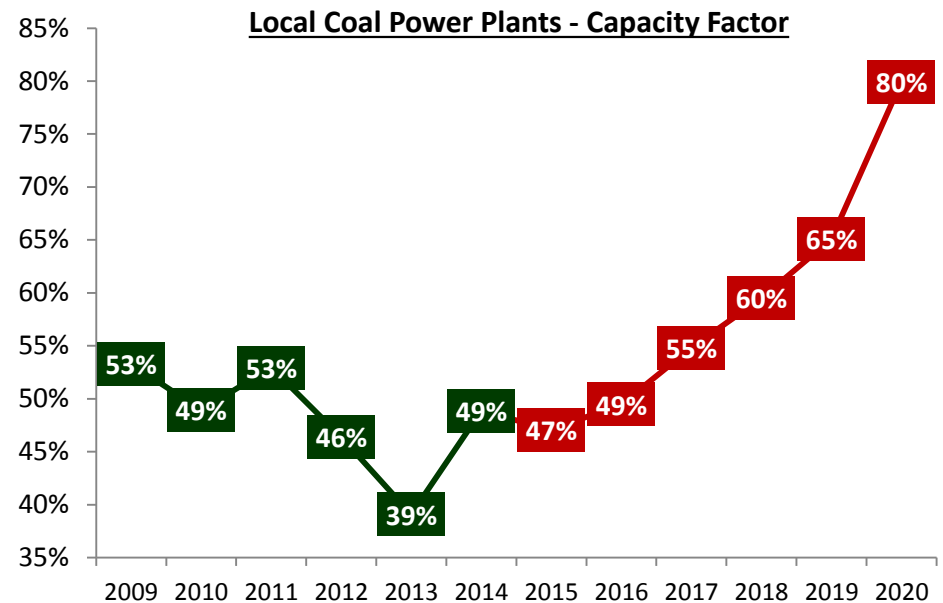
Source: TEIAS + Garanti Bank Market Intelligence

- Forecast based on power plants that have secured financing and that are under-construction.
- The total capacity of new thermal power plants will be **~13,500 MW** including power plants below 450MW.

* Rehabilitation works of Hamitabat and Ambarlı are not included in the list of new power plants.

Privatizations will have a hidden capacity increase effect

Coal Power Plants	Capacity (MW)	2009	2010	2011	2012	2013	2014	Avg.
Afşin-A	1.355	35%	17%	27%	26%	18%	20%	24%
Afşin-B	1.440	62%	61%	45%	38%	17%	24%	41%
Soma A-B	1.034	53%	45%	55%	56%	40%	61%	52%
Yatagan	630	59%	47%	59%	54%	38%	33%	49%
Kemerkooy	630	55%	49%	45%	52%	51%	63%	53%
Seyitomer	600	77%	69%	74%	63%	75%	86%	74%
Kangal	457	41%	58%	62%	28%	52%	74%	52%
Yeniköy	420	24%	35%	71%	78%	72%	71%	59%
Tuncbilek	365	50%	52%	56%	47%	45%	69%	53%
Çan	320	70%	76%	76%	52%	73%	68%	69%
Catalagzi	300	70%	72%	76%	58%	52%	58%	64%
Orhaneli	210	65%	64%	71%	56%	9%	71%	56%
Average CF		53%	49%	53%	46%	39%	49%	48%

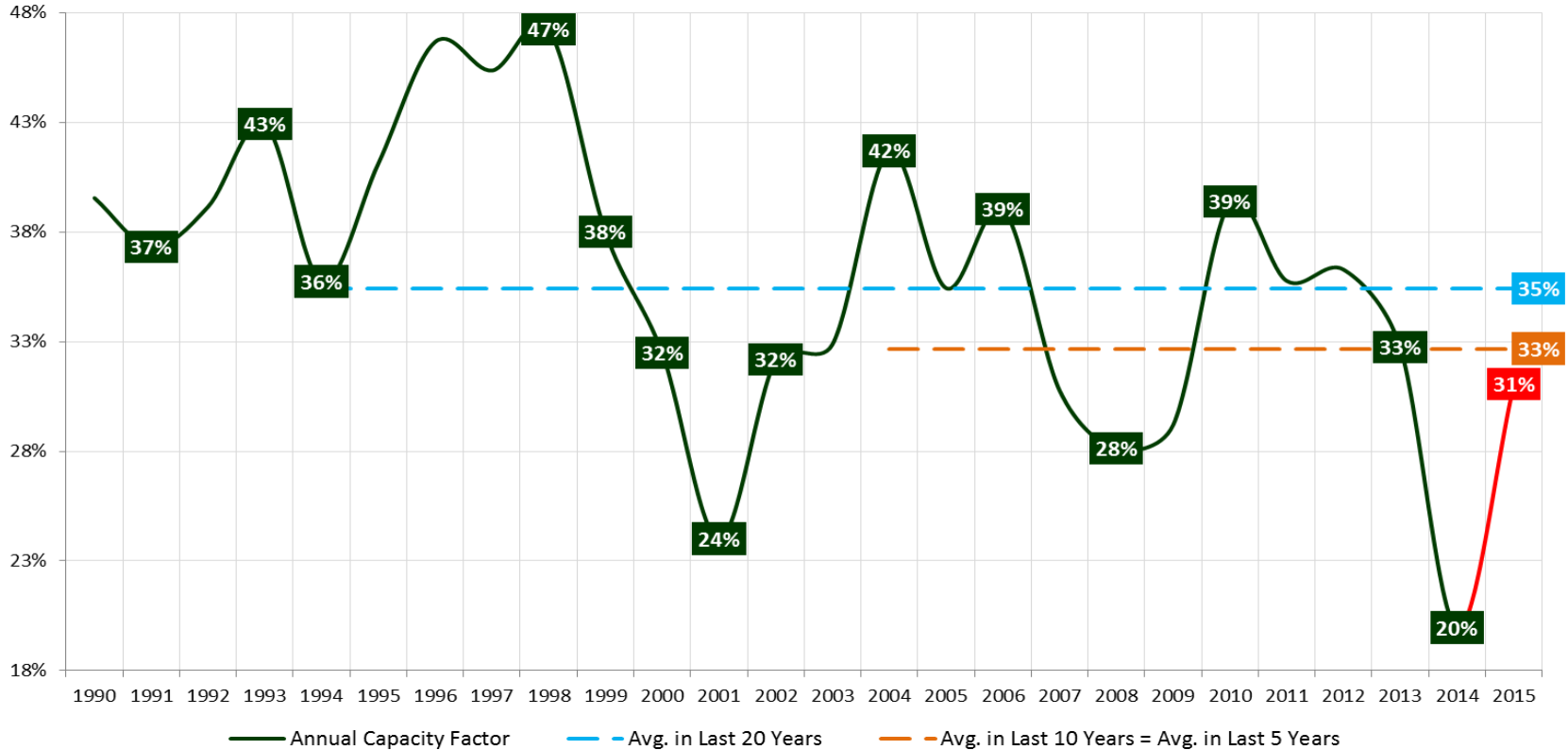


Source: EUAŞ + Garanti Bank

- Tenders of almost all coal power plants have been concluded:
 - Privatized power plants perform significantly better after the take-over.
 - Only the privatization of Çan power plant is left in the vast portfolio.
- Dispute for Afsin A has come to an end in 2014, plant will be operated on a BOT basis.
- Status and performance of each power plant have been analysed separately.
- After rehabilitation and replacement periods, the overall capacity factor is expected to reach **80%**.(equivalent to a new **3,000 MW** CFPP)

Hydro generation has a significant effect on prices

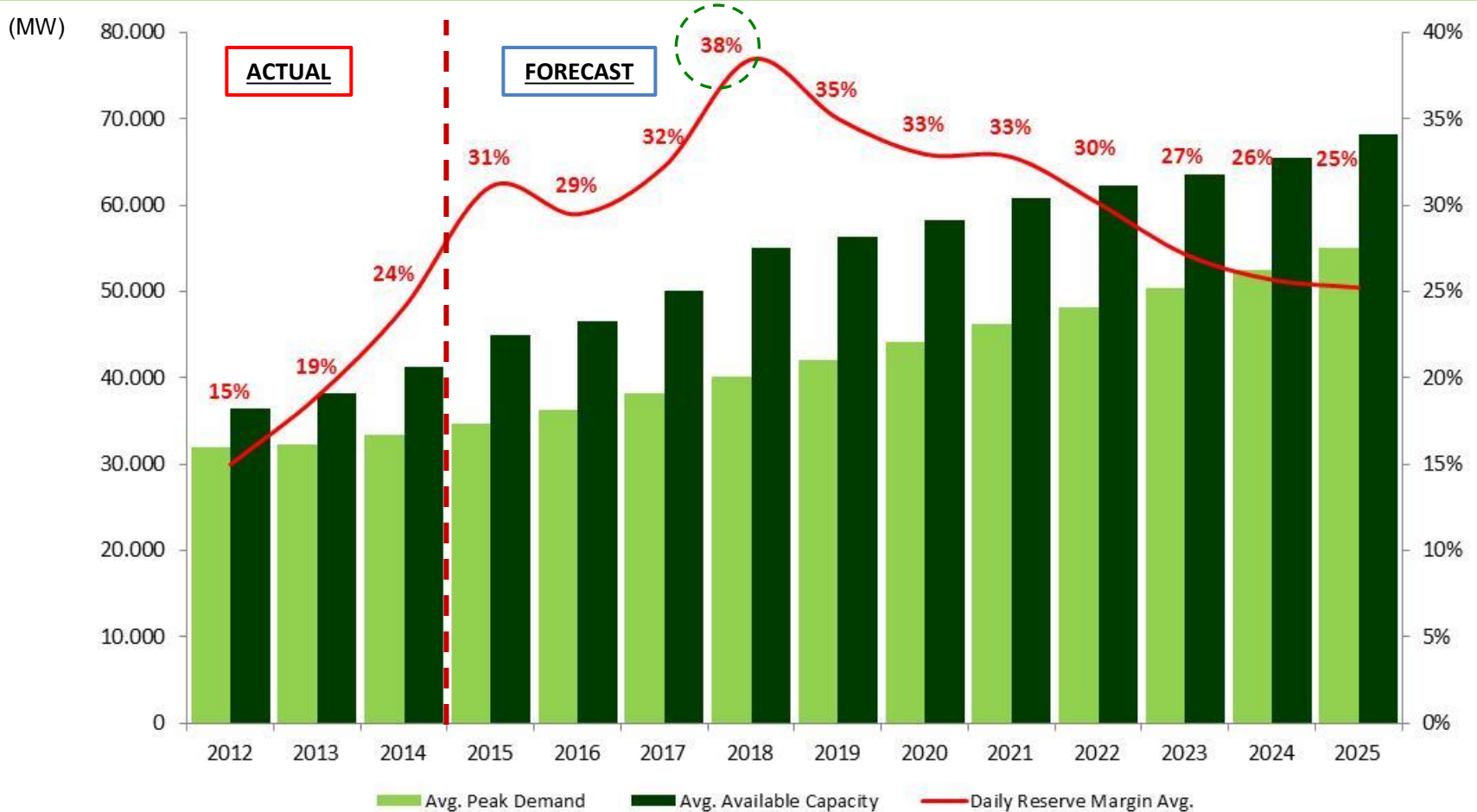
Realized Annual Hydro Capacity Factors



Source: TEIAS

- Hydro projects have a very cycle generation pattern and they have a significant impact on electricity prices.
- 1 percentage-point increase in hydro capacity factor has a **0.1 \$c/kWh negative effect** on electricity prices. (For example: Cap. Fac. **32% → 33%**; electricity prices go down **0.1\$c**)
- **Projection:** Hydros are expected to operate in-line with 10 year average (**33% cap. fac.**) in the long run.

Reserve margin will be increasing



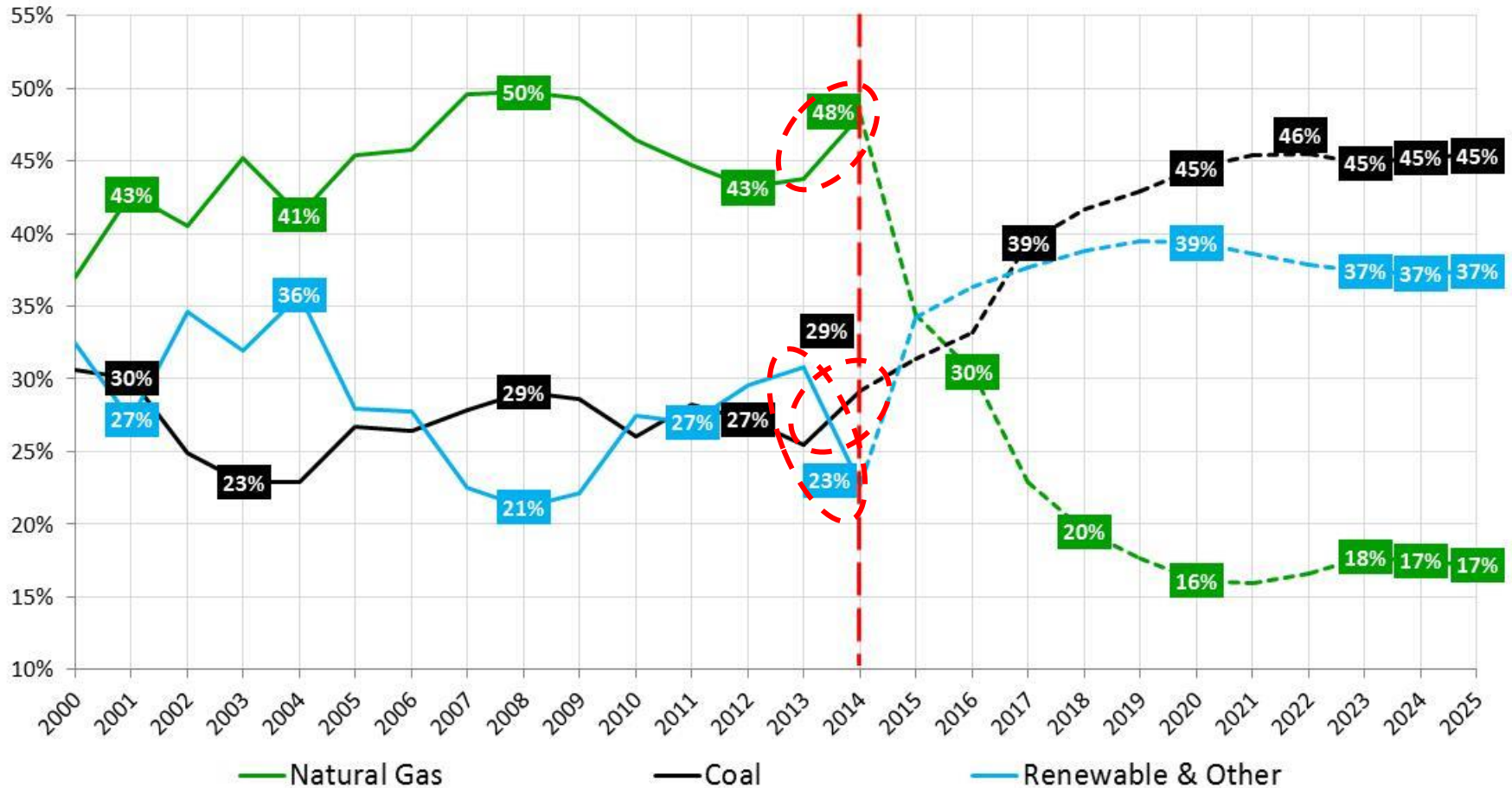
Source: TEIAS + Garanti Bank Electricity Market Forecast Model

- Reserve margin is expected to increase until 2018. Competition will intensify.
- Until 2025 reserve margin is not expected to fall below 2014 levels.
- Higher competition will force uncompetitive plants out of the market.

$$\text{Reserve Margin} = \frac{\text{Hourly Avl. Supply} - \text{Hourly Demand}}{\text{Hourly Demand}}$$

Share of natural gas power plants will fall significantly

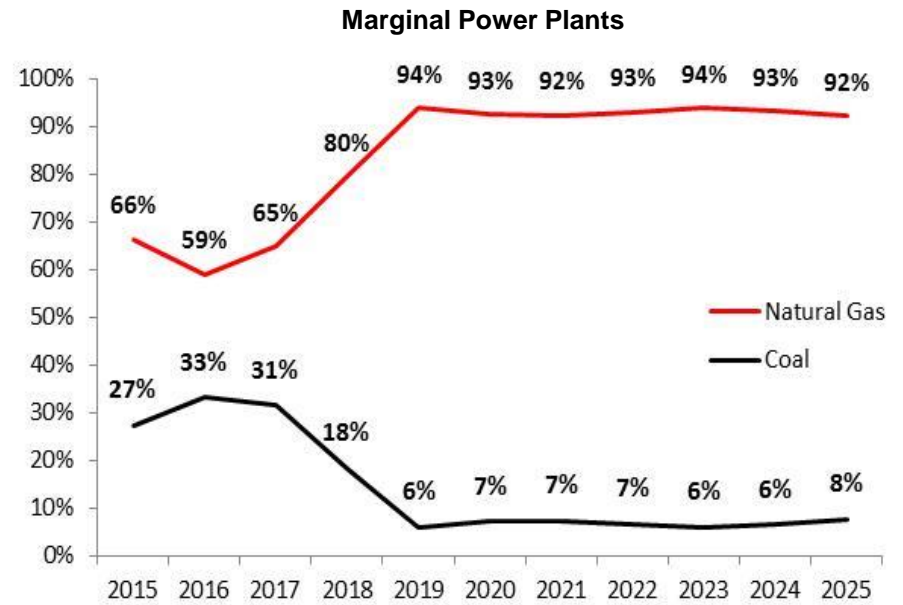
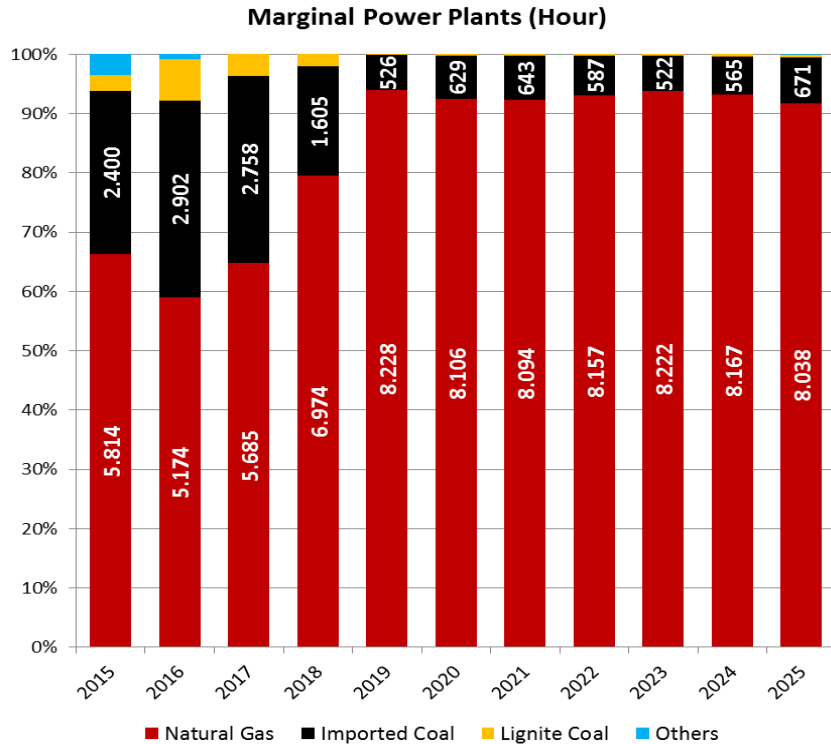
Electricity Generation Mix Projection



Source: TEIAS + Garanti Bank Electricity Market Forecast Model

- Share of Natural Gas will fall down to **15-20%**.
- Share of Renewables will rise up to **35-40%**.

The system will still require CCGTs



* After 2019 BO-BOT power plants become merchant

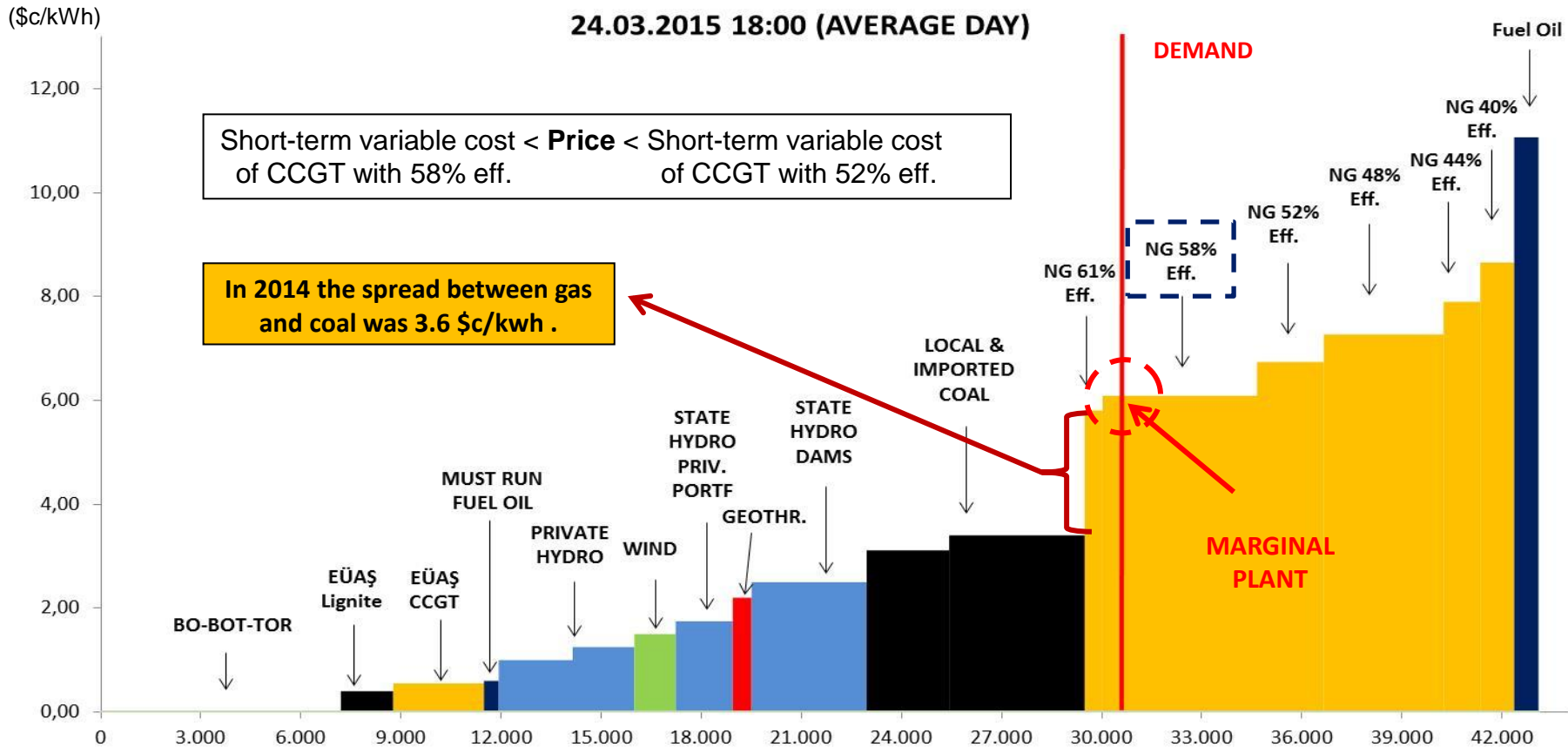
CCGTs will still be the marginal plant most of the time (84%) during the next 10 years.

Source: Garanti Bank Electricity Market Forecast Model

* Please note that these figures do not represent full capacity equivalent operating hours. These figures represent the number of hours where the relevant power plant is the marginal plant (price maker).

- Especially during summer and winter peak periods the system will require CCGTs for supply security.
- Marginal power plant hours of CCGTs are increasing over the years. However due to increasing reserve margin and competition between CCGTs' full capacity dispatch hours and spread margins will be falling.
- In order to maintain supply security, **capacity payments** similar to ones used in EU countries, could be established.

CCGTs are still the marginal plants on an average day

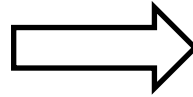


- Spot market prices are determined hourly, based on the **demand and available capacity** at that hour. (MW)
- Power plants are ordered according to their short-term marginal costs to form **the merit order**.
- **Marginal plant determines the price**. All power plants to left of demand dispatch and ones to right do not dispatch.
- **Competition** between different types of plants and within the same group of plants determine pricing strategy.

Lower commodity prices will affect all IPPs

Electricity Pricing Mechanism *

Oil Prices → Natural Gas Prices



Natural Gas Prices → Electricity Prices

Oil Price (\$) → Natural Gas Price (\$)
 Natural Gas Price (\$) x \$/TL → Natural Gas Price (TL)

Natural Gas Price (TL) → Electricity Price (TL)
 9,6 x Efficiency

- Oil price: USD
- BOTAS purchase price: USD
- BOTAS sales price: TL

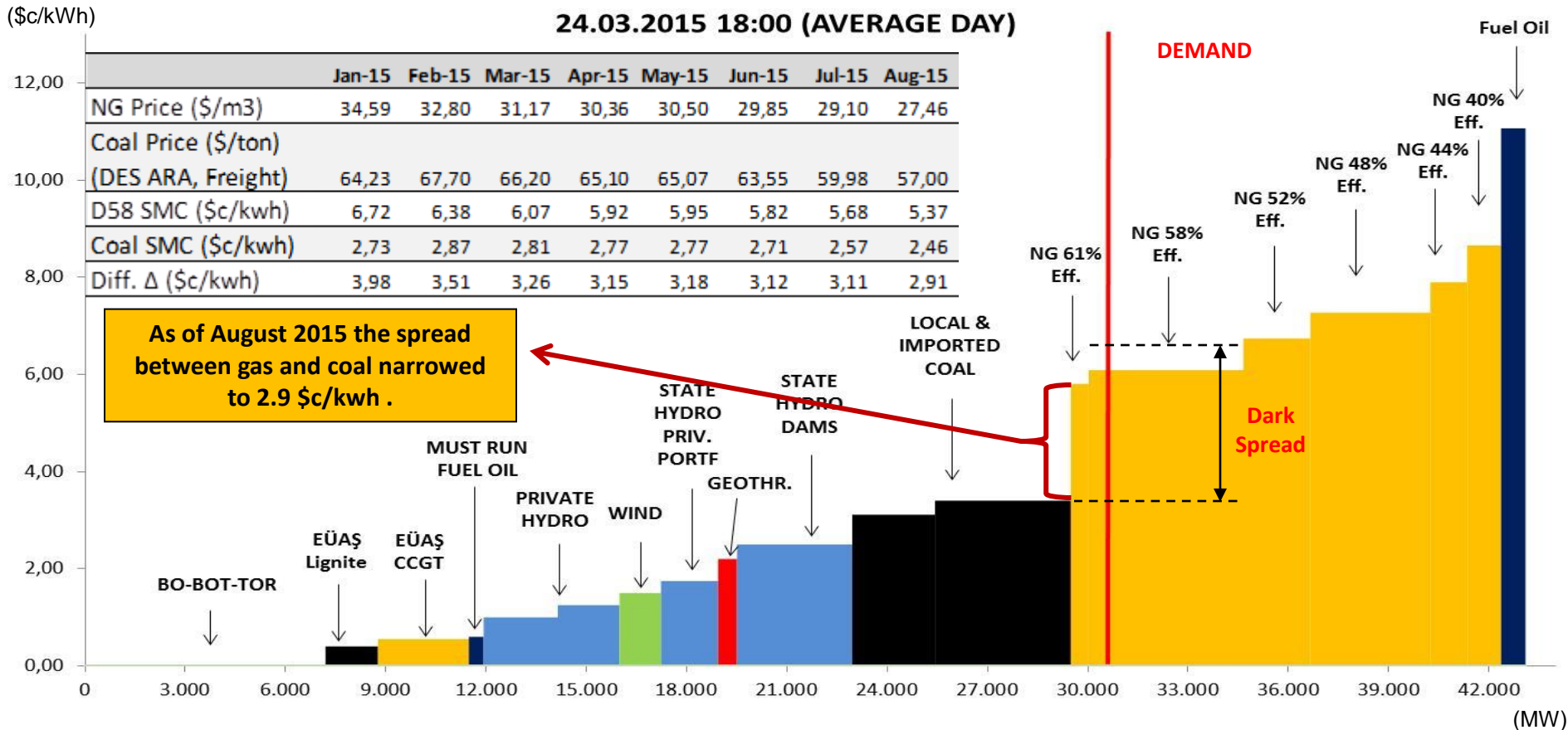
- BOTAS sales price: TL
- Electricity price: TL
- Pass-through reflection of changes in oil prices and \$/TL

Oil Price (\$) + \$/TL + Merit Order → Electricity Price (TL)

* This pricing mechanism is applicable when CCGT's are the marginal plants/price makers (~85% of the year)

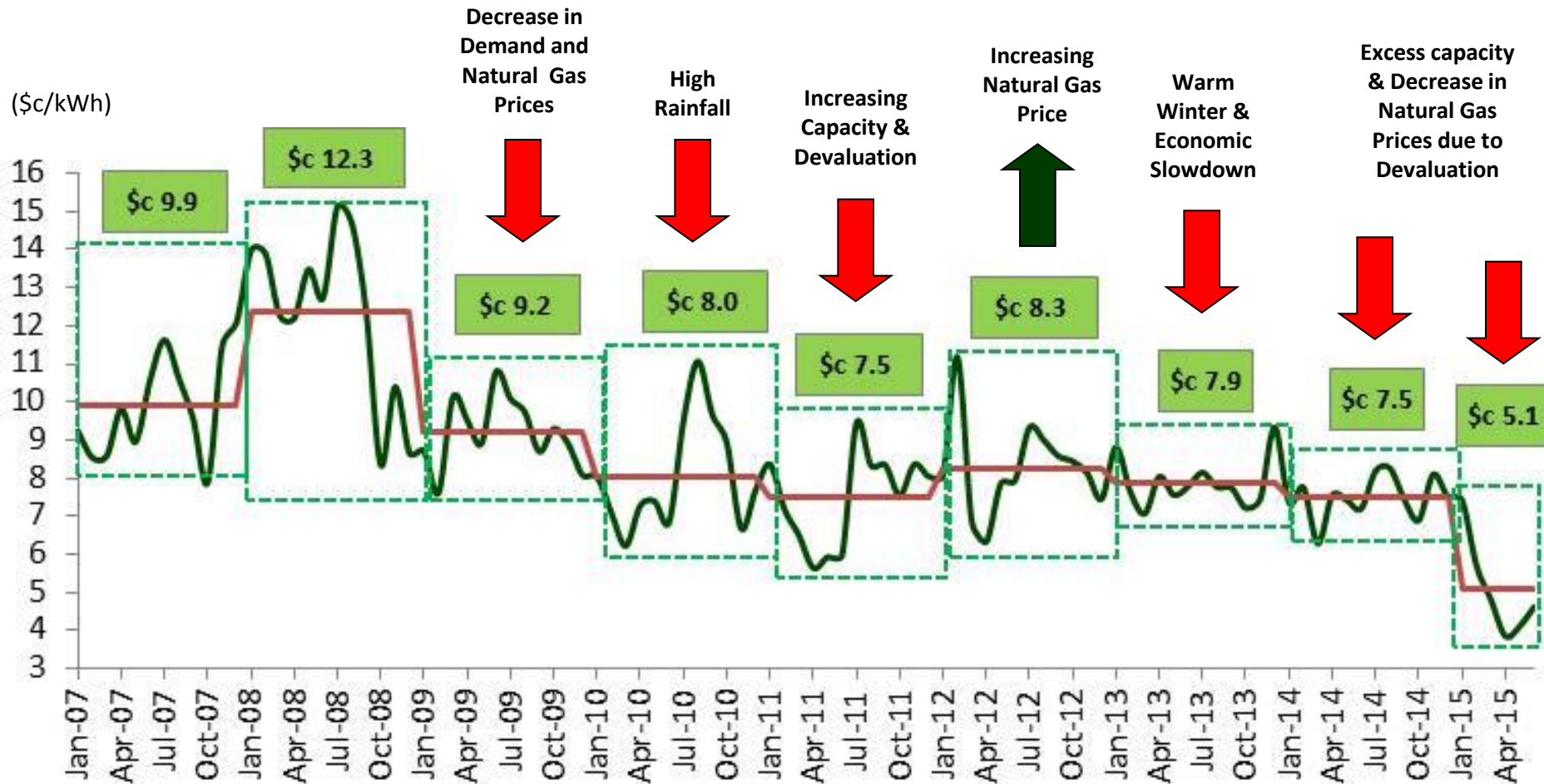
- Above **90%** of the time electricity prices are determined by plants whose fuel costs are in USD (CCGT and imp. coal).
- Price maker power plants will **reflect the changes in their fuel cost** to electricity prices on a pass-through basis.
- Since the fuel costs of price maker power plants are in USD, **if the automatic pricing mechanism is implemented in natural gas prices ,electricity prices will be naturally hedged to a great extent against currency volatility.**

Decreasing natural gas prices lowers electricity prices and spreads



- Since CCGTs are the marginal plants **85%** of the time natural gas prices are the most important determinant of electricity prices.
- **Lower natural gas prices** force CCGTs to **lower their prices** at the same demand level.
- No one benefits from lower natural gas prices unless CCGTs and Coal change place in the merit order. CCGTs can only be more competitive compared to coal if natural gas prices fall **55%** and coal price remains constant.

Day-ahead electricity prices maintain the falling trend



Source: TEIAS

- Electricity prices have been falling mainly due to excess capacity and lower commodity prices.

- 1H2015: 5.2 \$c/kWh
- 1H2014: 7.3 \$c/kWh

Oil prices will determine the long-term level of spot electricity prices

<u>L/T Brent Price</u>	<u>Electricity Price Projection</u> (2015-2025)	<u>L/T Elec. Price*</u>
50 \$/bbl	→	~5.0-5.5 \$c/kWh
70 \$/bbl	→	~6.0-6.5 \$c/kWh
80 \$/bbl	→	~6.5-7.0 \$c/kWh
90 \$/bbl	→	~7.0-7.5 \$c/kWh

Source: Garanti Bank Electricity Market Forecast Model

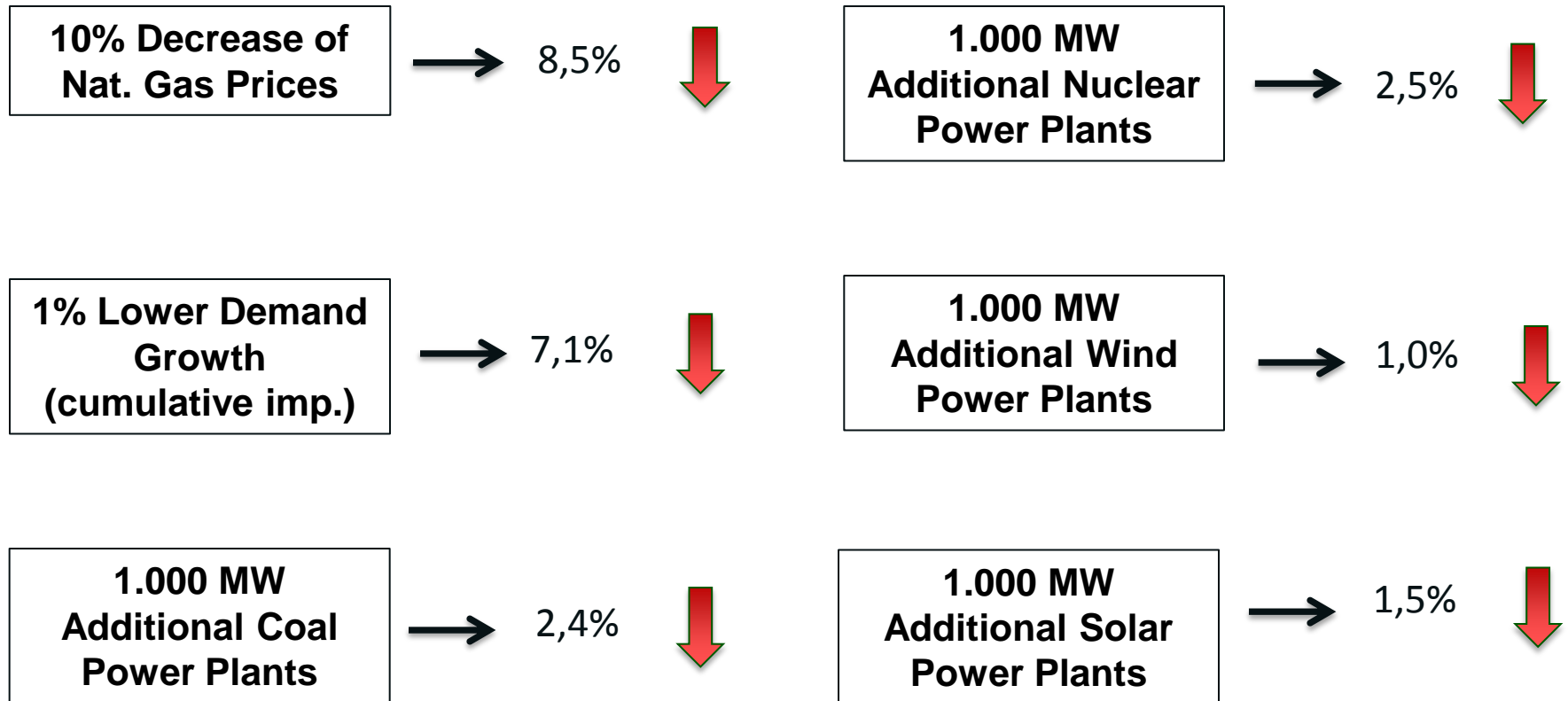
* Prices represent projected base load, spot market wholesale prices and are in real terms

- In the long-term the most important determinant of electricity prices, in addition to demand and supply will be the long-term oil prices...

MAIN ASSUMPTIONS:

4.6% average annual demand growth; 40.500MW gross capacity increase; 5.800MW decommissioning; 33% average hydro cap. factor; hourly load profile; quarterly, monthly and hourly operating cycle of renewables; import/export levels (1% of overall supply); availability of thermals and planned outage periods; generation privatizations completed; privatized lignite plants rehabilitated; BO-BOT plants to be merchant after 2019; 100% eligible consumer market; share of oil-indexed pricing in natural gas imports to continue; automatic pricing mechanism in natural gas markets to be applied; no carbon tax.

Electricity price sensitivities



Source: Garanti Bank Electricity Market Forecast Model

Climate change policies will shape the energy markets

Governments

- **COP21:** 21st **Conference of Parties** meeting will be held in between 30 Nov.-11 Dec. (~200 countries)
 - **After 2020** (post-Kyoto) international climate change agreement.
- **2015 G7 Convention:**
 - decarbonisation of the global economy over the course of this century.
- **US:**
 - Responsible for **%14 of the global emissions.**
 - Commitment to reduce CO2 emissions from the power sector to **32% below 2005 levels by 2030.**
- **China:**
 - Responsible for **%25 of the global emissions.**
 - **Peak by "around" 2030** and making "best efforts" to do so early.
 - Reduction of **emissions per unit of GDP by 60% to 65% from the 2005 level by 2030.**
- **Turkey:**
 - Pledged a reduction of as much as **21% from BAU levels in 2030.**

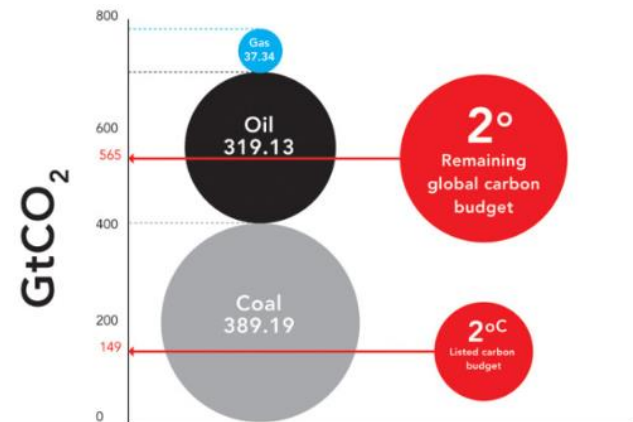


PARIS2015
UN CLIMATE CHANGE CONFERENCE
COP21·CMP11

Financial Sector

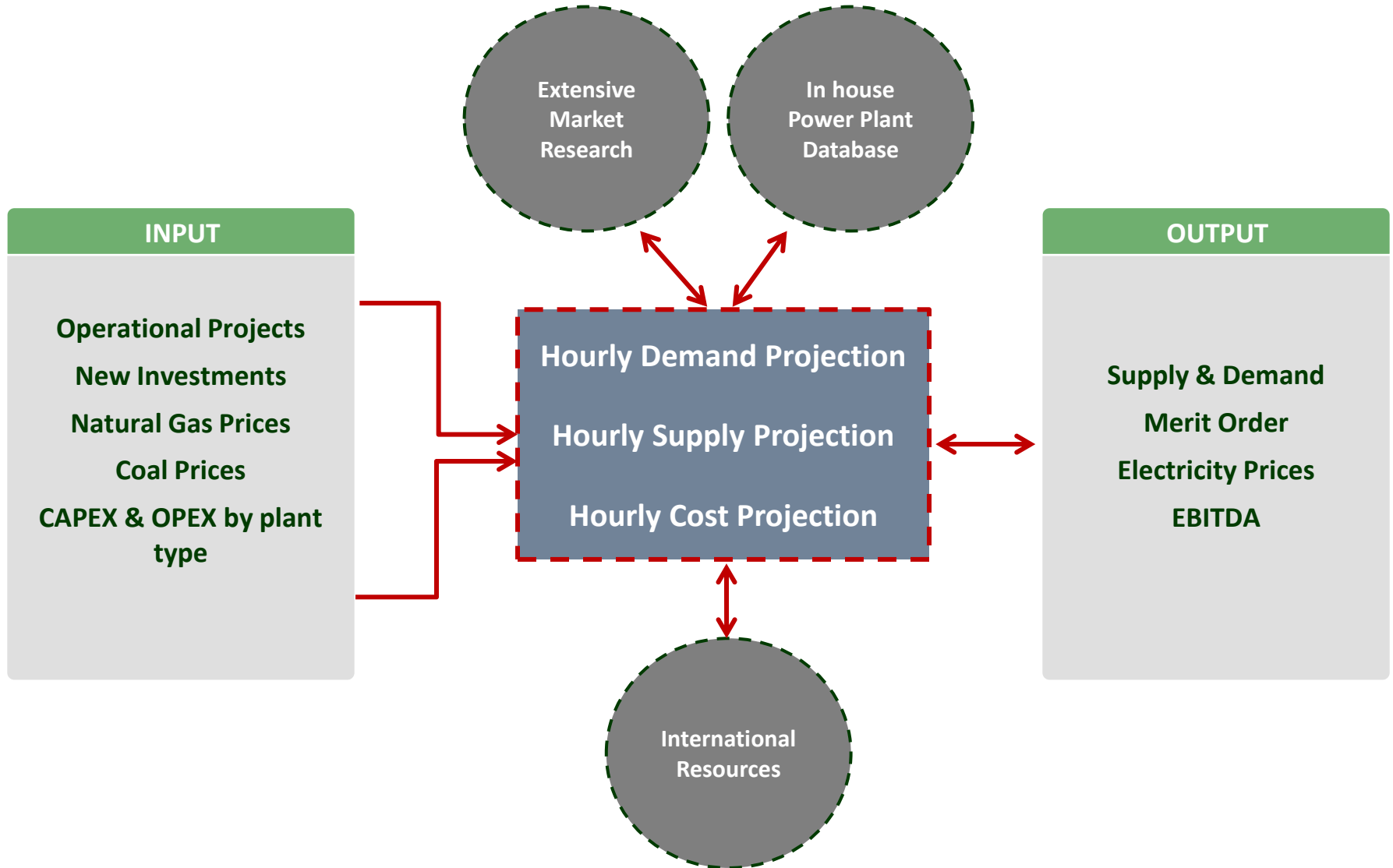
- **'Stranded Assets':** In 2011, Carbon Tracker's seminal report 'Unburnable Carbon' was issued.
- Between **60-80%** of coal, oil and gas reserves of publicly listed companies are 'unburnable'.
- **The Trillion Tonne Communique**
- **'Coal Divestment':**
 - 2014/Q1 MSCI: Coal Divestment is one of the 2014 ESG Trends to Watch:
- **'Put a Price on Carbon':**
 - TGB: **New Declaration on Carbon Pricing.**

CO₂ emissions potential of listed fossil fuel reserves**



*Source: Carbon Tracker Initiative

Model Structure - Hourly Electricity Price Projection



Model Structure

Hourly Demand Forecast

2014	01.01 00:00	01.01 01:00	01.01 02:00	01.01 03:00	01.01 04:00	01.01 05:00	01.01 06:00
Actual	22.657	22.657	21.384	20.507	20.062	19.945	20.166
2015	23.337	23.337	22.026	21.122	20.664	20.543	20.771
2016	24.270	24.270	22.907	21.967	21.491	21.365	21.601
2017	25.484	25.484	24.052	23.065	22.565	22.433	22.681
2018	26.758	26.758	25.255	24.219	23.693	23.555	23.815
2019	28.096	28.096	26.518	25.430	24.878	24.733	25.006
2020	29.501	29.501	27.844	26.701	26.122	25.969	26.257
2021	30.976	30.976	29.236	28.036	27.428	27.268	27.569
2022	32.524	32.524	30.698	29.438	28.799	28.631	28.948
2023	34.151	34.151	32.232	30.910	30.239	30.063	30.395
2024	35.687	35.687	33.683	32.301	31.600	31.415	31.763
2025	37.115	37.115	35.030	33.593	32.864	32.672	33.034

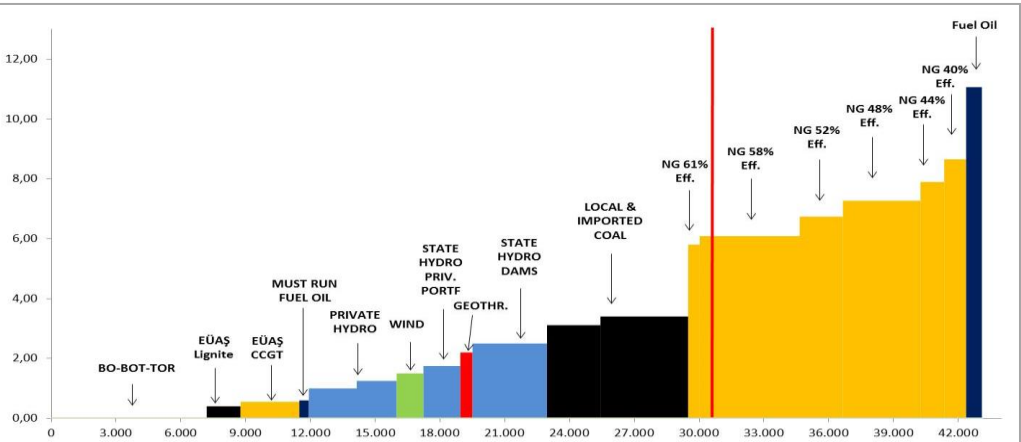
Production Forecast per plant

2015		Cost	01.01 12:00	01.01 13:00	01.01 14:00	01.01 15:00	01.01 16:00	01.01 17:00	01.01 18:00
# 2015 Merit Order									
16	Ambarli Natural Gas Plant B Section	0.55	675	675	675	675	675	675	675
17	Aliağa Natural Gas Plant - Motorin	0.55	140	140	140	140	140	140	140
18	Liquid Fuel (Must Run)	0.60	449	449	449	449	449	449	449
19	Solar (PV)	0.75	11	11	11	7	5	5	0
20	HEPP RoR (All Types)	1.00	1.478	1.478	1.478	1.478	1.478	1.478	1.478
21	HEPP Dam (Private+Autoproducer+TORA)	1.25	1.581	1.477	1.542	1.367	1.203	1.181	1.147
22	WEPP	1.50	994	994	994	994	994	994	994
23	HEPP Dam (EGC-PA+BOT)	1.75	1.677	1.402	1.412	1.705	1.430	1.317	1.156
24	JEPP	2.20	264	264	264	264	264	264	264
25	Biogas	2.25	212	212	212	212	212	212	212
26	HEPP Dam (EGC)	2.50	3.458	2.892	2.905	3.502	2.948	2.702	2.381
33	Local Coal (all types) (Private+Autoproducer)	4.19	426	426	426	426	426	426	426
34	Import Coal (Private+Autoproducer)	4.32	2.656	2.735	2.735	2.735	2.735	2.735	2.735
35	Natural Gas (D61)	6.22	0	0	0	0	0	0	0
36	Natural Gas (D58)	6.62	0	1.126	1.271	781	3.369	3.837	3.837

Hourly Electricity Price Forecast

Price Analysis	2015	2016	2017	2018	2019	2020	2021	2022
Base Load Elect. Price (\$cent/kwh)	5,55	5,38	6,52	7,24	7,80	7,64	7,59	7,68
Mid Merit Electricity Price (\$cent/kw)	5,83	5,65	6,74	7,31	7,84	7,68	7,64	7,74
Night Elect. Price (\$cent/kwh)	5,08	4,94	6,14	7,12	7,73	7,57	7,49	7,58
January Elect. Price (\$cent/kwh)	5,88	5,86	6,85	7,50	8,04	7,94	7,89	7,97
February Elect. Price (\$cent/kwh)	5,98	5,88	6,67	7,36	7,93	7,75	7,69	7,81
March Elect. Price (\$cent/kwh)	5,32	5,23	6,20	6,97	7,66	7,42	7,35	7,48
April Elect. Price (\$cent/kwh)	4,45	4,21	5,34	6,33	7,18	6,98	6,98	7,11
May Elect. Price (\$cent/kwh)	4,61	4,42	5,49	6,37	7,21	7,01	7,00	7,13
June Elect. Price (\$cent/kwh)	4,91	4,78	5,87	6,64	7,46	7,29	7,28	7,38
July Elect. Price (\$cent/kwh)	5,84	5,65	6,98	7,69	8,04	7,94	7,90	7,95
August Elect. Price (\$cent/kwh)	6,35	6,12	7,47	8,04	8,31	8,21	8,15	8,22
September Elect. Price (\$cent/kwh)	5,93	5,72	7,03	7,63	8,06	7,91	7,83	7,90
October Elect. Price (\$cent/kwh)	4,98	4,85	5,99	6,69	7,41	7,15	7,05	7,15
November Elect. Price (\$cent/kwh)	5,90	5,76	6,97	7,69	8,09	7,98	7,88	7,95
December Elect. Price (\$cent/kwh)	6,44	6,13	7,32	7,95	8,19	8,11	8,04	8,10

Merit Order



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2015-2025 Projections

