

Towards a Smarter Turkish Electricity System

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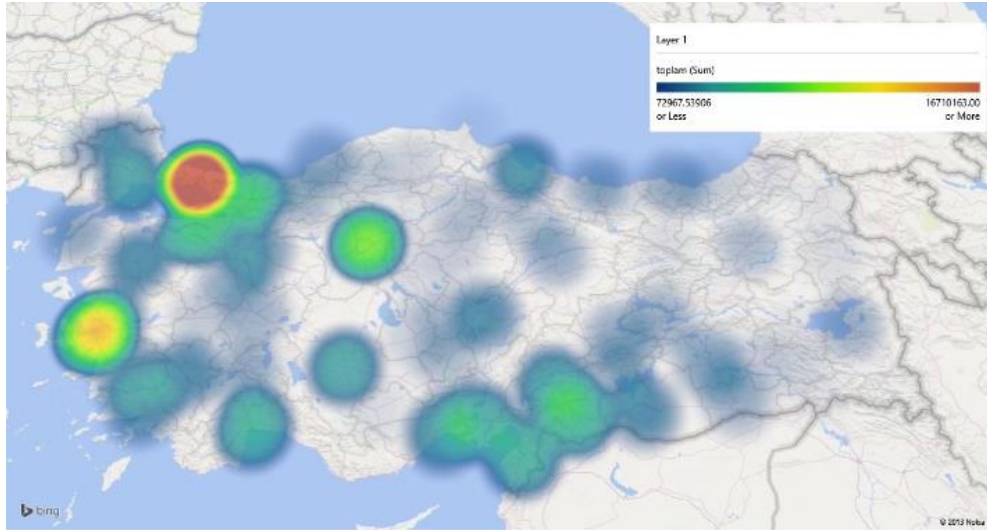
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- Turkey overview (short)
 - Graphics for demand and supply
 - Market overview and comparison
- What we have done so far?
- Upcoming Electricity Market Strategy Paper
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Turkey Overview

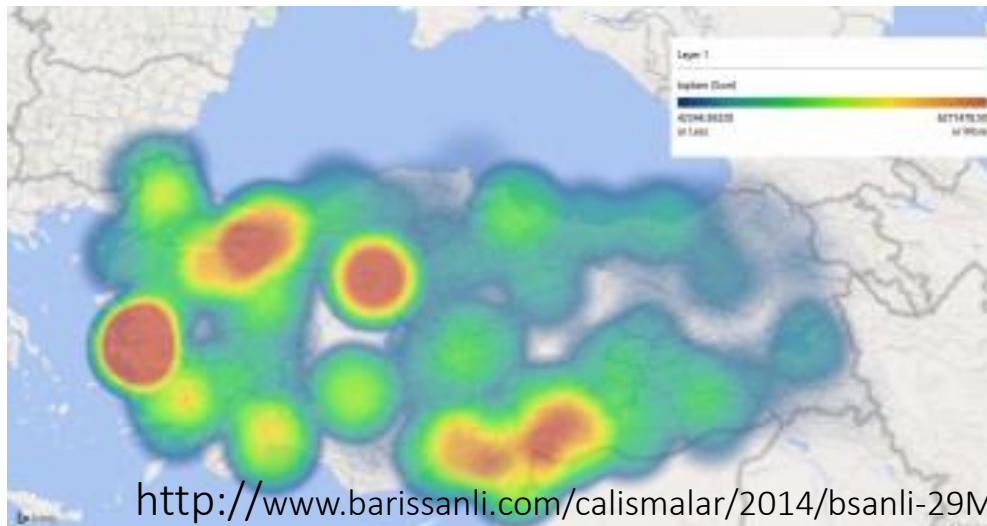
Some key points for electricity and natural gas dynamics

Demand Dynamics



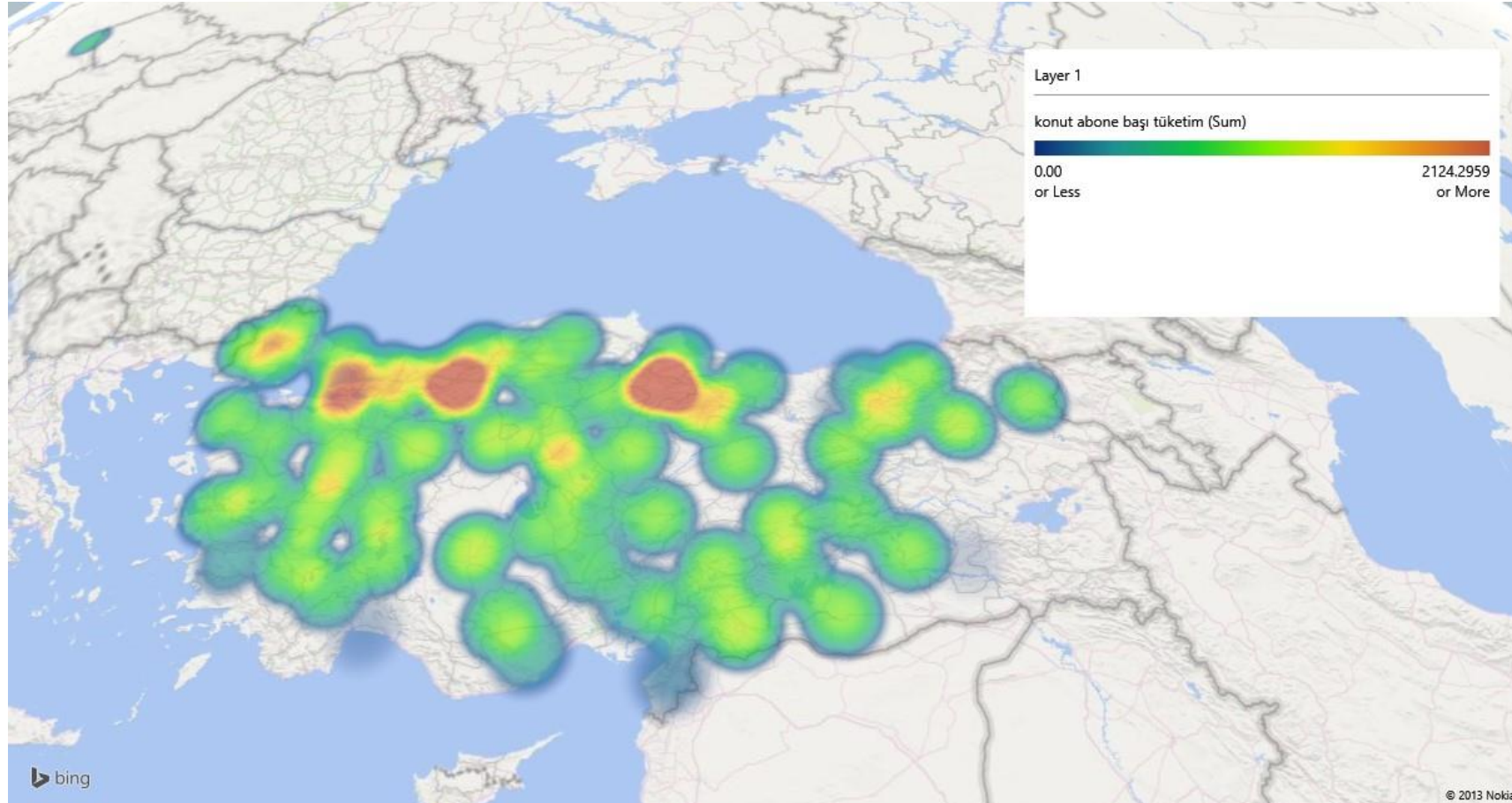
Electricity consumption

- (with Istanbul)

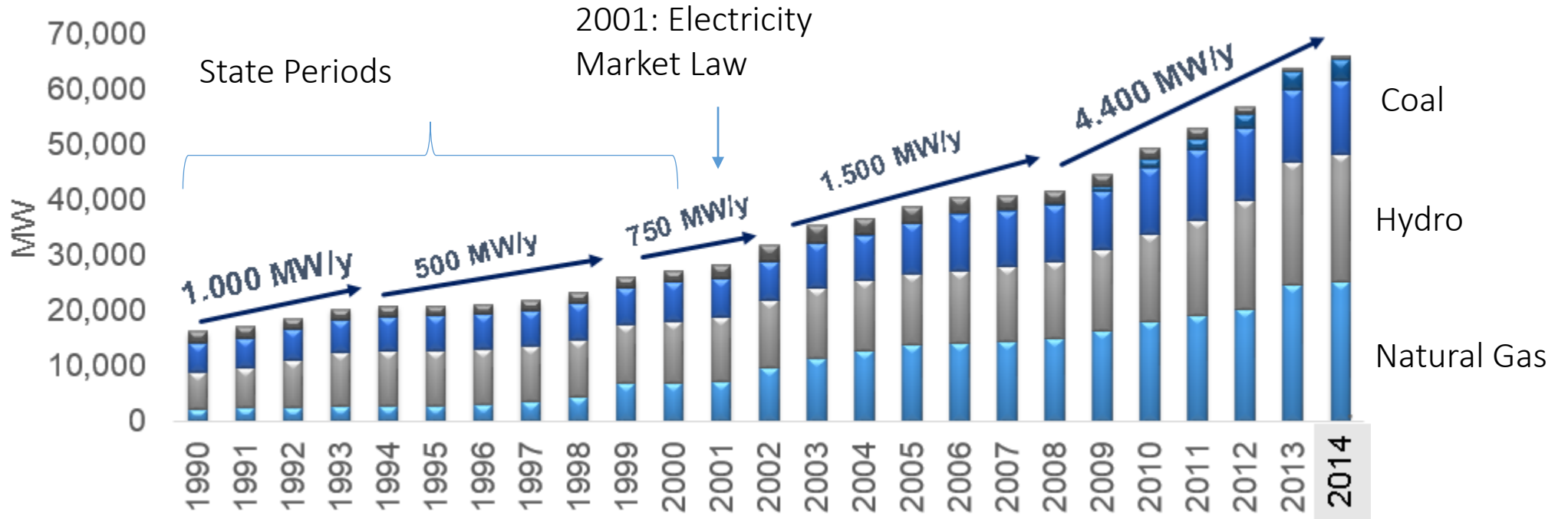


- (without Istanbul)

Turkish household consumption-NG



Electricity Market – Growth 5%

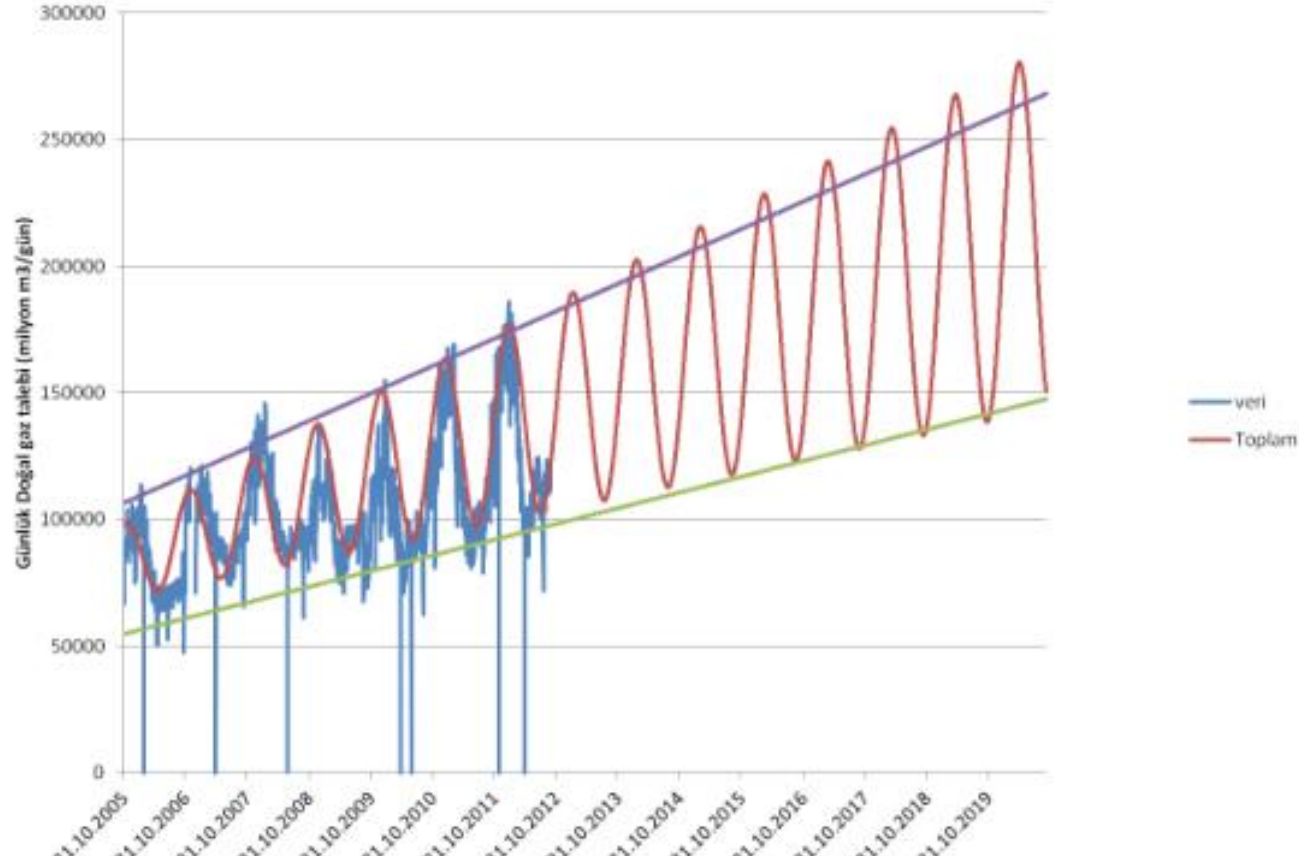


2002				
Resource	Installed Capacity (MW)	Share (%)	Generation (TWh)	Share in Generation (%)
Natural Gas	9.702	31	52,5	41
Hydro	12.241	38	33,7	26
Lignite	6.959	22	28,0	22
Imported Coal	480	1	4,1	3
Renewable	33.9	0	0,2	0
Other	2.761	8	10,9	8
Total	31.846	100	129,4	100

2014				
Resource	Installed Capacity (MW)	Share (%)	Generation (TWh)	Share in Generation (%)
Natural Gas	25,538	38	104,8	44
Hydro	23,299	34	59,2	25
Lignite	8,566	13	30,0	13
Imported Coal	4,862	7	31,4	13
Renewable	3,819	6	8,8	4
Other	1,354	2	5,1	2
Total	67,431	100	239,3	100

Natural Gas Demand Corridor for Turkey

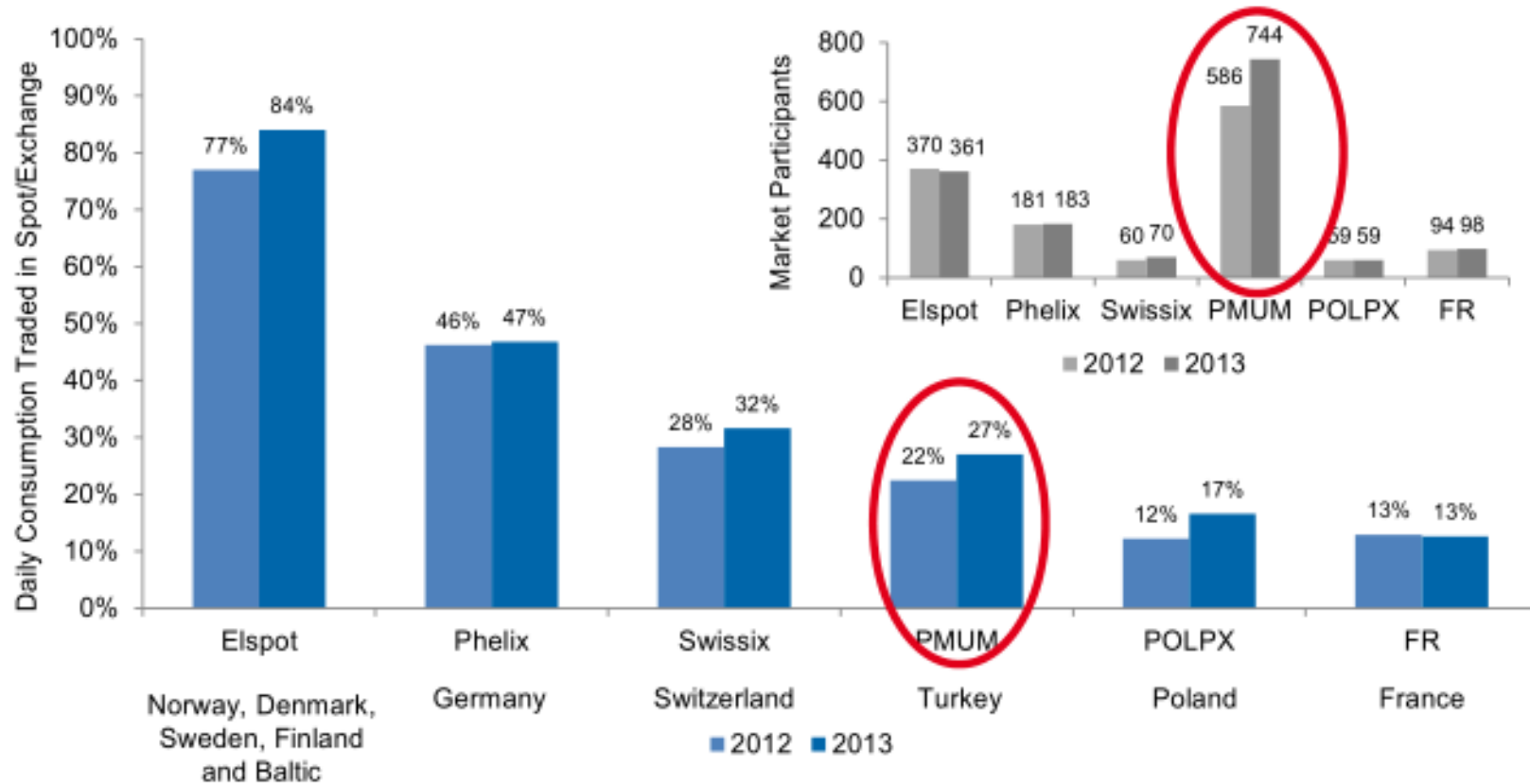
Doğalgaz Talep Koridoru



	Toplam	İstanbul Avrupa	İstanbul Anadolu	Ankara	Bursa	Eskişehir	İzmit	Şehirler Toplamı	Sanayi
Maksimum Tüketim/ Minimum Tüketim	2.4	13.34	18.44	23.5	25.14	41.37	15.27	15.57	2.37

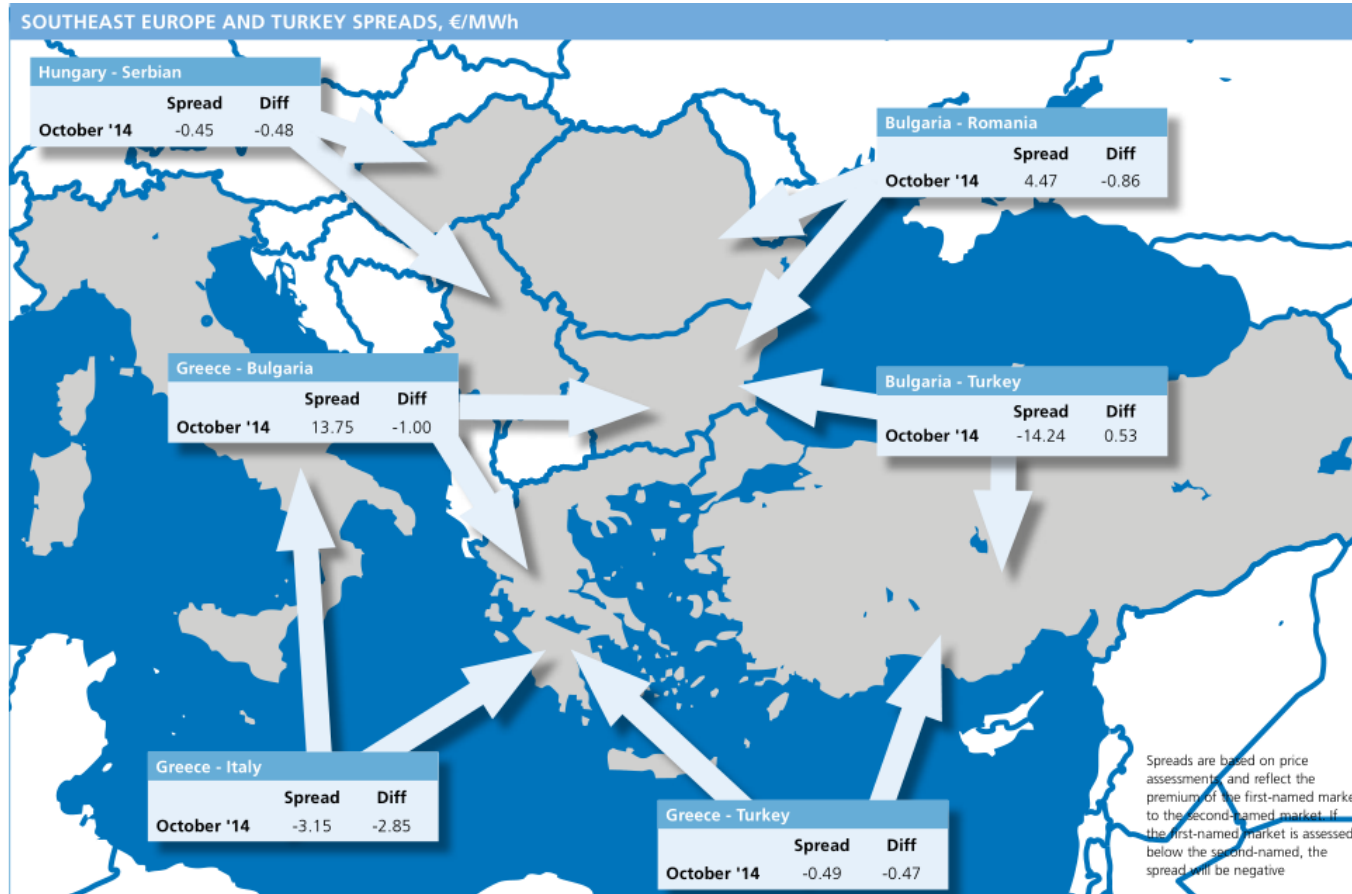
Barış Sanlı

Turkish Electricity Market and EU



Turkish spot market has reached liquidity of European energy markets

Trade with neighbours



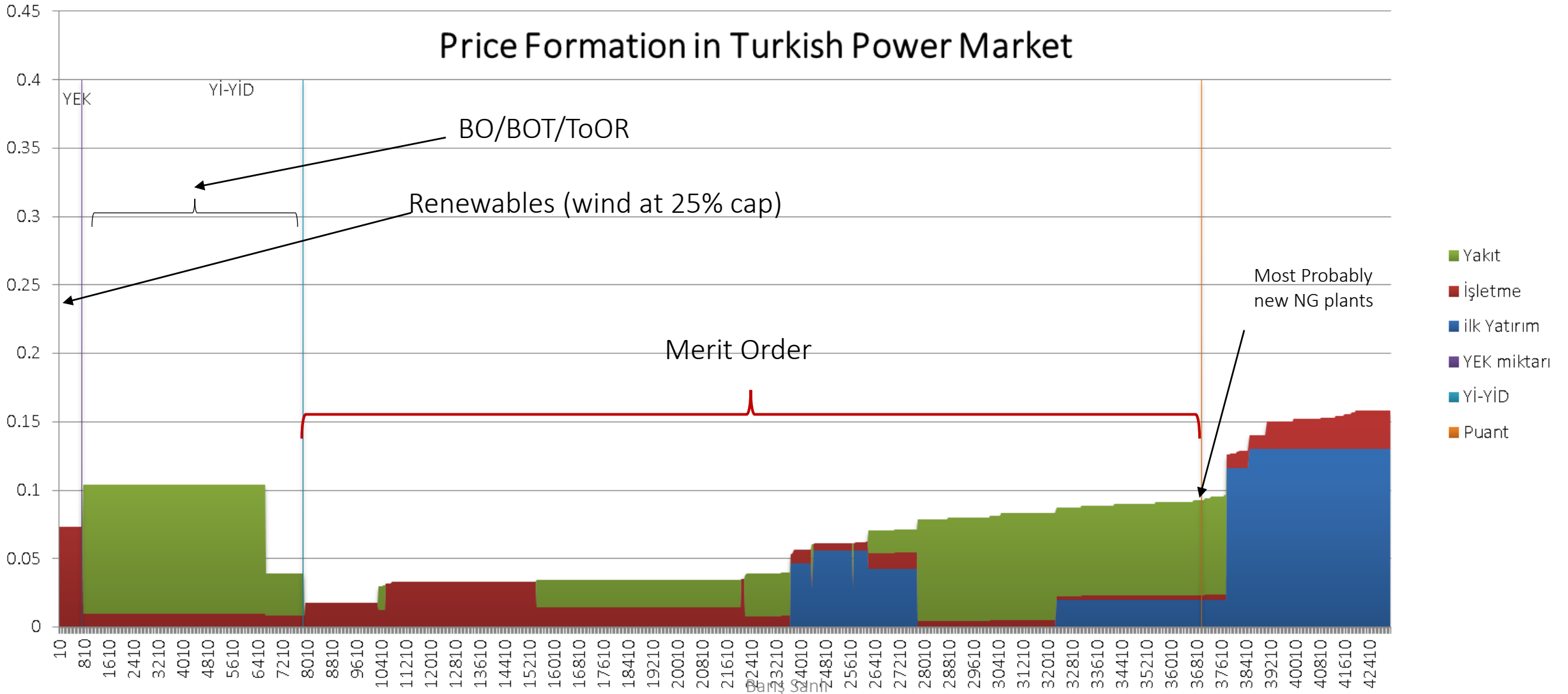
- Source: ICIS Heren

More coupling?

ENTERKONNEKSİYON (2018)

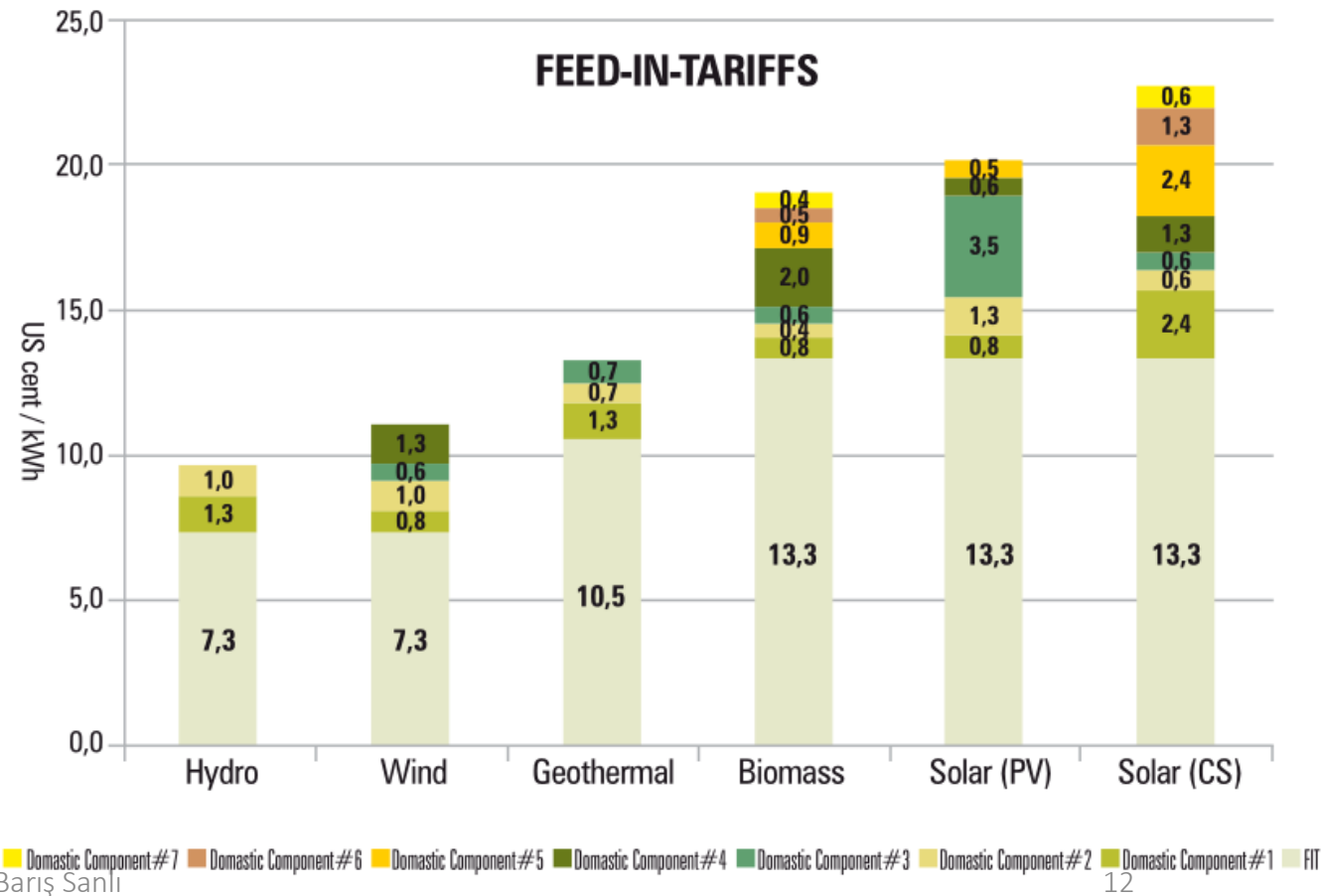


Turkish Power Prices 101



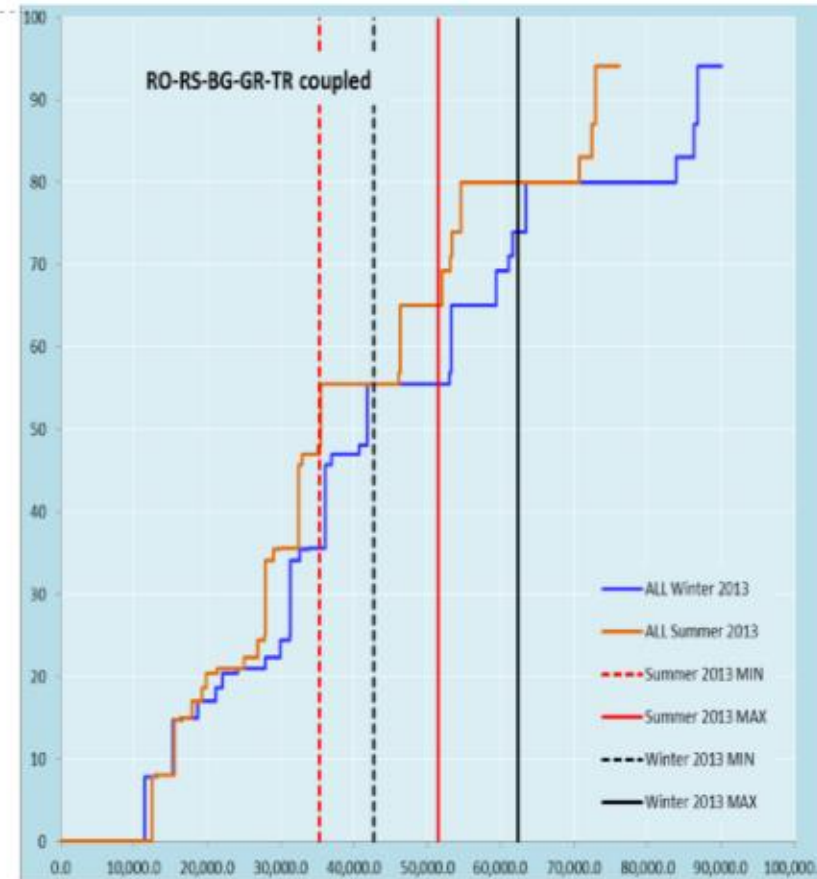
Prices

- Around 7.5-8 \$cent/kWh
- FIT
 - Wind : 7.3 \$cent/kWh
 - <3500 MW
 - Solar 13.3 \$cent/kWh
 - 20.3 MW
- Final consumer prices :
 - 17 \$cent/kWh



Towards a coupled electricity Market?

time of complete coupling (single price)					
%	BG	RO	TR	GR	RS
BG	X	95	10	50	75
RO	95	X			66
TR	10		X	25	
GR	50		25	X	
RS	75	66			X



What we have done so far?

Electricity and Natural Gas Operators

- A protocol between Electricity and Natural Gas Transmission operators
 - 30 July 2013
 - «Turkish Energy Transmission Operators' Cooperation Protocol»
- Regional planning
- Emergency plans
- Capacity projections

- Both have vast fiberoptic networks (maybe Enerji.net?)

Türkiye Enerji İletimi İşletmecileri İşbirliği Protokolü

1. Protokolün Tarafları

Protokolün tarafları, Türkiye Elektrik İletim A.Ş.(TEİAŞ), Boru Hatları ile Petrol Taşıma A.Ş.(BOTAŞ/İletim) ve Enerji ve Tabii Kaynaklar Bakanlığı(ETKB) adına Enerji İşleri Genel Müdürlüğü'dür.

2. Protokolün Amacı

Bu protokol Türkiye elektrik ve doğal gaz şebekeleri operatörleri olan TEİAŞ ve BOTAŞ/İletimin karşılıklı olarak teknik ve operasyonel deneyimlerinin paylaşılmasını ve artırılmasını; orta ve uzun vadede iki işletmecinin benzer sistem ve tecrübeler ile ortak hareket etmesini amaçlamaktadır.

Demand Side Management

- It is the killer app for Smart Grid
- However, most people confused?
 - Day ahead, ancillary, emergency?
- Step -1 : Calculated VoLL for different regions & surveys to factories
- Step -2 : July 2013 – First attempt to carry out a demo with «cement» & Iron&Steel Factories
- Step -3 : Sept 2013 – Need a more concrete regulatory framework
- Step -4 : Early 2014 – A working group formed by the request of Deputy Minister @ EMRA (Regulator) – finalizing work

Smart Grid Road Map (1/2)

- Too much confused with Smart Meter
- Google Trends shows the subject is losing attention

Smart Meter
«Akıllı Sayaç» / TR
search trend



House Automation
«Ev otomasyonu» /
TR search trend



Smart Grid Roadmap (2/2)

- Written a position paper as «DG for Energy Affairs» clearing Ministry's view
- Asked Regulator (EMRA) to form a group
- Offered 4 sub groups:
 - Metering
 - Standards
 - DSO infrastructure roadmap (to integrate more renewables)
 - Cybersecurity
- Stated : «Transmission side» grid projects are more cost effective

Smart Grid Road Map 1/2

From position paper: «Modern Grid Application Road map»

Transmission

- Technologies to watch: FACTS, PMU, Dynamic Thermal Rating, DSM (Open ADR?)

Distribution

- Scada, DMS, OMS, Data warehouse, Consumer Analytics, Micro grid, DSM, Interoperability

Pilot projects financed from DSO's R&D & Education & Certification item (regulated by EMRA)

DSM with Household Appliance Manufacturers

- Grid friendly appliances
- Turkey is one of the major manufacturing hub for appliance manufacturing
- Checked: ready for future?
- Offered a science project for public building AC systems to be remote controlled for DSM

EV Cars

- 2010-end 2013 : Bursa
- Not too much demand
- A sub market for Electric Scooters
- 2014 – Requested a brief from Hacettepe University
 - EV charging patterns
 - EV integration to grid including ancillary services
 - Ministry's EV strategy will include a prospect for EV's ancillary services

Cybersecurity

- A working group @ our DG for Energy Affairs
- Worked around 12 months, prepared a regulation
- EMRA simplified that regulation to ISO 27001
- We requested once a year penetration tests for network operators
- Our position:
 - A Standard by itself is a good start
 - But DSO's are part of critical infrastructure
 - Acknowledging «penetration tests on live/SCADA systems can be catastrophic»

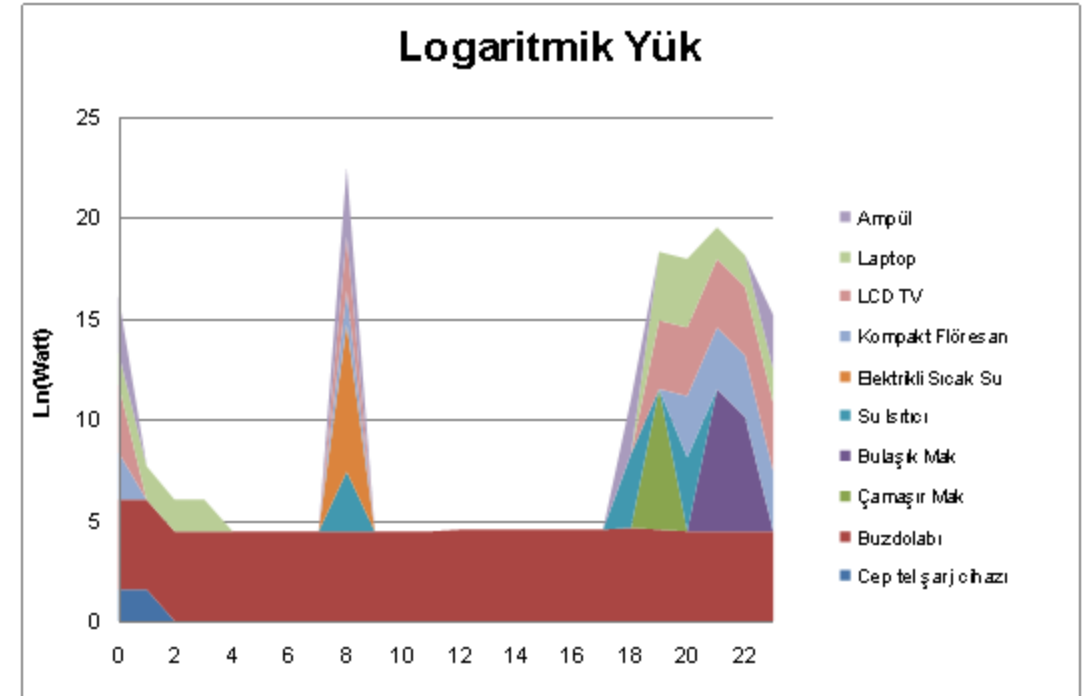
In the pipeline

Oct 2014

- Requested from Ministry of Finance & Info&Comm. Commission
- Tax break for GPRS services for energy metering
- Lowering the costs for communications

Problems

- ToU tariffs increasing costs
- Big consumers hedge themselves by preferring flat tariffs/regulated tariffs
- Consumer group's resistance to metering issues (lawsuits)
- EMRA's limit on meter costs



An average household's yearly bill increases to 671 TL from 604 TL by getting into ToU tariff (2009)

Upcoming Electricity Market Strategy Paper

Following are the requests of DG for Energy Affairs those appeared in the draft

Emphasis on several issues (1/2)

- A subsection : «Modern Infrastructure and Operation»
 - Strengthening infrastructure
 - Regional markets to be investigated
- «Value added by Smart Grid Technologies to each segment will be investigated,.... , distribution system to be ready for storage & EV cars & etc»
- «EMRA... will finalize roadmap by early 2016»
- DSM to be be phased in to large consumers by the end of 2016, residential to 2018

Standardization for DSOs

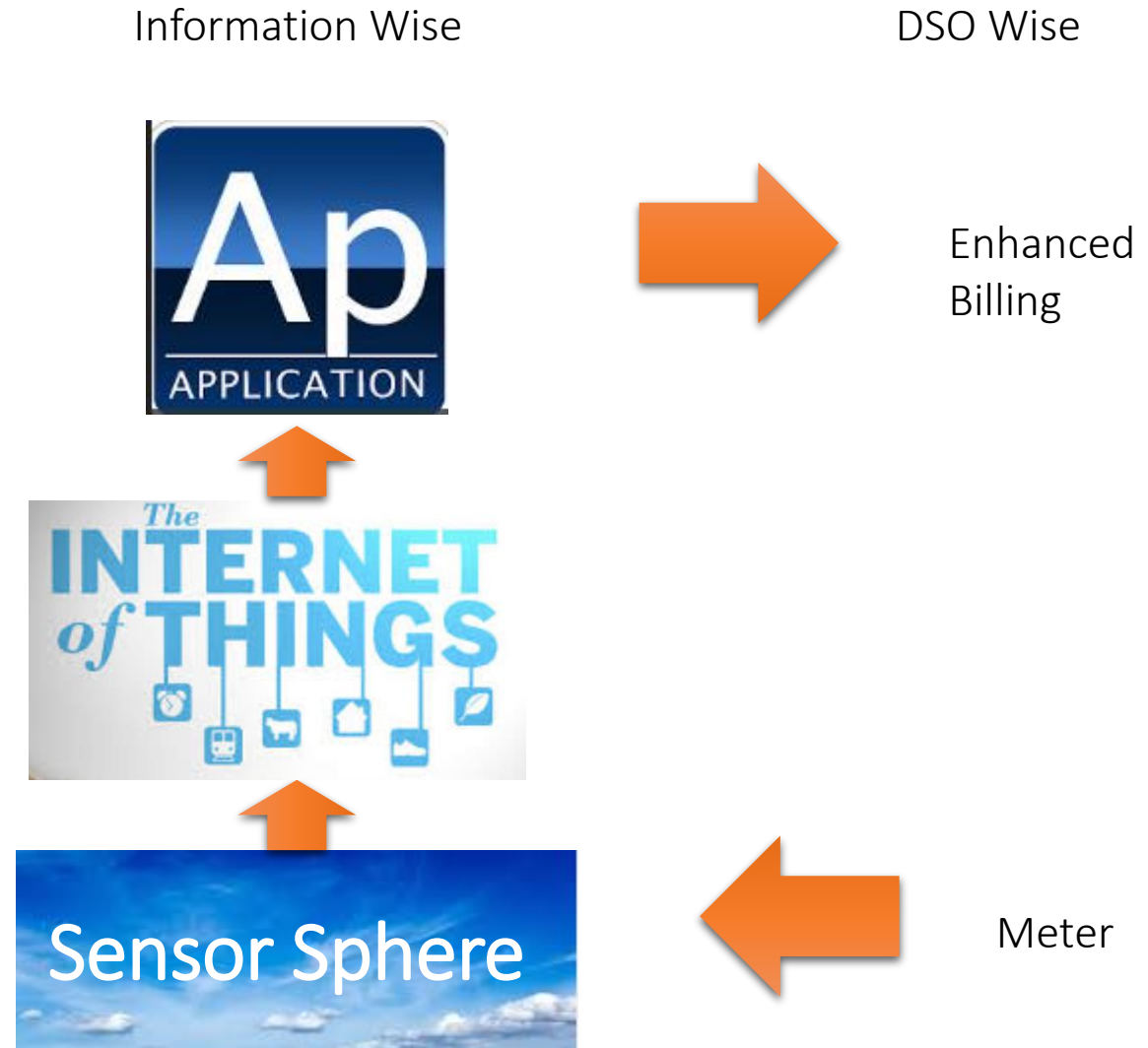
- Standards such as
 - ISO 9001
 - ISO 10002
 - OHSAS 18001
 - ISO 27001
 - ISO 14001
- Emphasis for consumer adaptation
- DSO's duty to manage peak

Future Overview

As a conclusion

Big Picture

- Future is empowering consumer
- Consumer appliances generate more data/interactive
- No need to meter?
- IP is enough
- House server can do everthing DSO can do



Will smart grid kill home smart meter?

Reality check for households

- Data is becoming more popular than merely meter value
 - Meter is the gate keeper
 - Who needs a gate keeper when everything is a «meter»
 - Why handover control of your house to DSO
 - Legal framework
-
- But smart meter will survive probably



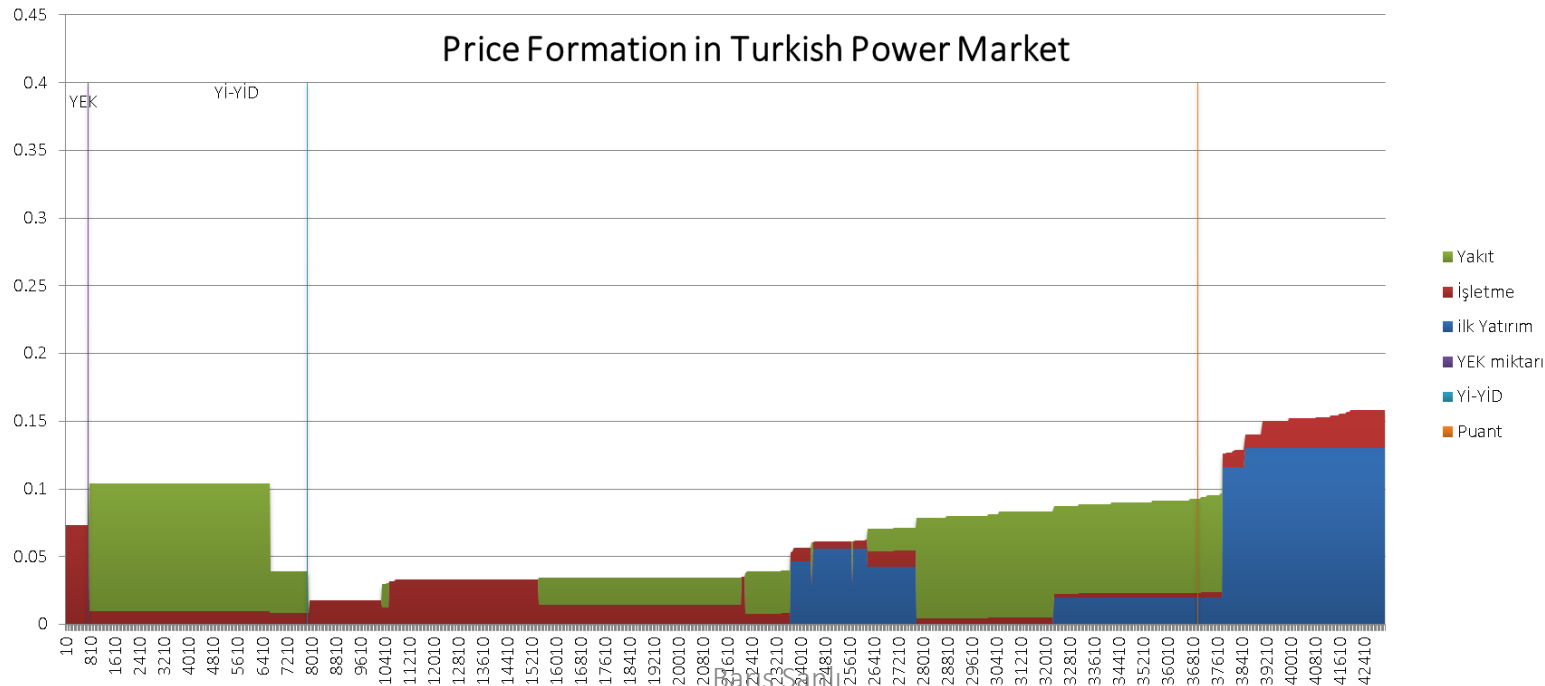
DSO to be Operating System of Energy

- DSO will lose power with IoT
- Can be the enabler/platform for active consumer engagement with services part of the bill
- Privacy is important «DSO is your trusted service provider, but geeks?»
- One stop data control point with consumer (The others are websites/virtual, we are here)
- The battle for consumer data will be bloody

Turkey

Turkish market prices will be more stable

- There is 9300 MWs of contracts with PPA with the state
- Towards 2023 these contracts expire
- FIT ren may replace those contracts



Sustainable Tariffs for REN

- Wind and solar on sustainable tariffs
- Great market enthusiasm
- A sub market for «unlicensed» –distributed with less bureaucracy-formed
 - Solar on a health growth
 - Phasing in is slow
 - No major problems for operations so far

Turkey will be one of the biggest market

- Commitment to modern infrastructure
- Policy makers scrutinize economic costs
- As REN showed a more fail-safe trajectory for smart grid technologies
- R&D budget from EMRA
- Specific Energy Institute by National Scientific and Technological Research Council
- Biggest asset is entrepreneurial spirit
 - Turkish DiscCo's interest in Africa, Europe
 - International workshops/gatherings
- No gender gap

3rd International Istanbul Smart Grid Conference (29-30 April 2015)

- Largest in the region
- With all Turkish stakeholders (govt, private sector, academia)
- Chances to meet with NG, Electricity, Water utilities, organized industrial districts, municipalities

The screenshot shows the homepage of the 3rd International Istanbul Smart Grid Congress and Fair. The header features logos for the Ministry of Energy and Natural Resources, EPDK (Energy Market Regulatory Authority), and the Istanbul Metropolitan Municipality. A central banner reads "Smart Grid, Sensible Development" and "ICSIG Istanbul 2015". Below the banner, it states "Countdown for 3rd International Istanbul Smart Grid Congress and Fair has already begun." and "We look forward to seeing you at April 2015." The website also includes a navigation menu with links like "THE MINISTER", "ABOUT ICSG", and "CONTACT", and a countdown timer showing 5 months, 24 days, and 1 hour remaining.

Thank you

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