Regional Electricity Trade
Lessons learnt from I.R.Iran

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Energy Sector of Iran at a Glance

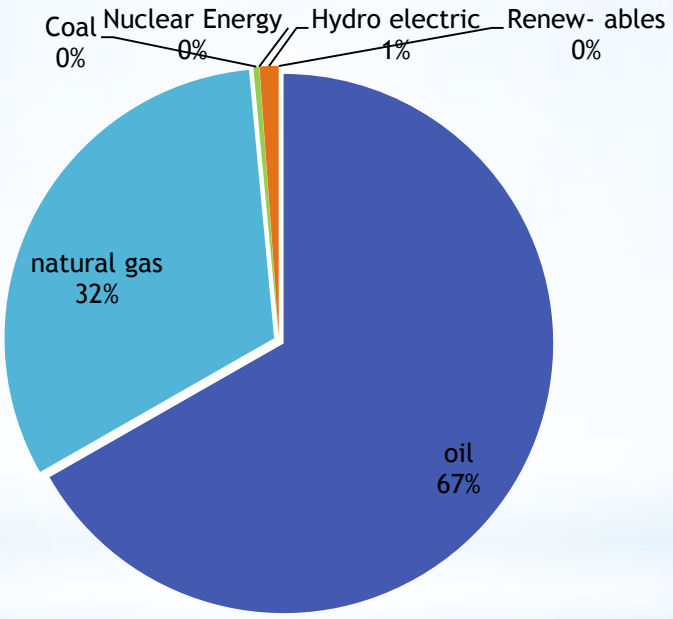
The Energy Sector of Iran at a Glance

Crude Oil	
Country	Total proved reserves - bb
Canada	171.5
Venezuela	300.9
Saudi Arabia	266.5
Iran	158.4

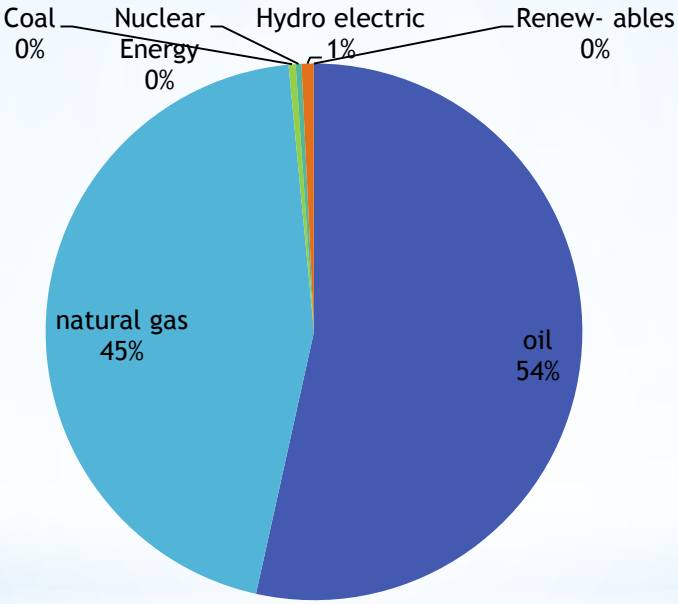
Natural Gas	
Country	Total proved reserves - TCM
Iran	33.5
Russian Federation	32.3
Qatar	24.3
Turkmenistan	17.5

Country	Population	Installed Capacity	Net Electricity Generation	Net Electricity Consumption	Electricity Exports	Electricity Imports	Capacity per Capita	Net Generation per Capita	Consumption per Capita	Operation Index
United States	3	2	1	2	13	1	5	1	5	1
China	1	1	2	1	7	23	27	27	25	22
Japan	8	3	5	4	30	34	9	13	11	32
Russia	7	5	4	5	11	24	21	16	16	17
India	2	4	3	3	31	25	38	38	37	20
Germany	11	6	7	6	3	2	10	14	14	35
Canada	24	7	6	7	4	13	4	4	3	5
France	15	9	9	10	2	21	18	11	13	15
Brazil	5	8	8	8	32	4	34	33	32	10
Italy	17	10	14	12	21	3	17	26	21	40
Spain	20	11	16	15	10	14	13	20	19	38
United Kingdom	16	14	11	11	23	8	22	21	20	30
Korea,South	18	12	10	9	33	35	16	9	9	3
Iran	13	13	15	18	16	26	30	30	28	25

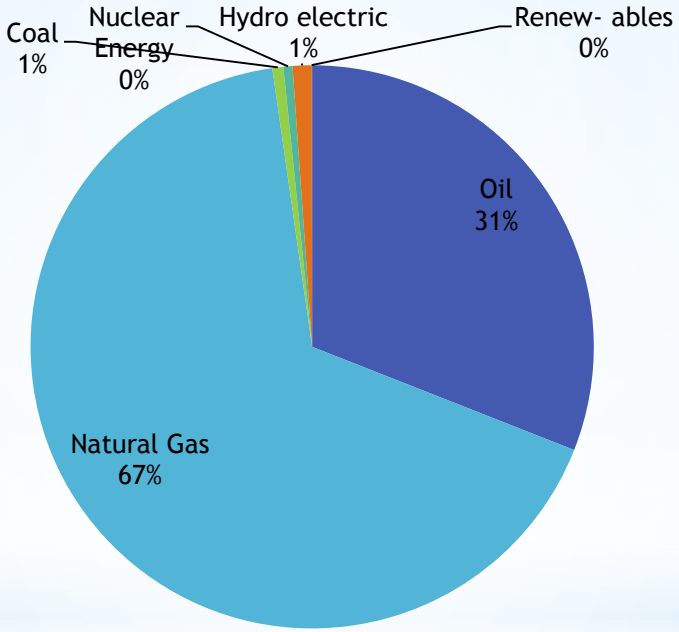
Iran's TPES (2006)



Iran's TPES (2016)



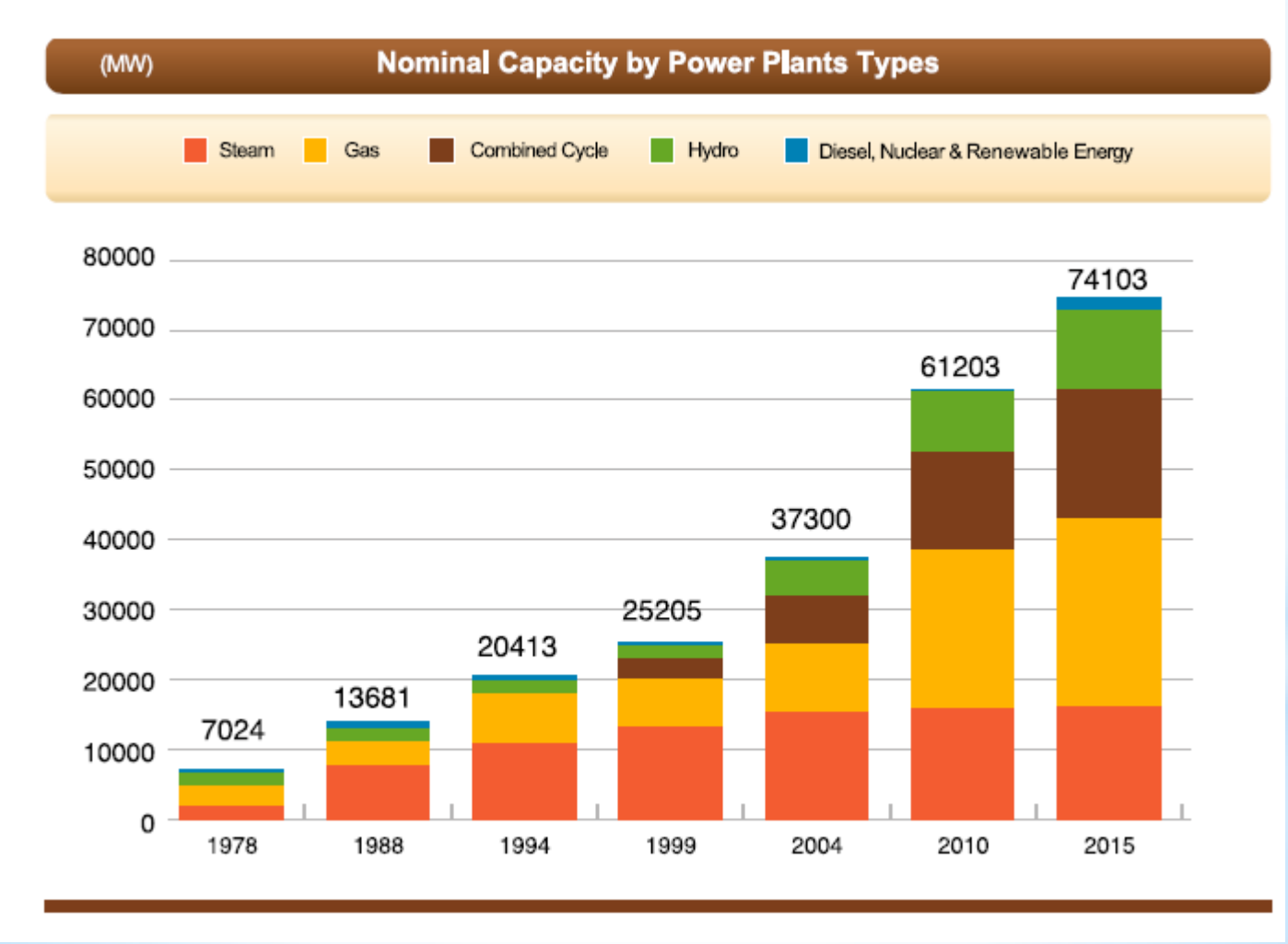
Primary Energy Consumption (2016)



The aggregate demand has been increased from 194.2 Mtoe in 2006 to 270.7 Mtoe

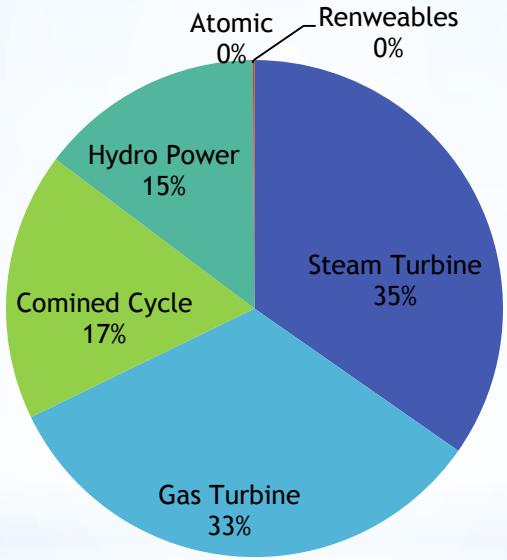
Iran Power Sector

Nominal Capacity by Power Plants Types



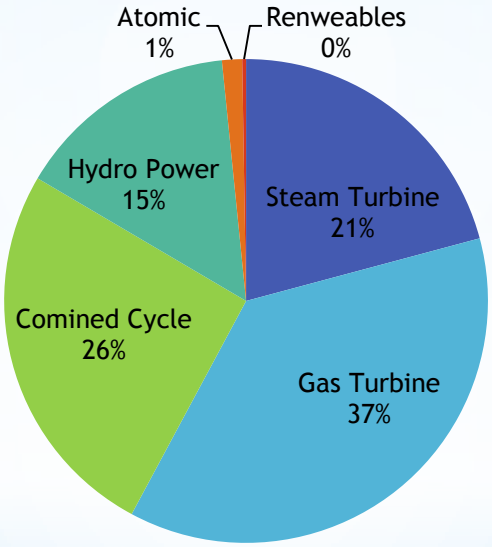
Installed Capacities (2006)

the share of power plants type

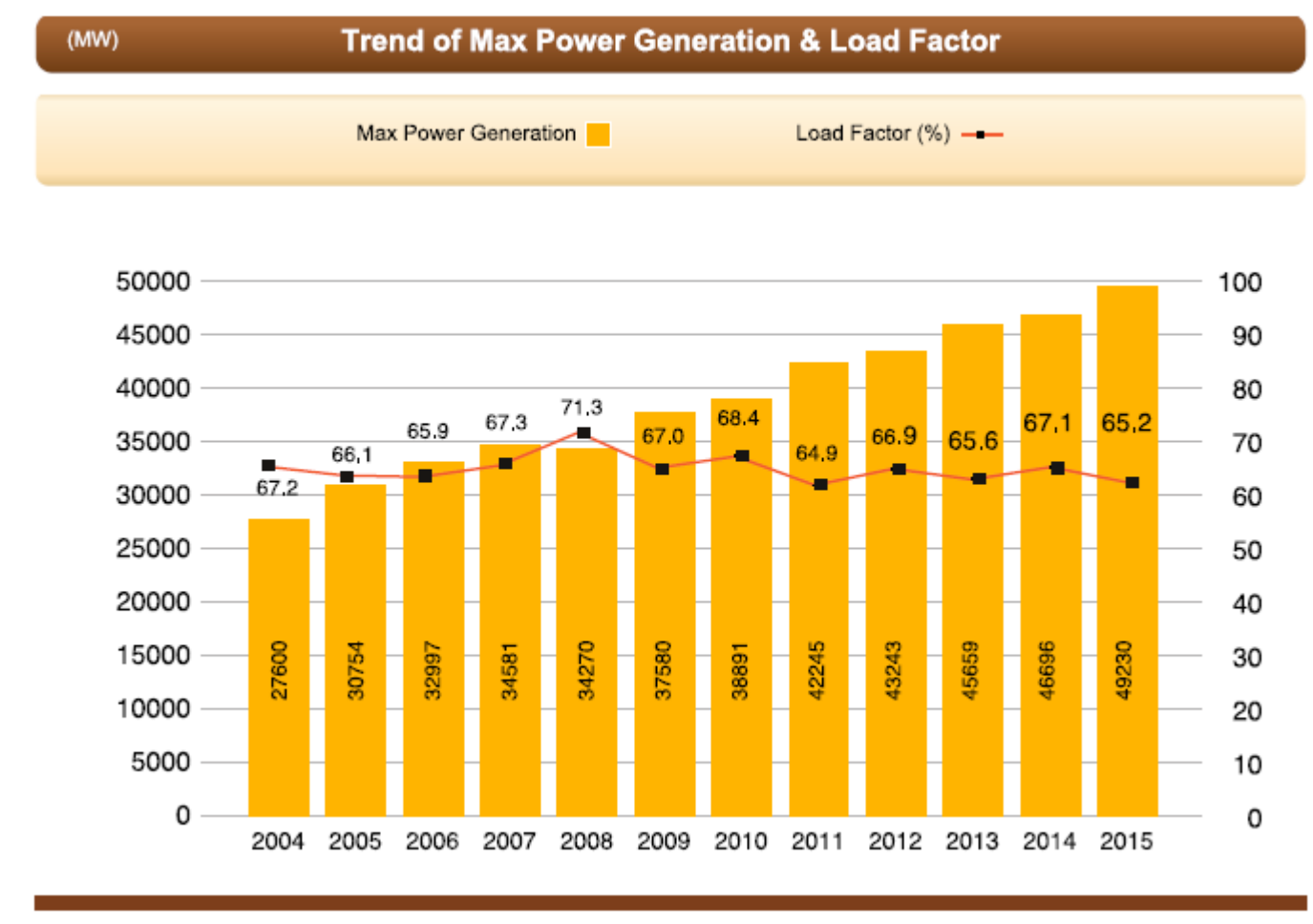


Installed Capacities (2016)

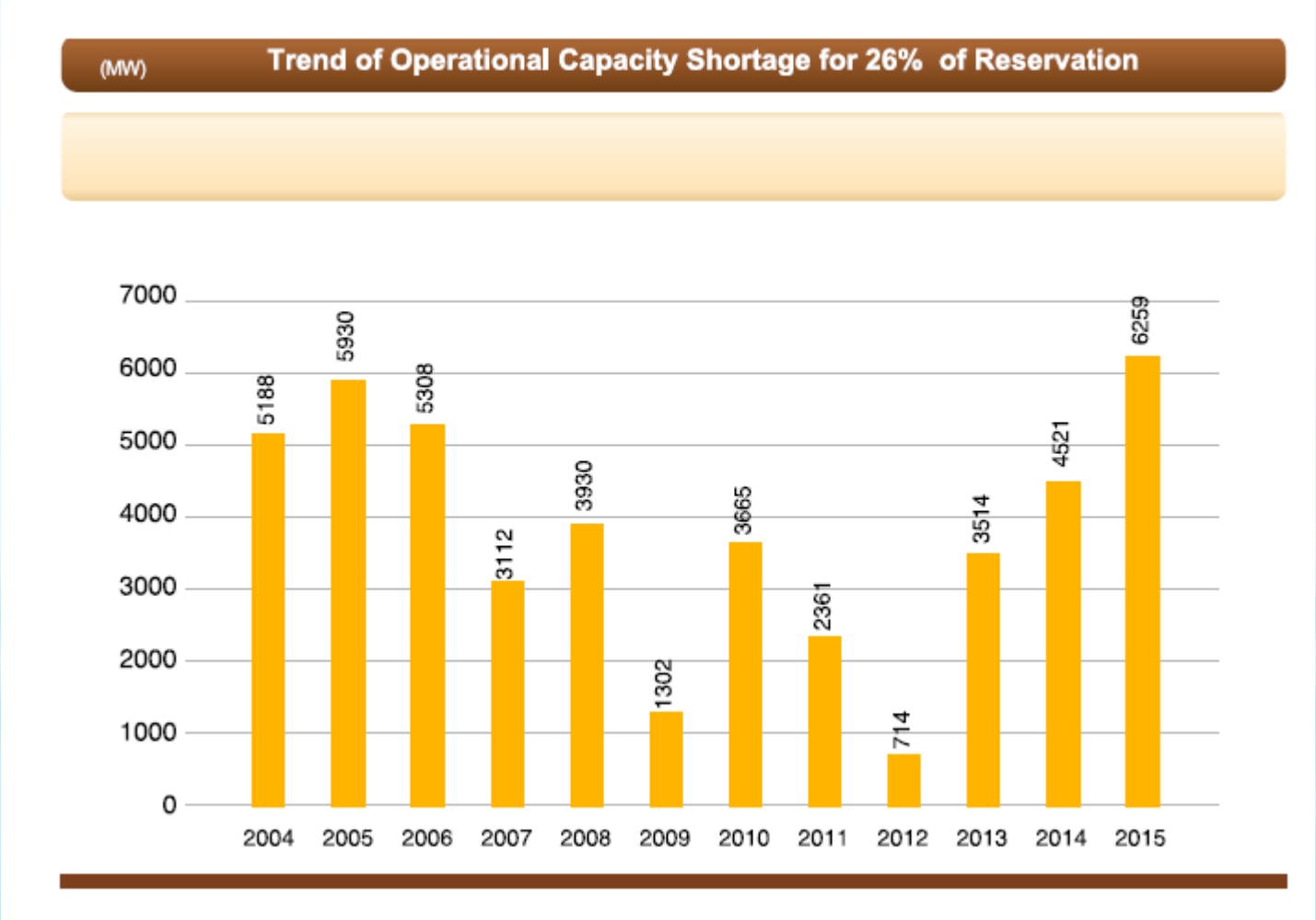
the share of power plants type



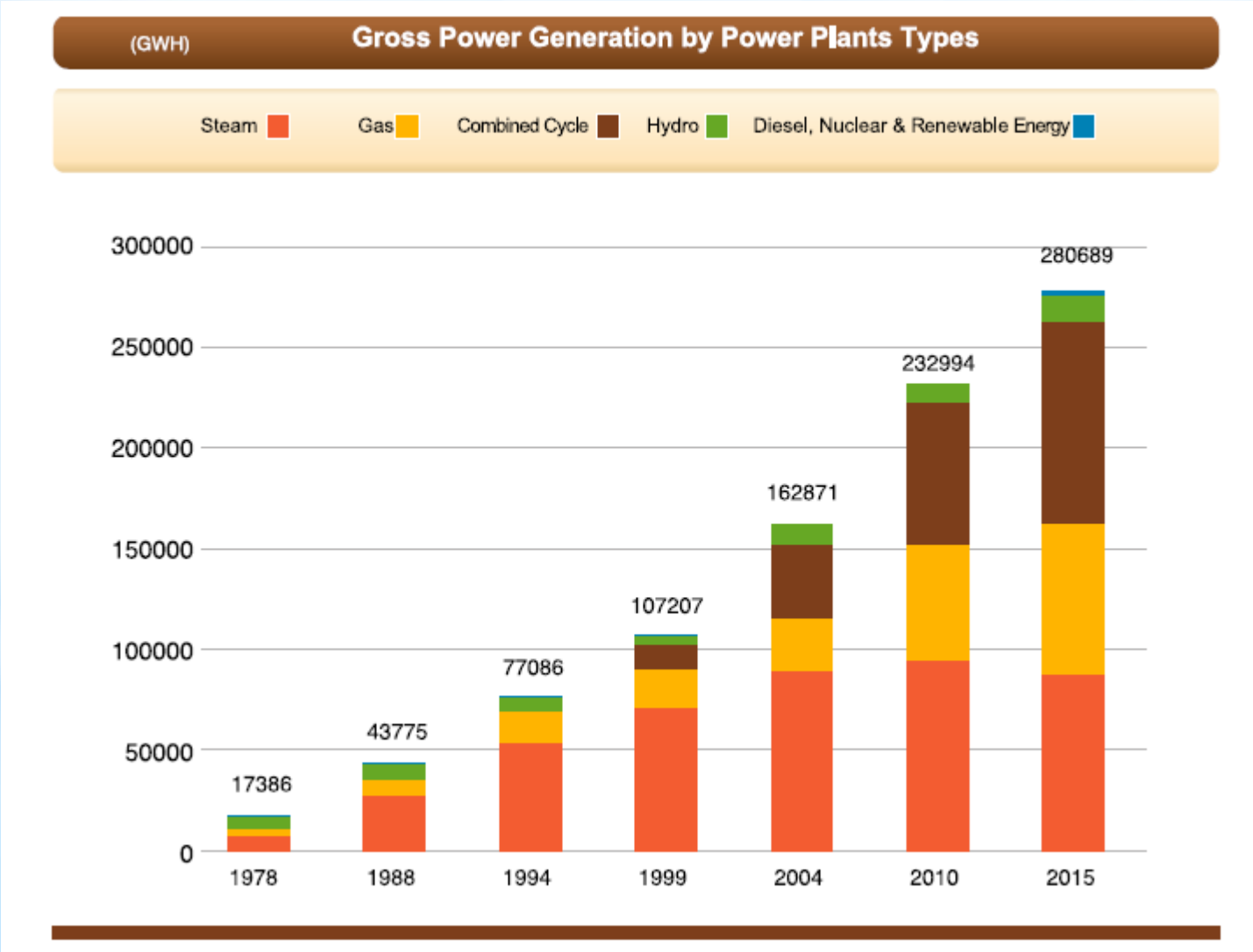
Trend of Max Power Generation & Load Factor



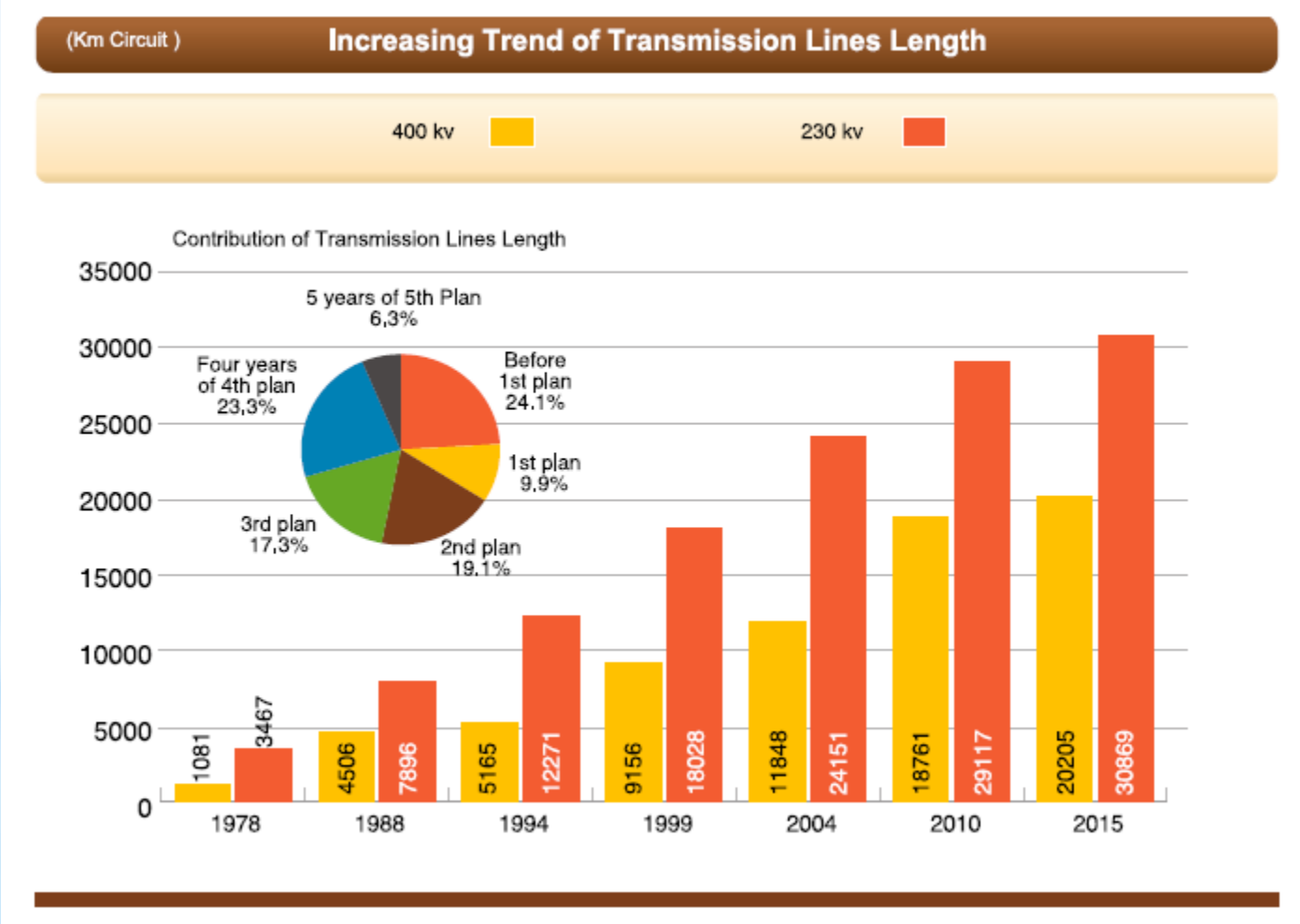
Trend of Operational Capacity Shortage



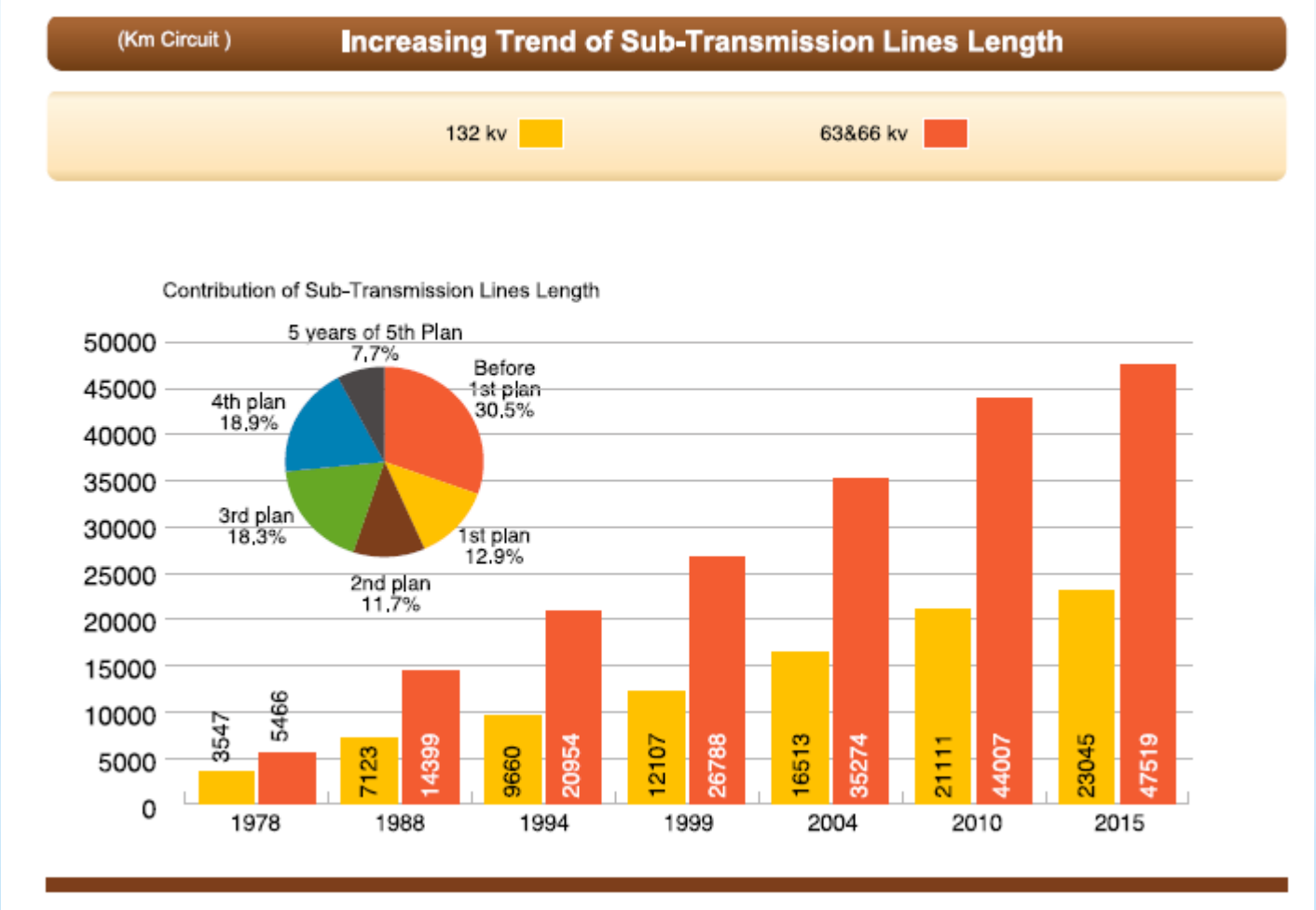
Gross Power Generation by Power Plants Types



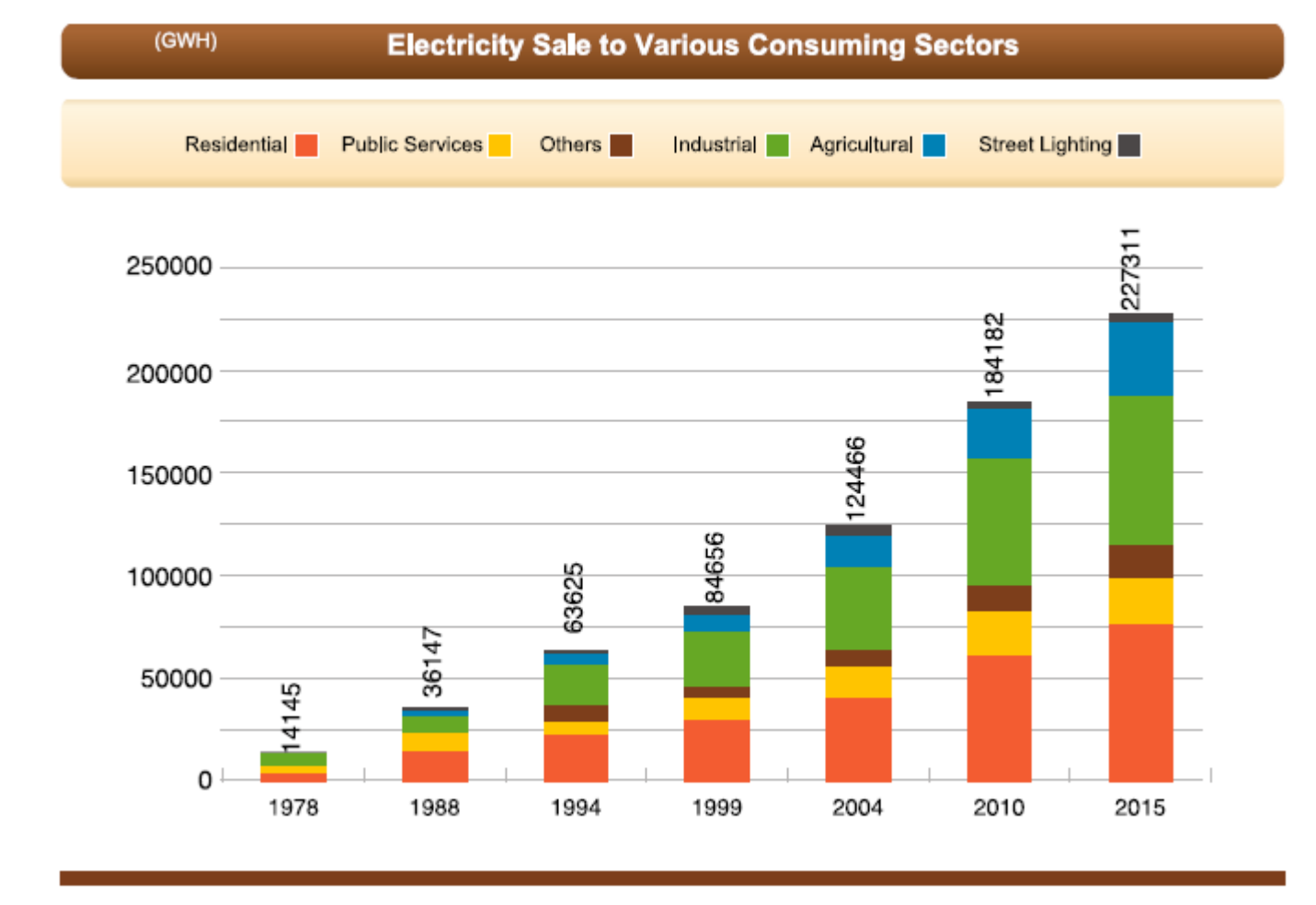
Increasing Trend of Transmission lines Length



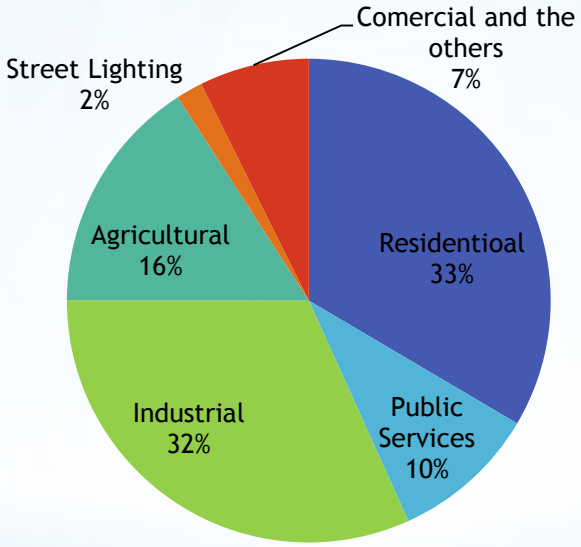
Increasing Trend of Transmission lines Length



Electricity Sale to Various Consuming Sectors



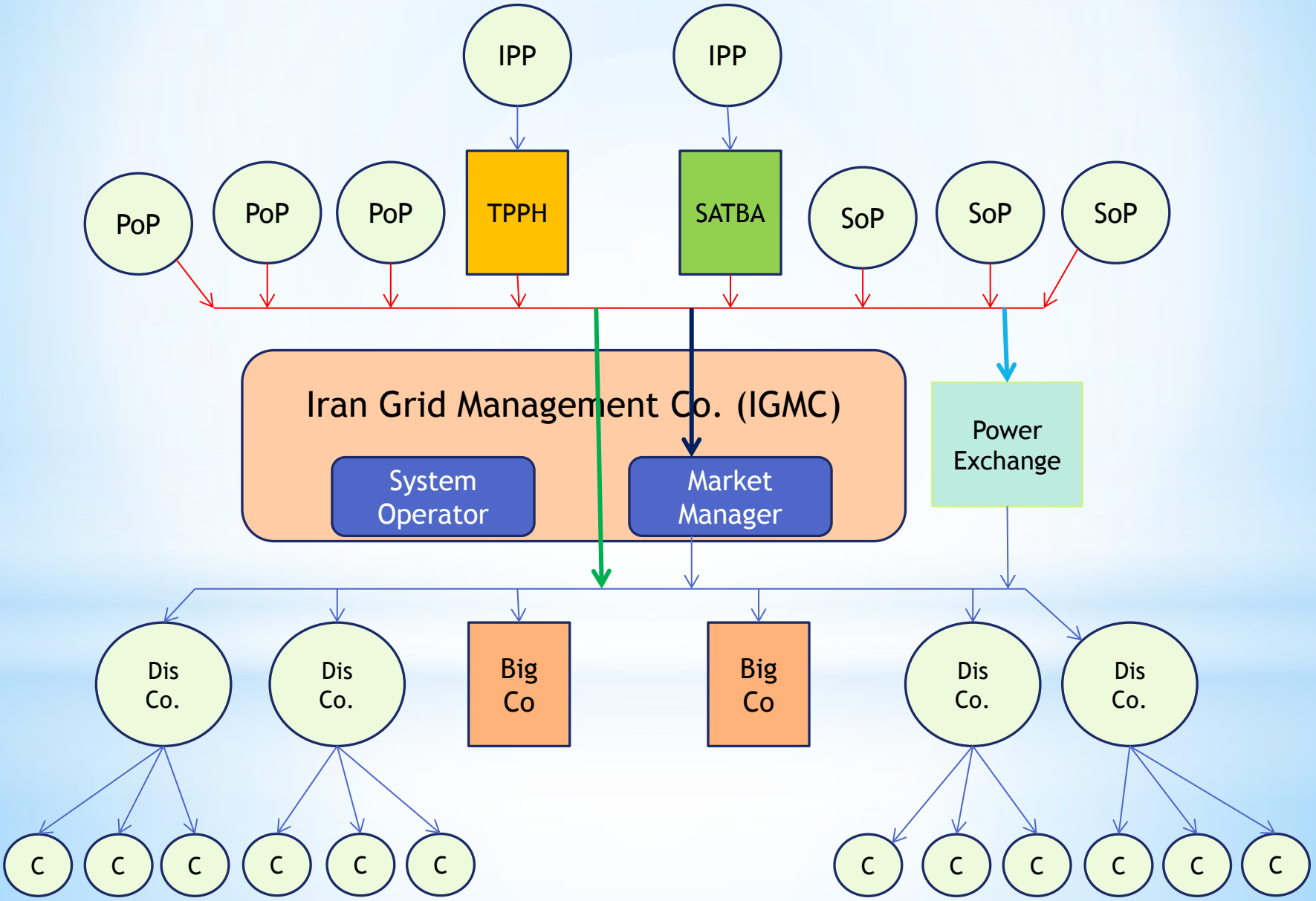
Total Consumption (2016) - Share of Consumer Sectors



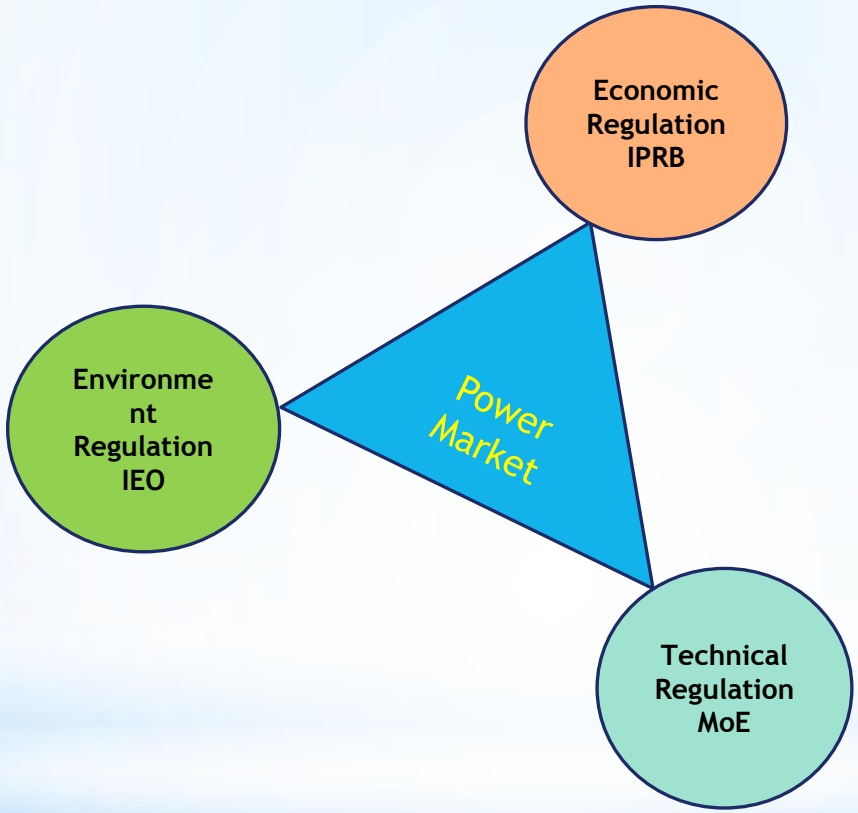
Power Sector Restructuring

Competition market and regulation

Iran Market Architecture



Power Market Regulatory System



Electricity Trade
(Import and Export)

Power grid Connection Points

* Turkey:

Two lines. The first, 400 KV high voltage 99.8 Km length, line between Khoy from Iran to Bash Ghale from Turkey. The second, 154 KV high voltage 40 Km length line between Bazargan in Iran to Do Biazit in Turkey.

* Armenia:

Two lines. Both are 230 KV high voltage line. The first, 109 Km length, between Ahar in Iran to Agarak in Armenia. The second, 87.2 Km length, between Songoon in Iran to Agarak in Armenia.

* Azerbaijan:

Six lines. 400 Kv (one line), 230 Kv (two line), 132 Kv (one line) and 10.5 Kv (two line). The length of these lines are 57, 57, 19, 2, 1 and 0.01 Km respectively. These lines connect Astara, Moghan, Aras and Jolfa in Iran to Astara, Imeshli, Aras and Ordoobad in Azerbaijan. Finally, two 400 Kv high voltage lines, 370 and 335 length, are under construction will connect Heris and Jolfa in Iran to Herazdan in Azerbaijan.

Power grid Connection lines

* Turkmenistan:

Two lines. Both 230 Kv High voltage. The first, 300 km length, connect Gonbad in Iran to Balkan Abad in Turkmenistan. The second, 126 Km length, connect Sarakhs in Iran to Shatligh in Turkmenistan. It should be mentioned that a 400 Kv, 340 Km high voltage power line, under construction, will connect Mashhad in Iran to Mari in Turkmenistan.

* Afghanistan:

Three connection lines. The first, 132 Kv, 210 Km length, two circle line connect Taibad and Torbat Jam in Iran to Herat in Afghanistan. The other two connection lines are local in distribution level.

* Pakistan:

Iran-Pakistan power grid connection lines are more or less similar to Iran-Afghanistan grid connection lines. A high voltage 132 Kv, 105 Km length, connects Jakigur in Iran to Mend in Pakistan. The other two connection lines are local in distribution network. It addition of current lines, a 230 Kv, 300 Km-circuit high voltage power line, under construction, will connect Polan in Iran to Goader in Pakistan.

Power grid Connection lines

Iraq:

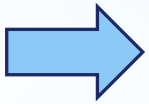
Seven lines, the highest connection lines comparing to the other neighbors. three 400 Kv lines, one 132 Kv line, one 63 Kv line and two 20 Kv lines connect Khoram Shahr, Karkhe, Sar Pole Zahab, Mersad and Marivan in Iran to Khoor-al-Zobeir, Alemara, Khaneghein, Dialeh and Panjvein in Iraq. in addition, Khosravi and Piran Shahr connection points are local in distribution level. The length of these lines are; 57, 150 and 300 Km for 400 Kv lines, 60 Km for 132 Kv line, 38 Km for 63 Kv line and 10 Km for local connection in Khosravi boarder line.

The map of grid connections



So, it is the time that …

Whole Sale Competition Market
Independent System Operator
Open Access Transmission
Establishing Energy (Power) Exchange
Privatisation of Power Plants
Possibility of Bilateral Contract between Consumers and Producers
Grid Connection with all Countries around
Independent Regulatory Body



Introduction to
Regional Electricity Market



What really happened!?

Iran Export-Import of Electricity (2016)

Country	Export	Share %	Import	Share %
Armenia	79	1.0	1185	27.7
Azerbaijan	1	0.0	4	0.1
Turkey	525	6.9	0	0.0
Naxcavan	48	0.6	47	1.1
Pakistan	486	6.4	0	0.0
Afghanistan	720	9.5	0	0.0
Turkmenistan	0	0.0	3039	71.1
Iraq	5751	75.6	0	0.0
Total	7610	100.0	4275	100.0

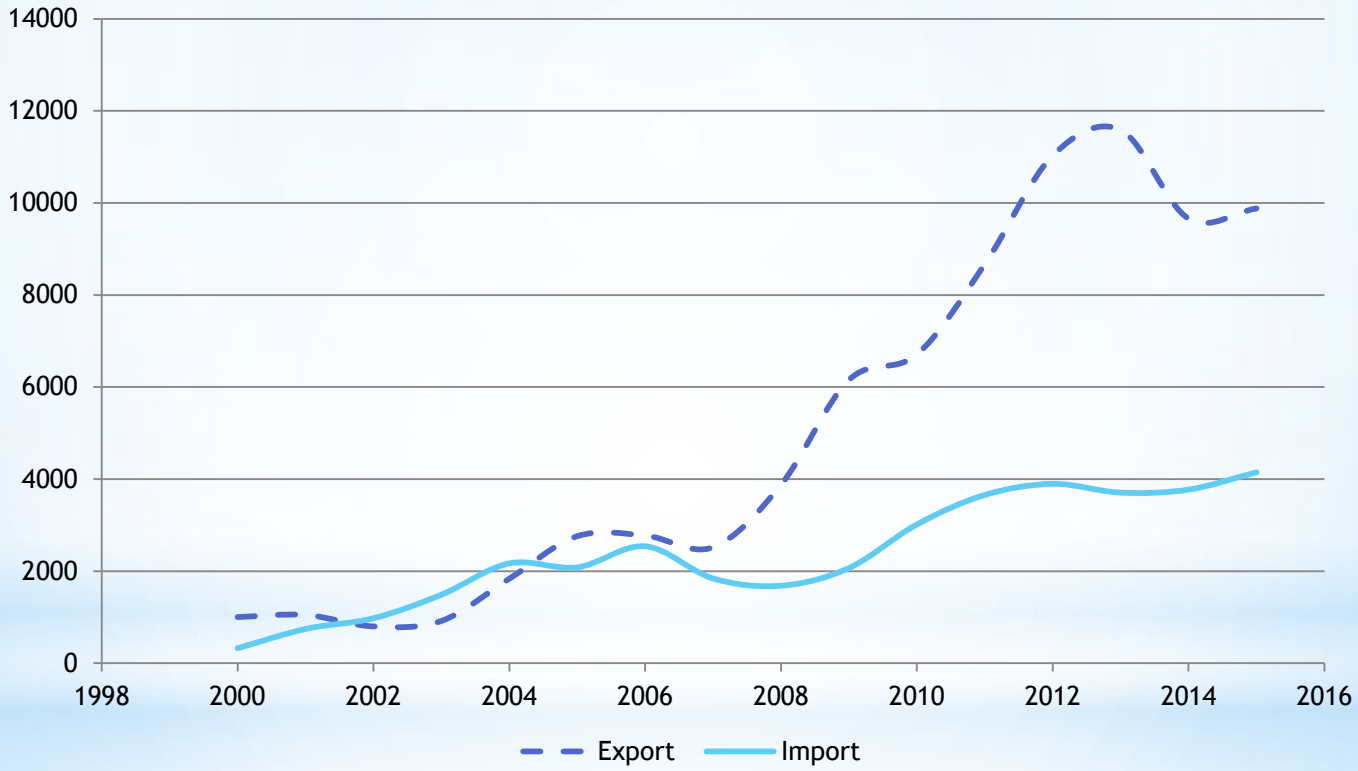
The first 25 countries of the world - power indexes

	country	consumption	country	generation	country	export	country	import
1	China	5,322	China	5,398	France	73,400	United States	59,260
2	United States	3,886	United States	4,099	Germany	66,810	Germany	46,270
3	Russia	1,038	Russia	1,057	Canada	57,970	Italy	45,410
4	Japan	859.7	Japan	936.2	Paraguay	46,120	Brazil	38,430
5	India	698.8	India	871	Switzerland	34,570	Netherlands	33,250
6	Germany	582.5	Canada	618.9	Sweden	31,280	Switzerland	32,250
7	Canada	499.9	France	561.2	Czech Republic	27,450	France	29,000
8	France	462.9	Brazil	530.7	Norway	22,170	Austria	23,260
9	Brazil	455.8	Germany	526.6	Austria	20,460	Finland	19,090
10	Korea, South	449.5	Korea, South	485.1	Spain	19,590	United Kingdom	17,530
11	United Kingdom	323.3	United Kingdom	365.7	Russia	19,140	Hungary	16,970
12	Italy	307.2	Italy	299.3	China	18,670	Belgium	16,850
13	Spain	249.7	Mexico	296	South Africa	15,040	Denmark	15,920
14	Taiwan	242.2	Spain	276.8	Netherlands	15,020	Slovakia	13,880
15	South Africa	234.2	South Africa	257.9	Slovakia	13,080	Uzbekistan	12,000
16	Australia	213.5	Taiwan	252.2	Poland	12,640	South Africa	11,890
17	Mexico	212.3	Iran	239.7	Bulgaria	12,110	Sweden	11,680
18	Iran	199.8	Saudi Arabia	239.2	Uzbekistan	12,090	Hong Kong	11,470
19	Saudi Arabia	190.9	Australia	225.5	United States	12,000	Canada	11,390
20	Ukraine	175.3	Turkey	217.7	Denmark	10,710	Portugal	10,760
21	Turkey	170.4	Ukraine	198.1	Mozambique	9,462	Czech Republic	10,330
22	Thailand	169.4	Indonesia	173.8	Hungary	9,000	Argentina	10,300
23	Indonesia	158	Thailand	173.3	Slovenia	8,363	Poland	9,803
24	Poland	155	Poland	153.4	Belgium	6,911	Iraq	9,802
25	Sweden	136	Sweden	148.7	Iran	6,707	Thailand	9,575

The first 15 countries in the world according to EER

Country	EER-Million $	Share-%
France	4500	14.3
Germany	4000	12.7
Canada	2400	7.6
Switzerland	2200	7.0
Paraguay	2100	6.7
Chine	1400	4.4
Czech Republic	1300	4.1
Netherland	1100	3.5
Austria	1000	3.2
Sweden	784	2.5
Hungari	748	2.4
Rusia	744	2.4
Spain	724	2.3
Bolgaria	601	1.9
Poland	596	1.9
Total	31468	100.0

Iran Export-Import of Electricity (the trend)



Key Points of Current Situation

* The role of government and public sector in electricity trade
* Low traded energy compared with installed capacities
* Low capital productivity
* Dead weight loss (allocative inefficiency) in the region
* High variation in energy traded during the last decade
* The role of Political forces and related challenges

The Future

What should be changed?

Regional Electricity Market – Main Challenges

* Monopoly power markets in national level
* Low flexibility to access transmission grid
* Captured IPPs by long-term PPAs
* Low flexibility of big consumers to choose the supplier
* Lack of efficient retailers
* Inefficient coordination of national ISOs
* Subsidy prices disturbance
* Inefficient I-E contracts between governments or state-owned companies
* Political problems

Policy Advice

* Efficient using of regional organisations (e.g. ECO) capacity to establish a more efficient business environment in the region
* Defining target for implementation of national energy sector reform plan
  * Unbundling
  * Deregulation and reregulation
  * Privatization
  * Open access transmission
  * Energy subsidy reduction
* Establishment power grid coordinator (Regional Network of Transmission System Operators for Electricity)
* Using political capacities more efficient to develop economic co-operations

Thank you for your attention