

IEPI in the World Arena



- **Future Trends of Electricity in the World**

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Today the social, political and economic crisis and the issues such as restrictions endured fossil reserves, environmental concerns, crowds, economic growth and consumption index are the subjects that are thought by thinkers' to find the suitable strategies in solving energy problems in the world, especially environmental crises. On the other hand since the political and economic support of countries depends on the rate of productivity fossil energy sources, to be empty fossil resources is not only a threat to the economy of the exported countries, but also is the main concern of economic system of the imported countries. Current using of the fossil reserves may lead to less productivity and ultimately to be empty the reserves in future.

Fortunately most countries of the world have been realized to importance and role of various resources of energy especially renewable energies in supplying the present and future needs and have done great researches and principle investments in the operation of development of these resources. With regard to such increasing and main tendency in using the renewable energies and its technologies in industrial and in-developing countries, it is necessary that basic strategies and plans are followed.

Pollutants caused by the combustion and increasing the density of CO₂ in the atmosphere and its consequences have faced the world with irrevocable and threatening changes. The increase in temperature on earth, climate changes, sea levels and eventually intensified international conflicts are some of these consequences. This has persuaded the policy makers to offer policies and standards for control of environmental and researchers to develop resources with less pollution and renewing.

All renewable energy resources share more in energy supply system in the world. The sources simultaneously answer to both main features of fossil resources as follows: renewable energies are compatible with environment and have not any pollution and because of renewing, there is no final for them. Another characteristic of these resources is their distribution and to be widespread in the world. Therefore, a special role has been allocated to these resources in the international policies and programs such as

in programs of United Nations in other to global stable development. However adjusting these resources with the current system of energy consumption in the world has still some difficulties that for solving them important scientific researches in recent years have been allocated.

In other hand the technology of construction and operation of each energy, environmental issues, technical characteristics, possibility of having access, the geographical distribution and other features have its own characteristic. Therefore, the variety of use of various energies will be caused country to have more reliable situation and it is necessary that their technologies is established in the country. Of course, the technology which is dependent on industry greatly is raw material of internal resources, and needs less foreign currency and on the other hand employment opportunities and increasing domestic production are realized. To reach this goal, it is necessary to modify the real prices of various energies and the essential measures are done to promote private sector.

According to presented programs by country's electricity industry in short-term period in a next decade, access to electronic power systems will be provided in electricity industry based on Silicon or Post Silicon to control of power supply system. Integration of decentralized generation and local storing in the form of a new architecture is proper for the future competitive market. On the other hand, country's electricity industry will follow new and proper services which interact with customers and based on customer needs. To accelerate in the world using of clean fossil technologies which are the most efficient and best methods to generate electric energy is of other measures that will be done in country's electricity industry. One of goals of country's electricity industry is development of electric energy generating systems in short-term periods that is proper in environmental features for in-developing countries.

As well as accelerating in the research and development projects in order to increase productivity of equipments for electric power costumers is from other cases that country's electricity industry pay attention to it in short-term goals. All these cases are caused that general policies of electricity industry are organized toward using of equipments and new technologies and knowledge in electricity industry.

In connection with general goal of power industry it should be mentioned that in the long term with a look at the perspective of the future, global use of electric power for better use of energy resources, the earth, water and to minimize industry, agriculture and cities garbage to create a framework for stable future is planning. On the other hand comprehensive development and compatible with the global prospect in the field of power supply reduce costs and improve environmental performance of the infrastructures is concerned. In other words to create new facilities compatible with the needs besides development, technology and innovation in this industry it must move in such way that it is befitted of the best facilities.

For example, electric based transportation may increase the electricity consumption of the world up to 15 percent in the next 50 years that in turn would reduce the consumption of oil products. It should be noticed that this trend does not necessarily mean the increase of electric power generation through traditional means of electric power generation, (considering the overview, which exists about fuel cells and technological development for storage of electricity).

Looking more curiously to the future energy consumption shows that utilizing nuclear energy development is complying with environmental issues. Making managerial decisions for different countries may be varied according to each country situation. Development of the nuclear power plants becomes more attractive when energy demand is growing very quickly. As nuclear technology is improving worldwide

continuously and several countries are obtaining and reaching this technology edges, considering some new aspects cannot be neglected. Quality warranty, management and dividing the know-how and applying the international accepted standards, considering necessary security and protection issues and improving cooperation levels are some of the issues.

Most of new nuclear power plants in the near future will be based on the new and developed plans and of course with the previous system. Now 20 members of IAEA are currently engaged in providing new reactors and new plans of fuel cycle.

With the increasing prices of fossil fuels, renewable energies will find the special position in the energy supply in the world. In next 20 years, the need of world energy will increase about 60 per cent. This is while that in the 21st century A. D., energy fossil-fuel resources such as coal, oil and gas fuels are finishing. The future of energy of the world is dependent on science and technology development in production and consumption of energy, the prices and decision-making politicians in the field of energy. Now due to the high cost, renewable energies may not challenge with the fossil fuels. However with increasing in fossil fuels prices, renewable energies will have a special position.

The shares of nuclear and renewable power plants are shown respectively in charts (38) and (39) in some countries of the world. As well as, charts (40)-(43) show the average growth of installed capacity, generation, consumption and population respectively for the past 10 years in different regions of the world.

Diagram (38): Contribution of Atomic Power Plants to Installed Capacity of a Number of World's Countries at the end of 2012

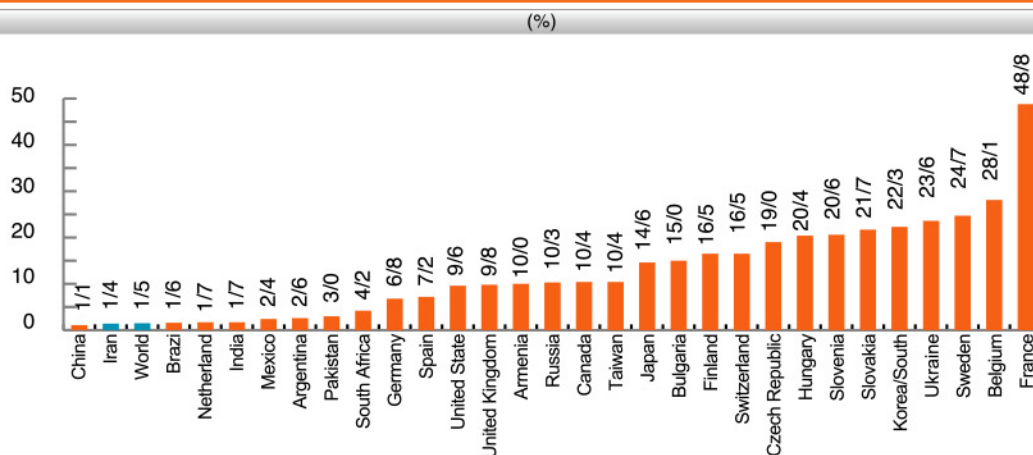


Diagram (39): Contribution of Renewable Power Plants To Installed Capacity of a Number of World's Countries at the end of 2012

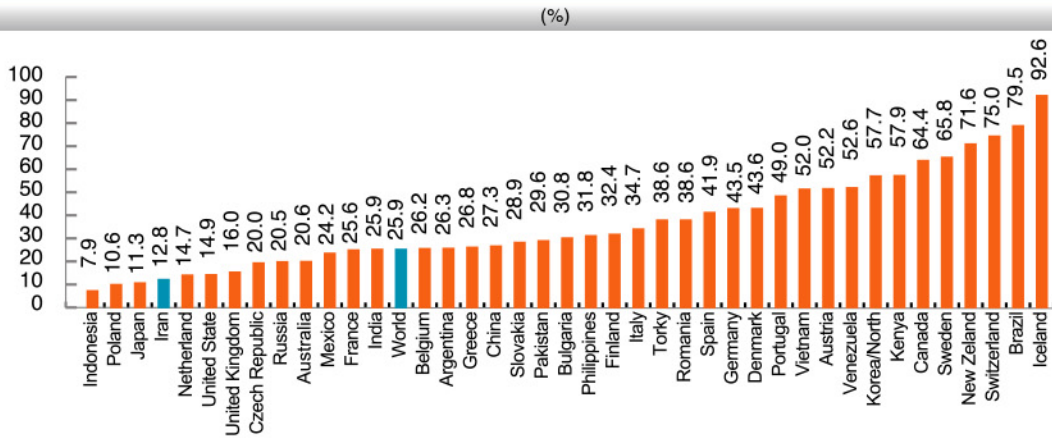


Diagram (40): Average Percent Growth of Installed Capacity during the Past Decade

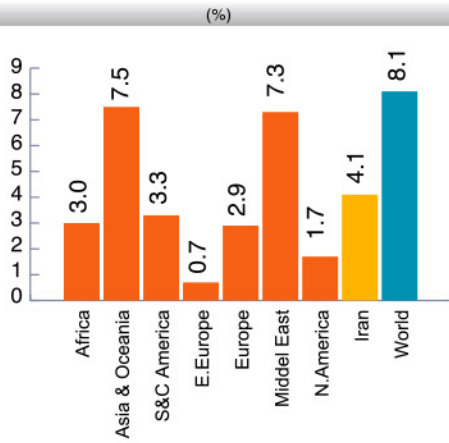


Diagram (41): Average Percent Growth of Electricity Energy Generation During the Past Decade

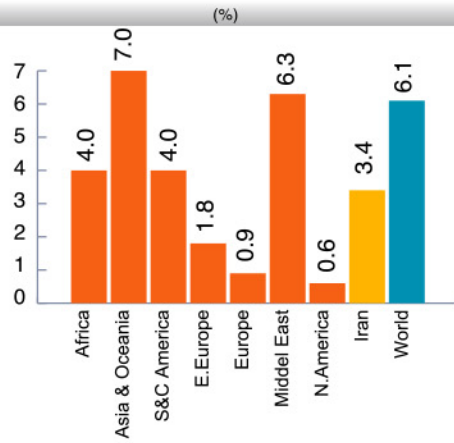


Diagram (42): Average Percent Growth of Electricity Energy Consumption During the Past Decade

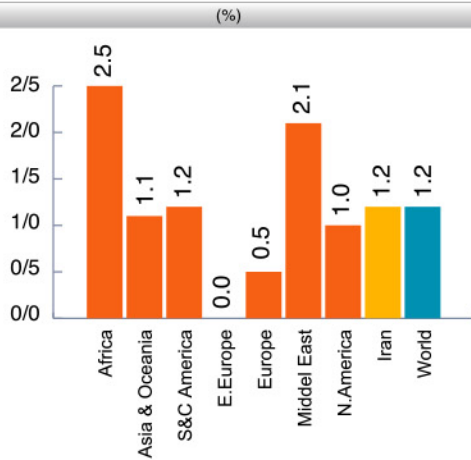
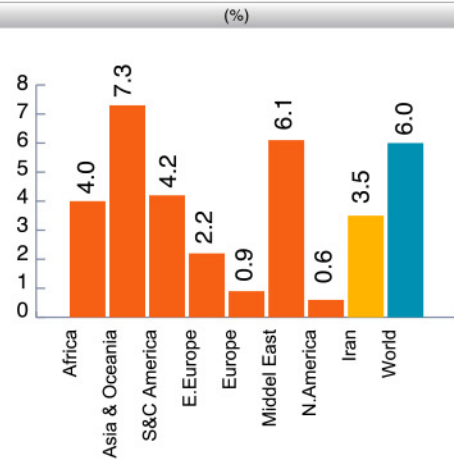


Diagram (43): Average Percent Growth of Population During the Past Decade



Complimentary Tables

Table 48: Ranking of 40 Countries in Respect to Various Indices in 2012

No.	Country	Population	Installed Capacity	Net Electricity Generation	Net Electricity Consumption	Electricity Exports	Electricity Imports	Capacity per Capita	Net Generation per Capita
1	United States	3	2	2	2	15	1	5	5
2	China	1	1	1	1	11	21	31	29
3	Japan	8	3	5	3	31	32	9	14
4	Russia	7	5	4	4	9	27	21	17
5	India	2	4	3	5	32	23	38	3
6	Germany	11	6	7	6	1	2	11	4
7	Canada	24	7	6	7	2	13	4	16
8	France	15	8	9	8	10	3	10	35
9	Brazil	5	10	8	9	8	29	4	14
10	Italy	17	9	12	8	12	22	3	10
11	Spain	20	11	13	12	13	10	20	27
12	United Kingdom	16	12	10	11	11	23	9	10
13	Korea, South	19	13	10	10	9	33	33	2
14	Iran	13	14	16	16	20	16	26	2
15	Mexico	9	16	14	14	14	27	28	2
		30	15	18	18	17	34	34	2
				21	21	22	18		

Table 10-1 : Iranian Electric Power Industry at a Glance

Description	Unit	2013	2014	Change (%)
General Indices				
Capacity per Capita	Watt	908	934	2.9
Electricity Production per Capita (MOE)	kWh	3388	3505	3.5
Electricity Consumption per Capita (MOE)	kWh	2624	2805	6.9
Average Household Consumption	kWh	2610	2765	5.9
Utilization of Effective Capacity of Power Plants	%	48.3	49	1.4
Average Efficiency of MOE Thermal Power Plants	%	37	36.3	-1.9
Load Factor	%	65.6	67.1	2.3
Power Cut/ Customer	Min/Day	2.47	2.38	-3.6
Customers Density per km ²	Customer	18.4	19.2	4.5
Customers per Employee	Customer	644	686	6.5
Residential Consumption	%	31.7	32.4	2.2
Share of Export From Total Sale	%	5.7	4.4	-22.9
Share of Electricity Consumption Productive Sectors.(Agri+Ind)	%	51.1	49.8	-2.5
Employee per Installed Capacity	kW	1494	1583.4	6.0
Productivity of Employee	MWH/Person	5573	5941	6.6
The Ratio of High Educated Staff to Total	%	43.8	47.9	9.4
Installed Capacity				
Hydro	MW	10265	10785	5.1
Steam	MW	15830	15830	0.0
Combined Cycle	MW	17850	18494	3.6
Gas	MW	24715	26412	6.9
Diesel	MW	439	439	0.0
Nuclear & Renewable Energy	MW	1181	1193	1.0
Max. Supplied Load	MW	46474	46828	0.8
Max. Demand	MW	46474	48937	5.3
Total Energy Generation				
Hydro	GWh	14470	13862	-4.2
Steam	GWh	89664	85623	-4.5
Combined Cycle	GWh	87135	96823	11.1
Gas	GWh	66039	73340	11.1
Diesel	GWh	71	83	16.9
Nuclear & Renewable Energy	GWh	4814	4748	-1.4
C-Energy Losses				
Transmission & Sub-Transmission	%	14.78	13.13	-11.2
Distribution	%	3.35	3.02	-9.9
	%	14.83	12.93	-12.8

Table 10-2 : Iranian Electric Power Industry at a Glance

Description	Unit	2013	2014	Change (%)
Fuel Consumption (MOE)				
Gas oil	10 ⁶ Liter	12186	8872	-27.2
Fuel oil	10 ⁶ Liter	15263	10273	-32.7
Nature Gas	10 ⁶ m ³	36648	50172	36.9
Lines Length				
400 kV	km-Circuit	19915	19995	0.4
230 kV	km-Circuit	30300	30732	1.4
132 kV	km-Circuit	22665	22919	1.1
63 & 66 kV	km-Circuit	46240	47105	1.9
Medium Voltage Distribution Lines	km	389566	397998	2.2
Low Voltage Distribution Lines	km	325868	336491	3.3
Substation Capacity				
400 kV	MVA	54303	57143	5.2
230 kV	MVA	71605	75024	4.8
132 kV	MVA	27838	29269	5.1
63 & 66 kV	MVA	63270	65061	2.8
Distribution	MVA	100878	105356	4.4
Total Energy Sale				
A-Domestic Sale	GWh	203088	219653	8.2
Residential	GWh	64379	71163	10.5
Public	GWh	17831	19767	10.9
Agricultural	GWh	33103	35188	6.3
Industrial	GWh	70634	74294	5.2
Others Consumption	GWh	13377	15404	15.2
Street Lights	GWh	3765	3837	1.9
B-Electricity Exchange	GWh	7879	5888	-25.3
Customers	1000 Customer	30287	31672	4.6
Residential	1000 Customer	24671	25739	4.3
Public	1000 Customer	1283	1382	7.7
Agricultural	1000 Customer	330	353	7.0
Industrial	1000 Customer	194	206	6.2
Others Consumption	1000 Customer	3810	3992	4.8
Number of Personnel	Person	47047	46200	-1.8
Tavanir Co	Person	882	823	-6.7
REC.s	Person	17985	17675	-1.7
Generation Co.s & Dams	Person	10249	9846	-3.9
Distribution Co.s	Person	16499	16441	-0.4
Others*	Person	1432	1415	-1.2
Electricity Average Sale Price	Rial/kWh	418.5	525.6	25.6
Residential	Rial/kWh	346.7	439.4	26.7
Public	Rial/kWh	516.3	617.6	19.6
Agricultural	Rial/kWh	133.2	177.9	33.6
Industrial	Rial/kWh	442.6	542.6	22.6
Others Consumption	Rial/kWh	1342.2	1664	24.0

Table (11-1) : Specifications of Thermal Power Plants in 2014

Power Plant	Company	Site	Operation Year	No. Units	Nominal Capacity(MW)
A-Steam Power Plants					
Tarasht (shahid Firouzi)	Tehren	Tehren	1959	4	50
Besat	Tehran	Tehran	1967-1968	3	247.5
Islam Abad(Isfahan)	Isfahan	Isfahan	1969	2	75
			1974	1	120
			1980-1988	2	640
Shahid Montazere Ghaem	Tehran	Karaj	1971-1973	4	625
Loushan(Shahid Beheshti)	Gilan	Loushan	1973	2	240
Zarand	Kerman	Zarand	1973	2	60
Mashhad	Khorasan	Mashhad	1973-1974	2	120
			1968-2007	1	12.5
Zargan		Ahwaz	1975-1992	2	290
Neka(Shahid Salimi)	Mazandaran	Neka	1979-1981	4	1760
			2007	2	19.60
Ahwaz(Ramin)	Khozestan	Ahwaz	1979-1999	6	1890
			2007	2	13
Bandar Abbas	Hormozgan	Bandar Abbas	1980-1986	4	1280
Shahid M. Montazeri	Isfahan	Isfahan	1984-1999	8	1600
			2011-2012	2	16
Toos	Khorasan	Mashhad	1985-1987	4	600
Tabriz	Azarbayjan	Tabriz	1986-1989	2	736
Shahid Rajaei	Tehran	Ghazvin	1992	4	1000
Bistoon	Gharb	Kermanshah	1994	2	640
Shahid Mofateh	Bakhtar	Hameden	1994	4	1000
Iranshahr	Sistan & Baluchestan	Iran shahr	1995-97-02-03	4	256
Shazand	Bakhtar	Arak	2000-2001	4	1300
Sahand	Azarbayjan	Tabriz	2004-2005	2	650
Total Steam Plants				79	15240.6

Table (11-2) : Specifications of Gas Power Plants in 2014

Power Plant	Company	Site	Operation Year	No. Units	Nominal Capacity(MW)
B-Gas Power Plants					
Shiraz	Fars	Shiraz	1965	1	11.8
			1967	3	45
			1973	1	28.6
			1974	1	25.6
			1975	1	24.2
			1981	1	60.8
Mashhad	Khorasan	Mashhad	1971-1989	2	37.6
			1977-1978	2	158
Bushehr	Fars	Bushehr	1975-1993	2	50
Loushan(Shahid Beheshti)	Gilan	Loushan	1977	2	120
Doroud	Bakhtar	Doroud	1977	2	60
Shahid Zandbagh(Yazd)	Yazd	Yazd	1977-1979	4	97
			1977-1978	4	128
			1977-87-07	10	237
			1978	9	288
			1978	3	255
			1978	1	24
Zargan		Ahvaz	1978-1980	4	128
Tabriz(New)	Azərbayjan	Tabriz	1978	2	64
Chahbahar(Konararak)	Sistan & Baloochestan	Chahbahar	1978	6	142.5
Orumia	Azərbayjan	Orumia	1981	2	60
Shariati	Khorasan	Mashhad	1984-1986	6	150
Sufian	Azərbayjan	Tabriz	1984-1985	4	100
Zahedan	Sistan & Baloochestan	Zahedan	1986	3	73.4
			1995	1	30
			1997	1	24.8
			2007	4	98
Ghaen	Khorasan	Ghaen	1987-1994	3	75
Hasa	Esfahan	Shahin Shahr	1989	3	87.6
Kangan	Fars	Kangan	1995-96-97-02	6	150
			1995	1	14
Yazd	Yazd	Yazd	1998	2	120
Farg Darab	Fars	Darab	2002	3	4.2
Bandar Abbas	Hormozgan	Bandar Abbas	2002	2	50
Hormozgan(Khalije Fars) C.C	Hormozgan	Bandar Abbas	2004-2005	6	990
Shirvan C.C	Khorasan	Shirvan	2005-06-07	6	954
Chelsotoon		Isfahan	2005-2006	6	954
Parand	Tehran	Tehran	2005	6	954
Roud Shour		Tehran	2005-2006	3	789
Orumia C.C	Azərbayjan	Orumia	2006-2007	4	636
			2009	2	324
			2006-2007	4	636
Sabalan C.C	Azərbayjan	Ardebil	2006-2007	4	636
			2009	2	324
Kahnodj		Kahnodj	2009-2012	3	75
Asaloye		Asaloye	2006-2007	6	954
Ferdosi C.C		Khorasan	2006-2007	6	954
Jahrom C.C	Fars	Jahrom	2006-2007	6	954
Chahbahar	Sistan & Baloochestan	Chahbahar	2007	4	96
			2007-2008	2	318
Shahid kaveh C.C (Ghaenat)	Khorasan	Ghaen	2007-2008	4	636
Khorramshahr		Khorramshahr	2007-08-09-13	4	972
Noshahr		Noshahr	2008	2	47.4
Kashan		Kashan	2008	2	324
Golestan		Golestan	2009	6	972
Zagros	Gharb	Kermanshah	2009-2010	4	648
Soltanie	Zanjan	Zanjan	2009-10-11	4	648
Semnan C.C	Semnan	Semnan	2009	2	324
Bastami (Shahrood)	Semnan	Shahrud	2010	2	324
Hafez (Fars)	Fars	Fars	2010-2011	6	972
Bam Pour	Sistan & Baloochestan	Iranshahr	2012-2014	2	324
Esin	Hormozgan	Hormozgan	2013	4	648
Shobsd (Kahnodj)	Kerman	Kahnodj	2013	2	324
Sarv (Chadormaloo)	Yazd	Chadormaloo	2013	2	324
Eslamabad Gharb	Gharb	Eslamabad	2013	3	75
Shams Sarakhs		Sarakhs	2013	2	50
DG & CHP		Country	2010-11-12	80	665
Total Gas Power Plants in NG				301	21211.5
Kish (Gas)	Kish	Kish	1992-99-2003	3	112.5
			2006-2007	1	24.3
			2006-2007	2	47.0
Khark (Gas)	Fars	Khark	2014	1	25.0
Total Gas power plants out of NG				7	208.8
Total Gas Power Plants				308	21420.2

Table (11-3) : Specifications of Combined - Cycle Power Plants in 2014

Power Plant	Company	Site	Operation Year	No. Units	Nominal Capacity(MW)
C-Combined-Cycle Plants					
Gilan Combined-Cycle	Gilan	Rasht	1992	6	859.2
			1997	3	446.4
Montazare Ghaem	Tehran	Karaj	1992	6	697.5
			1999-2000	3	300
Qom Combined-Cycle	Tehran	Qom	1993	4	514
			1997-1998	2	200
Shahid Rajaee Combined-Cycle	Tehran	Ghazvin	1994	6	742.8
			2001	3	300
Neishabour Combined-Cycle	Khorasan	Neishabour	1994-1998	6	740.4
			2002-2003	3	300
Shariati Combined-Cycle	Khorasan	Mashad	1994	2	246.8
			2003	1	100
Fars Combined-Cycle	Fars	Shiraz	1995-1998	6	740.4
			2002	3	294.9
Khuy Combined-Cycle	Azarbayjan	Khuy	1997	2	246.8
			2002	1	102.5
Shahid Salimi Combined-Cycle	Mazandaran	Neka	2006	1	160
			1990	2	275
Yazd Combined-Cycle	Yazd	Yazd	2006-2010	2	320
			2000	2	246.8
			2008-2009	2	318
Kazeroon Combined-Cycle	Fars	Kazeroon	1994	2	256
			2002-2003	4	636
			2006-2007	3	480
Kerman Combined-Cycle	Kerman	Kerman	2001-2002	8	1272
			2007-2009	4	640
Damavand Combined-Cycle	Tehran	Garmsar	2003-04-05	12	1908
			2009-10-11-12	6	960
Sanandaj Combined-Cycle	Gharb	Sanandaj	2005-2006	4	636
			2011-2012	2	320
Abadan Combined-Cycle		Abadan	2002-2003	4	493.6
			2013-2014	2	320
Zavare Combined-Cycle	Esfahan	Esfahan	2011	2	324
			2012	1	160
Pare Sar Combined-Cycle	Gilan	Gilan	2011-2012	4	648
			2013	2	320
Shir kooh Combined-Cycle	Yazd	Yazd	2012	2	324
			2013	1	160
Genaveh Combined-Cycle		Boushehr	2011	2	324
			2014	1	160
Total Combined-Cycle Plants				132	18493.1

Table (11-4) : Specifications of Hydro Power Plants in 2014

Power Plant	Company	Site	Operation Year	No. Units	Nominal Capacity(MW)
D-Large Hydro Power Plants					
Dez Dam	Khozestan	Andimeshk	1962-1971	8	520
Shahid Abbaspuor Dam	Khozestan	Masjed Soleyman	1977-2002-03	8	2000
Masjed Soleyman Dam	Khozestan	Masjed Soleyman	2002-03-07-08	8	2000
Karkheh Dam	Khozestan	Karkheh	2002-2003	3	400
Karoune 3 Dam	Khozestan	Masjed Soleyman	2004-05-06	8	2000
Karoune 4 Dam	Isfahan	Chahar Mahal	2010-2011	4	1000
Gotvand Dam	Khozestan	Masjed Soleyman	2012	4	1000
Kalan Dam	Tehran	East Tehran	1988	3	115.5
Mollasadra Dam	Fars	Fars	2007	2	100
Siabisheh	Mazandaran	Masjed Soleyman	2011	4	1040
Total Large Hydro Power Plants				52	10175
E-Medium Hydro Power Plants					
Amir Kabir Dam	Tehran	Karaj	1961	2	90
Sefid Rood Dam	Shomal	Mangil	1964	5	87.5
Latyan Dam	Tehran	Latyan	1969-1987	2	45
Zayandeh Rood Dam	Isfahan	Isfahan	1970	3	55.5
Aras Dam	Azarbaijan	Jolfa	1973	2	22
Jiroft Dam	Kerman	Jiroft	1997	2	32.4
Maroun Dam	Khozestan	Behbahan	2004	1	75
Koohrang Dam	Isfahan	Koohrang	2004-2005	3	39.3
Vafarghan Dam	Markazi	Saveh	1996	2	10.4
Taleghan Dam	Tehran	Taleghan	2006	2	18
Shoot-e-Moghan Dam	Azarbaijan	Moghan	2002	2	13
Dorood Zan Dam	Fars	Shiraz	1989	2	10
Takam Dam	Mazandaran	Mazandaran	2008	3	15
Lavarak Dam	Tehran	Tehran	2008-09	2	44
Total Medium Hydro Power Plants				33	557
F-Small Hydro Power Plants					
Mahabad Dam	West Azarbaijan	Mahabad	1972	2	6
Arde (Out of NG)	Gilan	Gilan	1991	1	0.1
Asiabak Dam	Markazi	Saveh	1997	2	5.2
Polkalo 4		Dena	1994	2	2.5
Golab	Isfahan	Golab	1996	1	2.8
Kerik 2		Dena	2006	2	2.5
Kerik 3		Dena	2006	2	3
Siram (Out of NG)	Larestan	Siram	2004	1	0.1
Sarrood (Out of NG)	Khorasan	Sarrood	1988	1	0.1
Maran (Out of NG)	Mazandaran	Maran	2005	1	0.04
Khalian (Out of NG)	Gilan	Khalian	2005	1	0.03
Gerni (Out of NG)	Khorasan	Gerni	2005	1	0.03
Nave (Out of NG)	Gilan	Nave	2005	1	0.1
Darjan (Out of NG)	Mazandaran	Darjan	2005	1	0.1
Polkalo2 & Khakhdan	Kohgiloyeh	Dena	2008	2	4
			2008	1	0.9
Shahid Talebi (Sepidan)	Fars	Sepidan	1995	3	2.3
Jannat Roodbar (Out of NG)	Mazandaran	Roodbar	1997	2	1
Gamasyab	Hamadan	Hamedan	2000	2	2.8
DarrehTakht 2 (Out of NG)	Lorestan	Lorestan	2002	2	0.9
Kernekh (Out of NG)	Ardebil	Khalkhal	2003	1	0.1
PolKalo 1		Dena	2005	2	4
Darreh Takht 1 (Out of NG)	Lorestan	Ezna	2006	2	0.7
Menj		Chahar Mahal Bakhtiari	2010	2	5
Piran	Kermanshah	Kermanshah	2011	2	8.5
Out of Network Small Hydro				15	3
Network Small Hydro				25	49.4
Total Small Hydro Power Plants				40	52
Total Hydro Power Plants				125	10785.0

Table (11-5) : Specifications of Renewable & Larg Industrial Power Plants in 2014

Power Plant	Company	Site	Operation Year	No. Units	Nominal Capacity(MW)
G- Renewable Energy					
Booshehr		Booshehr	2011	1	1020
Wind Power Plants					
Manjil (Manjil, RoodbarT Hrzevil, Paskoolan and Siahpoosh atomic energy)	SUNA	Manjil/Roodbar	1994	2	1.00
		Manjil	1997-1998-03	7	3.85
		Manjil	1997-1998	15	4.5
		Roodbar	1995	3	1.65
		Harzevil	1998-2000-2003	12	3.6
		Paskoolan	2003-2004	8	4.4
		Manjil	2002	1	0.66
		Paskoolan	2004-2005	22	14.52
		Manjil	2007	17	11.22
		Manjil	2008	24	15.84
		Manjil	2012	16	10.56
		Manjil	2014	31	20.46
		Binalood Khorasan	Khorasan	Khorasan	2004-2006
2007	23				15.18
2008	2				0.26
Zabol Wind Plant	Zabol	Zabol	2009	1	0.66
Shiraz Wind Plant	Shiraz	Shiraz	2010	1	0.66
Tabriz Wind Plant(oun ben ali)	Tabriz	Tabriz	2009-2010	3	1.98
Mahshahr Wind Plant	Mahshahr	Mahshahr	2012	1	0.66
Isfahan Wind Plant	Isfahan Wind Plant	Isfahan	2012	1	0.66
Sarein Wind Plant	Sarein Wind Plant	Ardebil	2012	1	0.66
Khaf Wind Plant	Khaf Wind Plant	Khorasan Razavi	2012	2	3.50
Takestan Wind Plant	Mapna	Takestan	2014	8	20.00
Artin Iranian Wind Plant	Artin Iranian	Binalood	2014	2	4.00
Sarab Wind Plant		Sarab	2014	1	0.66
Nir Wind Plant		Nir	2014	1	0.66
Total Wind Power Plants				225	155
Taleghan Solar PP		Taleghan	2003	1	0.05
Semnan, Solar PP		Tabriz	2005	1	0.02
Tabriz Waste PP	SUNA	Mashad	2009	2	0.66
Mashad Waste PP		Shiraz	2009	2	1.20
Shiraz Waste PP		Tehran	2009	1	1.90
Tehran Biogaz	Tehran Biogaz	Tehran	2012	1	4.00
Tehran Waste PP	Tehran Waste PP	Tehran	2012	1	3.00
Isfahan Waste PP	Isfahan Waste PP	Tehran	2012	1	0.51
Photovoltaic Units	Photovoltaic Units	Tehran	2012		6.99
Total Renewable & Nuclear				236	1193.31
Total Diesel Power Plants				145	409
Total Power Plants (MOE) & Private:				1049	67571
Large Industrial					
Zobahan (Steam)	Isfahan Zobahan Co.	Isfahan	1970	2	24.0
			1996	1	60.0
			1978	3	165.0
Zobahan (Gas)			1976	1	26.0
Mess Sarcheshmeh (Steam)	Mess-e-Iran Co.	Rafsanjan	1977	2	24.0
Mess Sarcheshmeh (Gas)			1977	5	130.0
Foolad-Mobarake (Steam)	Foolad-Mobarake Co.	Isfahan	1991	3	210.0
Foolad-Mobarake (Gas)			2004	1	108.0
Teraktorsazi (Gas)	Teraktorsazi Co.	Tabriz	1983	2	20.0
Chadormaloo	Chadormaloo	Yazd	2003	1	40.0
Khorasan Petrochimi		Khorasan	1986	3	24.0
			1963	3	12.6
			1984	1	9.0
Shiraz Petrochimi		Shiraz	1987	5	60.0
			1990-1991	4	328.0
			2009-2010	3	75.0
Bandare Emam Petrochimi		Bandar Emam	1979	5	70.0
Elam Gas Refinery		Ilam	1997	3	75.0
Razi Petrochimi	Razi Petroshimi	Bandar Emam	1995-1996	2	54.0
Tabriz Petrochimi	Tabriz Petroshimi	Tabriz	2005	5	585.0
			2009-2010	4	648.0
			2011	2	250.0
Fajr Petrochimi		Bandar Emam	2006-2012	7	861.0
Mobin Petrochimi	Mobin Petroshimi	Asalooyeh	2008-2009	6	954.0
Pars Jonoubi		Asalooyah	2010	4	120.0
Elam Petrochimi		Ilam	2010	2	324.0
Liquified Gas (LNG)		Booshehr	2011	2	324.0
Damavand Petrochimi		Asalooyeh		2	324.0
Total Large Industrial				82	5580.6
ToTal Country				1131	73152

Table: (12) Time Schedule for Completion of Various New Thermal and Hydro Power Plants

(MW)

No.	Status	Name of Power Plant	Type of Power Plant	Dispatching Region	2015	2016	2017	2018
1	MOE	Shirvan	Steam	Khorasan	0	480	0	0
2		Sarbandar-Mahshahr		Khozestan	324	324	0	0
3		West Mazandaran		Mazandaran	0	324	0	0
4		Ramin Development		Khozestan	0	0	325	325
5		Shazand Development		Bakhtar	0	0	325	325
6		Tabas		Yazd	0	0	325	325
7	B.O.O	South Ahvaz	C.C	Khozestan	0	162	322	0
8		Chadoormalo		Yazd	160	0	0	0
9		Pasargad Gheshm		Hormozgan	0	324	160	0
10		West Mazandaran		Mazandaran	0	324	160	0
11		Khoram Abad		Bakhtar	0	324	160	0
12		Sadough (Yazd 2)		Yazd	324	160	0	0
13		Dalaho		Kermanshah	0	324	160	0
14		Sirjan (Samangan)		Kerman	0	324	160	0
15		Kahnooj		Kerman	0	160	0	0
16		Behbahan		Khozestan	324	160	0	0
17		Jahrom		Fars	0	320	160	0
18		Renewable		Renewable	Different Regional	200	350	600
19	CHP	DG & CHP	Different Regional	200	480	480	480	
20	MOE (Special Projects)	West Eslamabad	Small (Gas)	Gharb	25	0	0	0
21		Wind Power Plants	Wind	Different Regional	30	140	90	100
22	MOE	Getvand	Hydro	Khozestan	0	0	0	640
23		Seimareh		Gharb	320	160	0	0
24		Daryan		Gharb	0	140	70	0
25		Roodbar Lorestan		Bakhtar	225	225	0	0
26		Sardast		Gharb	0	60	60	0
27		Chamshir		Khozestan	0	55	138	0
28		Azad		Gharb	0	0	0	510
29		Small Hydro Plants		Different Regional	0	4	0	35
Total Nominal Capacity of MOE Power Plants					924	1912	1333	2260
Total Private Power Plants					1208	3412	2362	1440
Total Nominal Capacity					2132	5324	3695	3700
Total Gathering Nominal Capacity of Country with 73152 Mw in the end of 2014					75284	80608	84303	88003

Table 13: Nominal Capacities of the Power Plants in 2014

(MW)

Type of Power Plant	MOE			non-MOE	Total
	In NG	Out of NG	Total		
Steam	11241	0	11241	4589	15830
Combined Cycle	4275	0	4275	14219	18494
Gas	6986	209	7195	19217	26412
Diesel	409	30	439	0	439
Hydro	10782	3	10785	0	10785
Atomic & Renewable	1140	0	1140	53	1193
Total in 2014	34833	242	35075	38078	73153
Total in 2013	35680	217	35897	34383	70280
Annual Growth %	-2	12	-2.3	10.7	4.1

Difference in total is due to rounding

Table 14 : Actual Capacity of the MOE Power Plants in 2014

(MW)

Type		Steam	C.C	Gas	Diesel	Hydro	Renewable Energy & Wind	Total
Actual Capacity	Max	14781	16342	18573	288	10772	1193	61949
	Min	14698	13940	16008	268	10772	1193	56879
	Average	15252	15105	21368	284	10785	1193	63987

Difference in total is due to rounding

Table 15: Growth of the Capacities of the MOE Power Plants in 2014

(MW)

Name of Power Plants	Unit Type	Installed Capacity (NO.*Unit Capacity)	Description
CHP & DG	Gas	126	2014
Renewable	Renewable	46	2014
Khark	Gas	25	2014
Shams-Sarakhs	Gas	50	2014
Bampour	Gas	162	9 April 2014
Siahbishe	Hydro	260	16 April 2014
Abadan	C.C	160	16 May 2014
Khoramshahr	Gas	162	22 May 2014
Khoramshahr	Gas	162	11 June 2014
Isin Hormozgan	Gas	162	11 June 2014
Isin Hormozgan	Gas	162	18 July 2014
Sarv (Chadarmalou)	Gas	162	18 July 2014
Isam Abad (gharb)	Gas	50	7 Sep. 2014
Sarv (Chadarmalou)	Gas	162	8 Sep. 2014
Siahbishe	Hydro	260	13 Sep. 2014
Isam Abad (gharb)	Gas	25	9 Oct. 2014
Genaveh	C.C	160	14 Oct. 2014
Isin (Hormozgan)	Gas	162	26 Nov. 2014
Shoubad (kahnouj)	Gas	162	21 Dec. 2014
Isin (Hormozgan)	Gas	162	17 Feb. 2015
Shoubad (kahnouj)	Gas	162	14 March 2015
Total Installed Capacity		2944	

Table 16 : Comparison of the Modified Monthly Peak Load in between 2013 - 2014

(MW)

Month		Mar-April	April-May	May-Jun	Jun-Jul	Jul-Aug	Aug-Sep	Sep-Oct	Oct-Nov	Nov-Dec	Dec-Jan	Jan-Feb	Feb-Mar	Peak in the Year	Date of Peak
Year	2013	32358	34867	42295	46344	45639	43216	38696	32642	32453	32738	32688	32355	46344	2013/July/17
	2014	34395	38479	45621	47610	48797	46750	39740	33156	32583	33994	32554	31899	48797	2014/July/26
Change %		6.3	10.4	7.9	2.7	6.9	8.2	2.7	1.6	0.4	3.8	-0.4	-1.4	5.3	

Source: Iran Grid Management Co. (IGMC)

Table 17 : Contribution of Various Types of Power Plants in Supply of the Coincide Peak Load during the Years 2008-2014

(MW)

Type	2014		2013		2012		2011		2010		2009		2008	
	Total	Percent	Total	Percent	Total	Percent	Total	Percent	Total	Percent	Total	Percent	Total	Percent
Steam	11322	24.3	12551	27.5	12755	29.5	13187	31.2	13673	35.2	13505	35.9	13734	40.1
Gas	13691	29.4	13063	28.7	13724	31.7	12590	29.8	11108	28.6	11606	30.9	9755	28.5
C.C.	12513	26.9	11573	25.4	11044	25.5	10232	24.2	10218	26.3	8356	22.2	7889	23.0
Hydro	7894	17.0	7335	16.0	5626	13.1	6170	14.6	3742	9.6	3967	10.6	2749	8.0
Atomic	1000	2.1	996	2.2	-	-	-	-	-	-	-	-	-	-
Diesel	138	0.3	92	0.2	94	0.2	66	0.2	150	0.4	146	0.4	144	0.4
Total	46558	100.0	45588	100.0	43243	100.0	42245	100.0	38891	100.0	37580	100.0	34270	100.0

Source: Iran Grid Management Co. (IGMC)

Table 18 : Coincide Max. Peak Load Synchronous with Available and Actual Capacity on One Day in the Year 2014

(MW)

Month	Date	Effective Capacity	Available Capacity	Max Demand	Generation Reserve(%)
April	19	58107	34811	34395	1.2
May	12	57713	38942	38479	1.2
Jun.	21	57256	45871	45621	0.5
Jul.	13	56642	47049	47610	-1.2
Jul.	26	56786	46586	48797	-4.7
Aug.	27	57407	46171	46750	-1.2
Sep.	23	58796	42207	39740	5.8
Oct.	28	59190	38280	33156	13.4
Dec.	8	59933	39426	32583	17.4
Jun.	10	60630	39247	33994	13.4
Feb.	15	60914	39751	32554	18.1
Mar.	9	59384	34832	31899	8.4

Source: Iran Grid Management Co. (IGMC)

Table 19 : Coincide Min. Load Synchronous with Available and Actual Capacity on One Day in the Year 2014

(MW)

Month	Date	Actual Capacity	Available Capacity	Min Demand	Generation Reserve (%)
April	2	58168	33329	20773	37.7
April	25	57777	32989	29859	9.5
June	6	56968	37504	34711	7.4
July	4	56638	39475	39774	-0.8
July	29	56780	39020	37769	3.2
Sep.	19	57770	37866	35704	5.7
Oct.	18	58810	33682	28161	16.4
Nov.	4	59080	33539	20216	39.7
Dec.	13	59945	33386	23992	28.1
Jan.	2	60739	34236	25767	24.7
Feb.	6	60765	34974	25853	26.1
Mar.	19	59074	37556	24039	36.0

Source: Iran Grid Management Co. (IGMC)

Table 20: Annual Growth Trend of the Peak Generation Load; Modified Consumption Demand and Max. Consumption Load during the Years 2004-2014											(MW)
Description	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004
Consumption Load	1018	2342	1092	2926	1869	3545	-517	1121	2423	2827	1271
Corrected Consumption Demand	2453	3105	1092	2128	2361	227	2668	714	1967	3035	2160
Maximum Generation Load	1041	2416	998	3354	1311	3310	-311	1584	2303	3154	1384

Table 21 : Gross Electricity Generation in 2014					(GWh)
Type	2014			2013	Annual Growth (%)
	In NG	Out of NG	Total	Total	
Steam	85623	0	85623	89664	-4.5
Gas	72684	656	73340	66039	11.1
C.C.	96823	0	96823	87135	11.1
Hydro	13860	2	13862	14470	-4.2
Diesel	58	25	83	71	16.9
Atomic & Renewable	4748	0	4748	4813	-1.4
Total	273796	683	274479	262192	4.7

Table 22 : Gross Generation and Internal Consumption in the MOE Power Plants in 2014				(GWh)
Type	Gross Generation	Internal Consumption		
		Quantity	Percent	
Steam	85623	5926	6.9	
Combined Cycle	96823	1746	1.8	
Gas	73340	660	0.9	
Diesel	83	7	8.4	
Hydro	13862	84	0.6	
Atomic & Renewabal Energy	4748	0	0	
Total	274479	8423	3.1	

Table 23 : The Growth Trend of the Electricity Generation Per Capita during the Years 2004-2014											(GWh)
	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004
Annual Energy Generation (GWh)	274480	262192	254265	240063	232994	221318	214530	203983	192535	178072	162871
Population (10 ⁶ Person)	78.3	77.4	76.5	75.3	73.6	72.6	71.7	70.9	70.5	67.9	67.5
Annual Generation per Capita (KWh)	3505	3387	3325	3188	3166	3048	2992	2877	2731	2623	2413

Annual Generation Growth in 2014: 4.7 %

Average Annual Generation Growth During 2004-2014:5.4%

Table 24 : Balance of Electricity Generation and Consumption in 2014			(GWh)
Description		Total	
Generation	MOE		123150
	Non-MOE		151329
	Total		274479
Import			3772
Total Generation & Import			278251
Consumption & Sale	Internal Consumption of MOE Plants		8033
	Internal Consumption of L.I. Plants		390
	Internal Consumption of Substations		251
	Large Industry Consumption		5655
	Transmission & Sub-Transmission Losses		7916
	Distribution Losses		26694
	Export		9659
Sale			219653
Total Consumption			278251

Difference in total is due to rounding.

Table 25 : Losses in the Electric National Grid Compared with Net Generation in 2014			(GWh)
Description	Quantity	%	
Net Generation	262035	-	
Electricity Delivered to Distribution Network	205102	-	
Transmission & Sub-Transmission Loss	7916	3.02	
Distribution Loss	26694	12.93	
Total Loss	34610	13.13	

Table 26 : Consumption of the Various Fuel Types in Power Plants in 2014 and its Comparison with 2013								
Type	Description	MOE Power Plants				Total		Change (%)
		Steam	C.C.	Gas	Diesel	2014	2013	
Diesel 10 ⁶ Liter Equivalent	Consumption	106	3963	4778	24	8871	12186	-27.2
	Percent Out of Total	1.2	44.7	53.9	0.3			
	Average Daily	0.3	10.9	13.1	0.1	24.3	33.4	
	Thermal Value (10 ⁹ Kcal) Consumption	912	34082	41091	206	76291	104791	
Fuel Oil 10 ⁶ Liter Equivalent	Consumption	10273	0	0	0	10273	15263	-32.7
	Percent Out of Total	100.0	0.0	0.0	0.0			
	Average Daily	28.1	0.0	0.0	0.0	28.1	41.8	
	Thermal Value (10 ⁹ Kcal)	94512	0	0	0	94512	99507	
Natural Gas 10 ⁶ M ³	Consumption	12917	17778	19477	0	50172	36648	36.9
	Percent Out of Total	25.7	35.4	38.8	0.0			
	Average Daily	35.4	48.7	53.4	0.0	137.5	100.4	
	Thermal Value (10 ⁹ Kcal)	111590	153584	168262	0	433436	316603	

Table 27 : Length of Transmission and Sub-Transmission Lines at the end of 2013 and 2014						km-Circuit
Description	400kv	230kv	132kv	63,66kv	Fiber-Optic	
Total Line Length in 2013	19915	30300	22665	46240	17852	
Establishment Completion of New Line in 2014	80	432	253	865	269	
Total Line Length in 2014	19995	30732	22919	47105	18121	
Annual Growth(%)	0.4	1.4	1.1	1.9	1.5	

Table 28 : Statistical Comparison of the Number and Capacity of Transmission Substations of 400 kV at the end of 2013 & 2014

Conversion ratio of Voltage	No. Stations		No. Transformers		Capacity (MVA)	
	2014	2013	2014	2013	2014	2013
400/230/...	50	48	116	111	37435	35905
400/132/...	28	27	52	51	11000	10800
400/66,400/63	18	16	38	33	7350	6350
400/11,400/20,400/33	5	4	9	8	1357.5	1248
Switchyards	12	11	0	0	0	0
Total	109	104	215	203	57142.5	54303
Annual Growth (%)	4.8		5.9		5.2	

Table 29 : Statistical Comparison of the Number and Capacity of Transmission Substations of 230 kV at the end of 2013 & 2014

Conversion ratio of Voltage	No. Stations		No. Transformers		Capacity (MVA)	
	2014	2013	2014	2013	2014	2013
230/132-20	56	51	123	113	15870	14550
230/63-66	191	188	398	390	51678	50354
230/33/11	28	27	62	61	3927	3877
230/20	25	19	47	39	3449	2884
230/11-6.6	2	2	3	3	100	100
Switch Board	6	6	0	0	0	0
Total	268	256	633	606	75024	71765
Annual Growth (%)	4.7		4.5		4.5	

Table 30 : Statistical Comparison of the Number and Capacity of Sub-Transmission Substations at the end of 2013 & 2014

Description	No. Stations		No. Transformers		Capacity (MVA)		
	2014	2013	2014	2013	2014	2013	
132kV	132/63	13	12	27	23	1465	1325
	132/33	126	121	260	248	8337	7881
	132/20	333	320	580	557	16555	15800
	132/11	45	44	78	76	2003	1923
	With Secondary Voltage of less 10 kv	18	18	36	36	908	908
	Total	478	464	981	940	29269	27838
	Annual Growth (%)	3.0		4.4		5.2	
63,66kV	63/33 & 66/33	2	2	4	4	98	98
	63/20 & 66/20	1192	1163	2237	2187	61077	59255
	63/11-20 & 66/11 - 20	2	2	3	3	45	45
	63/10 & 66/10	25	25	53	54	1499	1529
	With Secondary Voltage of less 10 kv	63	63	125	125	2366	2344
	Total	1246	1218	2422.0	2373	65062	63270
	Annual Growth (%)	3.8		2.1		2.8	
Total	1724	1682	3403	3313	94330	91107	
Annual Growth (%)	2.5		2.7		3.5		

Table 31: Length of the Medium-Voltage Lines at the end of the Years 2004 - 2014

(km)

Year	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	Growth in 2014 (%)	Average Annual Growth (%)
Overhead Lines	379273	371667	363651	356495	348039	335750	326267	315148	305478	293724	279800	2.0	3.1
Under Ground Lines	18725	17898	17277	16524	15662	14832	13876	12830	12154	11474	10823	4.6	5.6
Total	397998	389565	380928	373019	363701	350582	340143	327998	317632	305198	290623	2.2	3.2

Table 32: Length of the Medium-Voltage Lines at the end of the Years 2004 - 2014

(km)

Year	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	Growth in 2012 (%)	Average Annual Growth (%)
Overhead Lines	291366	282554	271052	264900	258635	250400	241592	232825	226750	220145	212693	3.1	3.2
Under Ground Lines	45126	43314	42762	40791	39190	37309	35115	33001	31411	29451	27103	4.2	5.2
Total	336492	325868	313814	305691	297825	287709	276707	265826	258161	249596	239796	3.3	3.4

Table 33 : Statistical Comparison of Distribution Substations at the end of the Years 2004 - 2014

Year	Overhead Substation		Ground Substation		Total Substations		Average Capacity (kVA)
	No. of Units	Capacity (MVA)	No. of Units	Capacity (MVA)	No. of Units	Capacity (MVA)	
2004	291635	42420	21824	15948	313459	58368	186.21
2005	316940	46268	22897	16686	339837	62954	185.25
2006	338749	49272	25400	18939	364149	68211	187.32
2007	362283	52355	25728	18899	388011	71309	183.78
2008	390762	56639	27127	20378	417889	77017	184.30
2009	420101	60508	28433	21140	448534	81684	182.11
2010	449481	64824	29617	21993	479098	86817	181.21
2011	482333	69050	30637	22824	512970	91874	179.10
2012	508108	72041	31797	23488	539905	95529	176.94
2013	537500	76459	32989	24419	570489	100878	176.83
2014	563859	80074	34181	25282	598040	105356	176.17
Growth in 2014 (%)	4.9	4.7	3.6	3.5	4.8	4.4	
Average Annual Growth 2004-2014 (%)	6.8	6.6	4.6	4.7	6.7	6.1	

Table 34: Some of the Distribution Electric Information at the end of the Years 2004 - 2014

Year	No. of Customers (10 ³ Customers)	Max. Demand (MW)	Electricity Delivered to Distribution Network (GWh)	Consumption (GWh)	Distribution Loss (%)	Non/Supply Energy of Distribution (MWh)	Non-Distributed Distribution Energy Ratio (Units per Thousand)	Power Cut Customer (Min/Day)
2004	18806	29267	132493	124466	16.4	140807	1.1	1.5
2005	19652	32302	142832	132897	18.1	142479	1.1	1.4
2006	20559	34594	152286	144598	18.0	212785	1.5	1.98
2007	21547	34983	160417	152330	17.9	286000	1.9	2.45
2008	22739	37651	166596	161445	17.5	298000	1.8	14.0
2009	24191	37878	169280	168438	16.0	337000	2.0	2.86
2010	25693	40239	179329	184182	14.8	348000	1.9	2.76
2011	27165	42367	177798	183905	14.7	354000	1.9	2.85
2012	28752	43459	187154	194148	15.03	293000	1.5	2.6
2013	30287	46474	195050	203215	14.83	293000	1.4	2.5
2014	31672	48937	205102	219653	12.93	383000	2.1	2.4
Average Annual Growth 2004-2014 (%)	3.5	5.3	4.5	3.8	-2.3	10.5	6.5	4.6

Table 35 : Trend of Changes of the Number of Customers in Various Consuming Sectors at the end of the Years 2004 - 2014										(1000 customers)	
Consumption Sectors	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004
Residential	25739	24670	23467	22224	21045	19844	18715	17769	16989	16400	15719
Public	1382	1283	1181	1083	1013	952	856	789	749	675	634
Agricultural	353	330	307	285	258	202	174	151	138	127	116
Industrial	206	194	185	174	159	161	165	166	152	131	121
Others Consumption	3992	3810	3611	3399	3223	3031	2828	2668	2531	2320	2216
Street Lighting*	142*	127*	118*	112*	81*	81*	70*	61*	47*	37*	30*
Total	31672	30287	28751	27165	25698	24190	22738	21544	20559	19653	18806

* No Included in Total

Table 36 : Trend of Energy Consumption in Various Consuming Sectors at the end of the Years 2004 - 2014										(GWH)	
Consumption Sectors	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004
Residential	71163	64379	61351	56774	60908	55630	52896	50777	48085	44108	40564
Public	19767	17833	17810	16751	21308	21827	20428	19648	18329	16350	15021
Agricultural	35188	33126	31647	30020	24189	21405	21179	17670	17666	16469	15489
Industrial	74294	70733	67107	63944	61486	54887	52110	49772	46590	43123	40343
Others Consumption	15404	13378	12599	12664	12725	11015	10742	9953	9320	8542	7863
Street Lighting*	3837	3765	3635	3752	3564	3674	4091	4510	4608	4305	5188
Total	219653	203215	194148	183905	184180	168438	161446	152330	144598	132898	124468

Table 37 : Average Rate of Electricity Sales to Various Consuming Sectors based on Current Price During Years 2004 - 2014						(Rial / kWh)
Year	Residential	Public	Agricultural	Industrial	Others	Total Average
2004	107.1	175.9	16.0	185.0	515.3	151.1
2005	102.7	176.8	21.6	201.4	449.6	152.0
2006	102.9	181.7	21.3	200.4	541.2	152.8
2007	124.7	159.6	21.0	205.9	508.0	165.0
2008	119.4	228	22.0	204.7	407.1	174.5
2009	129.0	152.0	21.0	206.0	501.0	165.0
2010	142.3	226.5	46.8	263.6	599.1	208.7
2011	334.8	501.6	125.7	441.9	1275.3	409.5
2012	337.5	491.0	131.1	427.5	1339.5	407.0
2013	346.7	516.3	133.4	442.6	1342.2	418.5
2014	439.4	617.6	177.9	542.6	1664	525.6
Average Annual Growth 2004-2014(%)	15.2	13.4	27.2	11.4	12.4	13.3

Table 38 : Average Rate of Electricity Sales to Various Consuming Sectors based on Constant Price of 2011 at the end of the Years 2004 - 2014

(Rial / kWh)

Year	Residential	Public	Agricultural	Industrial	Others	Average	Inflation Indices
2004	296.8	487.6	44.4	512.9	1428.3	418.7	36.1
2005	258.0	444.0	54.1	505.7	1128.9	381.7	39.8
2006	231.0	407.8	47.7	449.8	1214.7	342.9	44.6
2007	236.4	302.6	39.8	390.3	963.1	312.8	52.7
2008	180.6	344.8	33.3	309.6	615.7	263.9	66.1
2009	176.2	207.6	28.7	281.3	684.1	225.3	73.2
2010	172.9	275.1	56.9	320.2	727.7	253.5	82.3
2011	334.8	501.6	125.7	441.9	1275.3	409.5	100.0
2012	258.6	376.3	100.5	327.6	1026.4	311.9	130.5
2013	197.1	293.5	75.8	251.6	763	237.9	175.9
2014	218.83	307.57	88.58	270.21	828.67	261.77	200.8
Average Annual Growth 2004-2014(%)	-3.0	-4.5	7.2	-6.2	-5.3	-4.6	

Table 39 : Education profile of the Power industry personnel at the end of the years 2004 - 2014

Year		Degree				Total
		Below Diploma	High School Bac	University	BA/BS & Higher	
2004	Person	19188	11561	8911	10883	50543
	%	38.0	22.9	17.6	21.5	
2005	Person	16850	11001	9026	11745	48622
	%	34.7	22.6	18.6	24.2	
2006	Person	15718	10513	9433	11846	47510
	%	33.1	22.1	19.9	24.9	
2007	Person	14445	10052	9786	12252	46535
	%	31.0	21.6	21.0	26.3	
2008	Person	12560	8448	10732	13159	44899
	%	28.0	18.8	23.9	29.3	
2009	Person	11048	7831	10881	14131	43891
	%	25.2	17.8	24.8	32.2	
2010	Person	9403	7370	10081	14857	41771
	%	22.5	17.7	24.2	35.6	
2011	Person	8865	10277	13437	16870	49449
	%	17.9	20.8	27.2	34.1	
2012	Person	6863	9453	12285	18523	47124
	%	15	20	26	39	
2013	Person	5584	9341	11516	20606	47047
	%	12	20	24	44	
2014	Person	4568	8930	10551	22151	46200
	%	10	19	23	48	

Table 40 : The Quantitative changes of the work force in the Main Body of the Electric Power Industry at the end of the years 2004-2014

Person

Instiution	Year										
	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004
Tavanir Co.	823	882	905	921	580	610	663	621	644	618	741
REC.S	17675	17985	17147	17794	9895	10555	11334	11989	12569	12721	13287
Generation Co.s & Dams	9846	10249	10110	10425	10369	10605	10895	10611	10582	10677	10770
Distribution Co.	16441	16499	17564	18893	18922	19962	20317	21752	21883	22394	23717
Others	1415	1432	1398	1416	1948	1908	1744	1609	1832	2212	2028
Total	46200	47047	47124	49449	41714	43640	44953	46582	47510	48622	50543

Other Companies include Iran Power Development Co. SUNA, SABA & Iran Power Plant Rapairs Co.

Table 41 : Number of the Power Industry Personnel in Respect to Various Factors at the end of 2014								Person
	Categories	Tavanir	RECs	Generation Co.	Distribution Co.	Other Companies	Total	Hydro Power
Year of Service	0-5	97	7396	2132	4235	408	14268	376
	6-10	136	3259	1873	1855	394	7517	450
	11-15	103	2240	1376	2614	217	6550	308
	16-20	70	1183	1421	2666	171	5511	140
	21-25	187	1846	950	2983	99	6065	110
	26-30	133	1250	515	1736	94	3728	73
	30&More	97	501	88	352	32	1070	34
	Total	823	17675	8355	16441	1415	44709	1491
Rank	1-10	823	17675	1716	3861	1415	44709	299
	11-15			4654	8610			476
	16 -20			1682	3559			164
	Others			303	411			552
	Total			823	17675			8355

Table 42 : Number of Employees of the main body of electricity industry to the seperation in 2014								Person
TAVANIR		Regional Power Electric Co.		Generation Management and Hydroelectric Power Olant		Distribution Co.		
Managing Director	202	Managing Director	4299	Managing Director	610	Managing Director	1189	
Deputy for Distribution Coordination	60	Human Resources	673	Manager Power Plant	78	Power System Operation and Dispatching	6222	
Deputy for Power Planning & Grid Development	64	Financial Suport	1838	Planning and Engineering	645	Planning and Engineering	2086	
Deputy of Coordination and Supervising on Operating the Power System	70	Planning and Research	613	Suport	1267	Sale, Support and Service Network	2728	
Economic Affairs Deputy for Financial	318	Design and Development	825	Operation	4011	Deputy of Financial andLogistics	3055	
Human Resources and Researches Affairs	109	Distribution Transmission and	9427	Chemical	748	Human Resources	1161	
				Transmission	316			
				Maintenance	1831			
				Safety Management, Active protection System, Fire Department, Security Office	340			
Total	823	Total	17675	Total	9846	Total	16441	

Table 43 : A Glance at the Statistics of the Global Electricity (2012)										
Description	Installed Capacity (1000 MW)					Net Electricity Generation	Electricity Consumption	Population (10 ⁶ Person)	Net Per Capita Electricity Generation (kWh)	Net Per Capita Electricity Consumption (kWh)
	Thermal Plants	Nuclear Plants	Hydro Plants	Renewable Plants	Total					
	(10 ⁹ kWh)									
Former U.S.S.R	254	37	71	2.2	364	1480	1305	289	5121.1	4515.6
Europe	553	125	173	222	1073	3583	3315	611	5864.2	5425.5
N. America	883	118	166	93	1260	4944	4592	460	10747.8	9982.6
Asia & Oceania	1600	88	382	123	2193	1480	8108	3840	385.4	2111.5
S&C. America	114	2.8	147	16	280	1177	999	478	2462.3	2090.0
Africa	112	1.9	26	2.1	142	680	601	1053	645.8	570.8
Middel East	218	0.9	14	1	234	907	793	217	4179.7	3654.4
World	3735	373.6	979	459	5547	21530	19713	6948	3098.7	2837.2
Iran	58	0.8	10	0.3	69	246	195	77	3215.7	2549
Iran's World Share	1.6	0.2	1.0	0.1	1.2	1.1	1.0	1.1		

Source: www.eia.doe.gov

Table 44-1: Summary of the Electricity Situation in the Major Developing Countries at the end of 2011

Country	Population (10 ⁶ Person)	Installed Capacity (10 ³ MW)	Net Electricity Generation (10 ⁹ kWh)	Consumption (10 ⁹ kWh)	Export (10 ⁹ kWh)	Import (10 ⁹ kWh)	Per Capita Capacity (W)	Per Capita Generation (kWh)	Per Capita Consumption (kWh)	Operation Indices (%)
China	1311	1101	4491	4208	1.2	6.6	840	3426	3211	46.6
India	1189	238	975	758	0.13	5.6	200	820	637	46.8
Brazil	198	119	530	479	2.5	38.4	603	2684	2423	50.8
South Korea	49	85	490	472	0	0.0	1742	10043	9686	65.8
Mexico	114	62	279	232	1.2	0.65	541	2449	2043	51.7
Iran	75	65	240	184	8.7	3.7	866	3187	2444	42.0
Turkey	79	54	219	187	3.6	4.6	683	2771	2371	46.3
Saudi Arabia	26	51	235	212	0	0.0	1958	9008	8107	52.5
Thailand	67	49	141	139	1.6	10.7	727	2111	2084	33.1
Indonesia	246	41	173	156	0.0	0	167	702	634	48.1
Egypt	82	28	148	129	1.6	0.01	339	1799	1576	60.7
Pakistan	187	23	90	74	0.0	0.0	121	480	394	45.2

Source: www.eia.doe.gov

Table 44-2: Summary of the Electricity Situation in the Major Developing Countries at the end of 2012

Country	Population (10 ⁶ Person)	Installed Capacity (10 ³ MW)	Net Electricity Generation (10 ⁹ kWh)	Consumption (10 ⁹ kWh)	Export (10 ⁹ kWh)	Import (10 ⁹ kWh)	Per Capita Capacity (W)	Per Capita Generation (kWh)	Per Capita Consumption (kWh)	Operation Indices (%)	Annual Growth of Per Capita Net Generation (%)
China	1311	1174	4768	4468	18	6.9	896	3638	3409	46.4	6.18
India	1189	255	1052	865	0	4.8	214	885	727	47.1	7.91
Brazil	198	122	538	484	0.5	41	617	2723	2449	50.3	1.43
South Korea	49	94	500	482	0	0	1928	10256	9887	60.7	1.12
Mexico	114	62	279	234	1.3	0.6	545	2454	2058	51.4	0.18
Iran	77	69	246	195	11	3.9	902	3216	2549	40.7	0.89
Turkey	79	57	228	197	1.5	5.8	722	2890	2497	45.7	4.30
Saudi Arabia	26	54	255	232	0	0	2069	9770	8889	53.9	8.46
Thailand	67	54	156	156	1.5	11	810	2339	2339	33.0	10.80
Indonesia	246	48	185	167	0	0	195	752	679	44.0	7.12
Egypt	82	29	155	136	1.5	0	353	1888	1657	61.0	4.94
Pakistan	187	23	93	77	0	0.4	123	497	441	46.2	3.45

Source: www.eia.doe.gov

Table 45: Time Scheduling of Entering the final Thermal & Hydro Elec. Power Plants in being Constructed by Gov. & non Gov. Sec.					(MW)
Type		2015	2016	2017	2018
Steam	Gov.	324	1128	975	975
C.C (Steam)	Gov.	0	0	0	0
	Non Gov.	808	2582	1282	0
Gas	Gov.	25	0	0	0
Hydro	Gov.	545	644	268	1185
Wind	Gov.	30	140	90	100
Renewable Energy	Non Gov.	200	350	600	960
CHP	Non Gov.	200	480	480	480
Total Gov.		924	1912	1333	2260
Total non Gov.		1208	3412	2362	1440
Grand Total		2132	5324	3695	3700
Cumulative Sum. Gov. & non Gov. Increasing Capacity		2132	7456	11151	14851
Total Nominal Capacity		75284	80608	84303	88003

At the End of the Year of 2014 County Nominal Capacity Was 73152 MW.

Table 46: The Rate of Engineering services and equipment SUNIR CO.					(10 ⁹ Rials)
	Country	Value of Exports (\$)	Sale in the End of 2013	Sale in the 2014	Sale in the End of 2014
1	Sri Lanka	1290	1277	(259)	1018
2	Iraq	1337	1256	(9)	1247
3	Pakistan	354	238	(6)	223
4	Pakistan	232	204	(9)	195
5	Armenia	3256	113	(2)	111
6	Iraq	1919	532	205	736
7	Pakistan	1584	390	375	765
8	Afghanistan	390	181	105	285
9	Afghanistan	24	1	22	23
10	Iraq	154	71	34	104
11	Turkmenistan	83	68	16	83
12	Iraq	390	4	25	29
13	Pakistan	367	4	3	6
14	Syria	1908	-	78	78
15	Ethiopia	156	-	3	3
16	Iraq	200	-	2	2

Table 47: Statistical Comparison of the Electricity Indices of 40 Top Countries in the Year 2012

No.	Country	Population (10 ⁶ person)	Installed Capacity (GW)	Net Electricity Generation (10 ⁹ Kwh)	Net Electricity Consumption (10 ⁹ Kwh)	Electricity Exports (10 ⁹ Kwh)	Electricity Imports (10 ⁹ Kwh)	Capacity per Capita (Watt)	Net Generation per Capita (Kwh)	Consumption per Capita (Kwh)	Operation Index (%)
1	United States	312	1063	4048	3832	12	59	3411	12991	12298	43.47
2	China	1311	1174	4768	4468	18	6.9	896	3638	3409	46.36
3	Japan	128	293	966	921	0	0	2298	7576	7224	37.64
4	Russia	143	234	1012	889	19	2.7	1642	7102	6239	49.37
5	India	1189	255	1052	865	0	4.8	214	885	727	47.09
6	Germany	82	177	585	540	67	46	2172	7178	6626	37.73
7	Canada	34	135	616	525	58	11	3971	18118	15441	52.09
8	France	65	129	533	451	57	12	1975	8162	6907	47.17
9	Brazil	198	122	538	484	0.5	41	617	2723	2449	50.34
10	Italy	61	124	281	303	2.3	45	2033	4607	4967	25.87
11	Spain	47	105	280	243	19	7.8	2244	5983	5192	30.44
12	United Kingdom	63	94	336	319	1.7	14	1499	5359	5088	40.80
13	Korea,South	49	94	500	482	0	0	1928	10256	9887	60.72
14	Iran	77	69	246	195	11	3.9	902	3216	2549	40.7
15	Mexico	114	62	279	234	1.3	0.6	545	2454	2058	51.37
16	Australia	22	63	235	223	0	0	2895	10800	10248	42.58
17	Ukraine	45	55	187	160	6	0	1220	4146	3548	38.81
18	Turkey	79	57	228	197	1.5	5.8	722	2890	2497	45.66
19	Saudi Arabia	26	54	255	232	0	0	2069	9770	8889	53.91
20	Thailand	67	54	156	156	1.5	11	810	2339	2339	32.98
21	South Africa	49	45	239	212	15	10	918	4878	4327	60.63
22	Taiwan	23	48	234	234	0	0	2069	10086	10086	55.65
23	Sweden	9	38	161	131	31	12	4176	17692	14396	48.37
24	Indonesia	246	48	185	167	0	0	195	752	679	44.00
25	Poland	38	35	153	139	13	9.8	911	3984	3620	49.90
26	Argentina	42	35	128	117	0.5	8.1	837	3062	2799	41.75
27	Norway	5	32	145	116	22	4.2	6809	30851	24681	51.73
28	Egypt	82	29	155	136	1.5	0	353	1888	1657	61.01
29	Netherlands	17	30	95	107	15	32	1796	5689	6407	36.15
30	Malaysia	29	29	127	119	0.7	0.1	1010	4425	4146	49.99
31	Venezuela	28	26	123	98	0	0.5	942	4457	3551	54.00
32	U.Arab Emirates	5	27	101	93	0	0	5294	19804	18235	42.70
33	Pakistan	187	23	93	77	0	0.4	123	497	411	46.16
34	Austria	8	23	65	64	20	23	2805	7927	7805	32.26
35	Romania	22	22	56	46	3.7	9	1005	2557	2100	29.06
36	Portugal	11	20	43	47	2.9	11	1852	3981	4352	24.54
37	Kazakhstan	17	18	96	80	2.9	4.3	1040	5549	4624	60.88
38	Belgium	10	21	76	82	6.9	17	2019	7308	7885	41.31
39	Czech Republic	10	20	82	61	29	12	1961	8039	5980	46.80
40	Switzerland	8	20	65	58	34	32	2548	8280	7389	37.10

Source: www.eia.doe.gov

According to Annual Report 2013-2014

Iran	78	73	266	220	9.6	3.7	935.9	3410.3	2820.5	41.6
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Table 48: Ranking of 40 Countries in Respect to Various Indices in 2012

Grade

No.	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
1	United States	3	2	2	2	15	1	5	5	5	23
2	China	1	1	1	1	11	21	31	29	29	19
3	Japan	8	3	5	3	31	32	9	14	13	31
4	Russia	7	5	4	4	9	27	21	17	17	14
5	India	2	4	3	5	32	23	38	38	38	17
6	Germany	11	6	7	6	1	2	11	16	15	30
7	Canada	24	7	6	7	2	13	4	3	3	8
8	France	15	8	9	10	3	10	16	11	14	16
9	Brazil	5	10	8	8	29	4	35	33	33	11
10	Italy	17	9	12	12	22	3	14	23	21	39
11	Spain	20	11	13	13	10	20	10	18	19	37
12	United Kingdom	16	12	11	11	23	9	22	21	20	28
13	Korea,South	19	13	10	9	33	33	18	7	8	3
14	Iran	13	14	16	20	16	26	25	30	31	34
15	Mexico	9	16	14	14	27	28	36	35	36	10
16	Australia	30	15	18	17	34	34	6	6	6	25
17	Ukraine	21	18	21	22	18	35	23	26	28	29
18	Turkey	12	17	20	19	24	22	34	32	32	21
19	Saudi Arabia	27	19	15	16	35	36	12	9	9	7
20	Thailand	14	20	24	23	25	14	33	36	34	35
21	South Africa	18	23	17	18	12	16	29	22	24	4
22	Taiwan	28	21	19	15	36	37	13	8	7	5
23	Sweden	36	24	23	26	5	11	3	4	4	15
24	Indonesia	4	22	22	21	37	38	39	39	39	22
25	Poland	23	25	26	24	14	17	30	27	26	13
26	Argentina	22	26	28	28	30	19	32	31	30	26
27	Norway	40	27	27	29	7	25	1	1	1	9
28	Egypt	10	29	25	25	26	39	37	37	37	1
29	Netherlands	32	28	33	30	13	5	20	19	16	33
30	Malaysia	25	30	29	27	28	31	26	25	25	12
31	Venezuela	26	32	30	31	38	29	28	24	27	6
32	U.Arab Emirates	39	31	31	32	39	40	2	2	2	24
33	Pakistan	6	33	34	35	40	30	40	40	40	20
34	Austria	37	34	37	36	8	7	7	13	11	36
35	Romania	29	35	39	40	19	18	27	34	35	38
36	Portugal	33	37	40	39	20	15	19	28	23	40
37	Kazakhstan	31	40	32	34	21	24	24	20	22	2
38	Belgium	34	36	36	33	17	8	15	15	10	27
39	Czech Republic	35	38	35	37	6	12	17	12	18	18
40	Switzerland	38	39	38	38	4	6	8	10	12	32

Source: www.eia.doe.gov

Definitions

Generation

Steam Power Plant:

The power plant in which the thermal energy in liquid, solid and gas fuels to generate steam and its consumption in steam turbines to generate electricity is used.

Gas Power Plant:

The power plant in which the thermal energy in liquid and gas fuels to generate hot gas and its consumption in gas turbines to generate electricity is used.

Combined Cycle Power Plant:

In a combined cycle power plant, the heat of the gas turbine's exhaust is used to generate steam by passing it through a heat recovery steam generator.

Diesel Power Plant:

A diesel power plant is the combination of a diesel engine with an electrical generator (often an alternator) to generate electrical energy.

Hydro-Electric Power Plant:

It is the term referring to electricity generated by hydropower; the production of electrical power through the use of the gravitational force of falling or flowing water.

Transmission and sub-transmission Network:

A network is included substations, overhead lines, cables and other electrical equipment to transit energy from power plants to end users.

Substation:

A substation is included a series of electrical equipment e.g. transformers, circuit breakers, disconnectors, instrument devices, in/out-coming feeders, reactor and capacitor and various Bays for transmission and distribution of electricity.

GIS Substation: A gas insulated substation is an electrical substation in which the major structures are contained in a sealed environment with sulfur hexafluoride gas as the insulating medium.

Voltage: Voltage is a difference between two points of a circuit

Transformer: A transformer is a static electrical device that transfers energy by inductive coupling between its winding circuits.

Distribution

Distribution Network: A series of medium and low voltage overhead lines, underground cables and substations to distribute electricity energy in an area.

Electric Power Industry in Iran 2014-2015

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Since its establishment, Management of Information Technology and statistics has been in charge of collecting, processing and issuing the data related to the activities of Electricity Industry in the country. For this purpose, it has attempted to equip itself so to go along with new quantity and quality developments in this industry, and meet all information requirements. Periodicals issued annually by this group include:

- Detailed statistics about Iran Electric Power Industry (for strategic management)
- Statistics of rural electrification
- Detailed statistics of power generation in Iran
- Detailed statistics of power transmission in Iran
- Detailed statistics of power distribution in Iran
- Detailed statistics about Iran Electric Power Industry (for management)
- 10 Years trend of Iran Electric Power Industry (by REC.s, Distribution Cos and Provinces)
- Statistical report on Iran Electric Power Industry (both in persian and in english)
- Iran Electric Power Industry (both in persian and in english)
- Weekly buletin
- Electronic version of all above-mentioned on DVD
- Iran Electric Power Industry monthly bulletin & projects through Tavanir website as "Iran Electricity Statistics News"
- Iran Electric Power Industry statistics on Tavanir website

The report of Iran's electricity industry is containing the latest information from current situation and its development in the fourth economic and social development planning and comparing it with the electricity of other countries in the world.

