

Independent Power Producers

February 2016

Power Chain

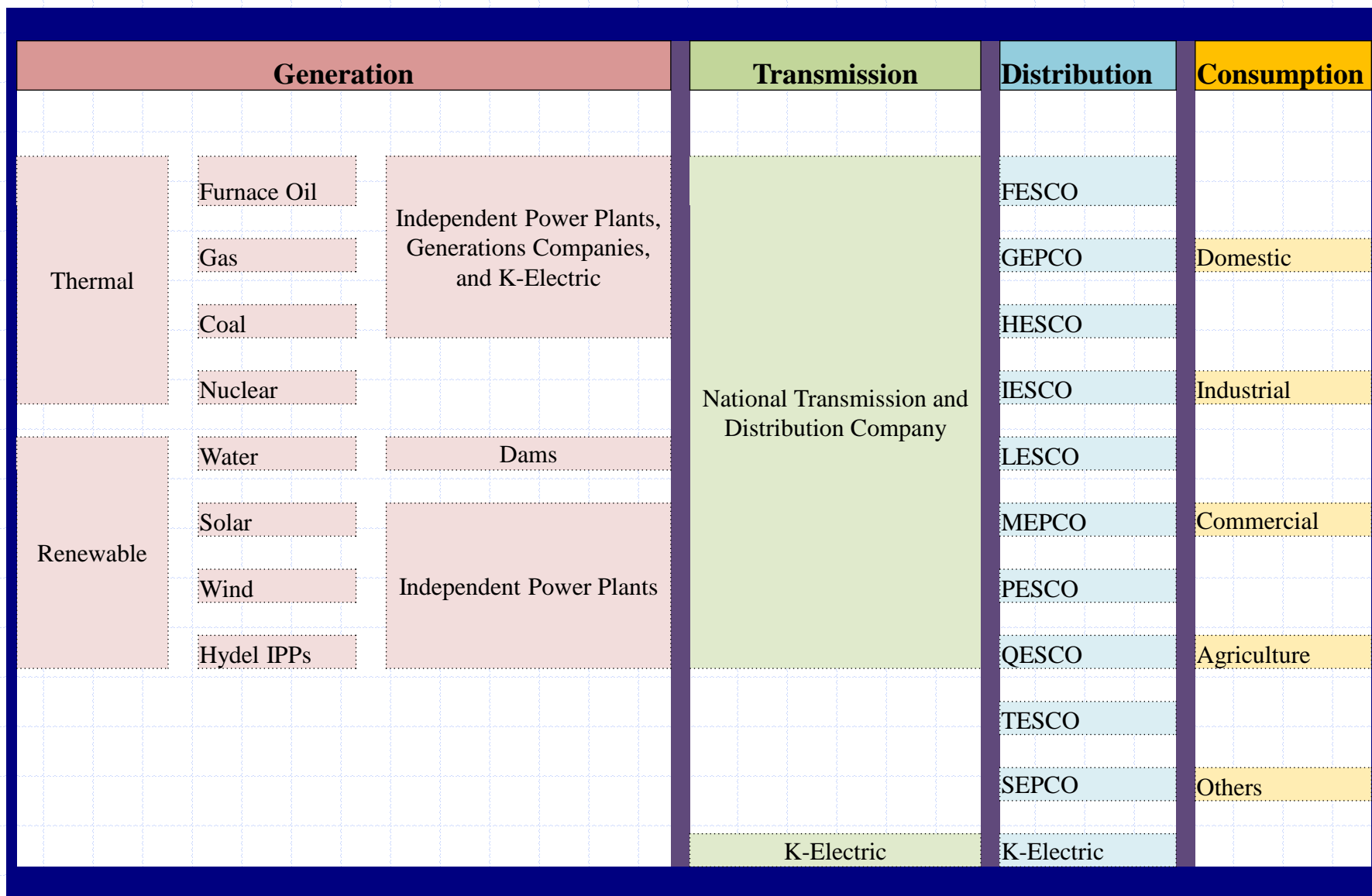
Generation

Independent
Power Producers

Circular Debt

Outlook

Power Chain



Installed vs Actual

- ◆ Thermal – the largest source of electricity generation
- ◆ Addition of Wind and Bagasse based IPPs
- ◆ Largely stagnant capacity utilization

Capacity Source		Dependable Generation Capacity (MW)					
		Jun-15	Mix		Jun-14	Mix	
			%	%		%	%
Thermal	IPPs	7,939	34%	65%	7,939	37%	64%
	GENCOs	4,669	20%		3,160	15%	
	K-Electric	2,247	10%		2,247	11%	
	Others (CPPs/SPPs)	285	1%		285	1%	
Hydel	WAPDA	6,902	30%	31%	6,755	32%	33%
	IPPs	213	1%		213	1%	
Nuclear	Two Nuclear plants	615	3%	3%	615	3%	3%
Wind	IPPs	205	1%	1%	106	0%	0%
Solar	IPPs	100			-		
Bagasse	IPPs	76	0%	0%	26	0%	0%
Total		23,251	100%	100%	21,346	100%	100%

	FY15	FY14	FY13	FY12	FY11	FY10
Generation (GWh)	103,966	103,857	102,989	98,664	100,582	99,766
Growth (%)	0.1%	0.8%	4.4%	-1.9%	0.8%	3.2%

Demand and Supply during Peak Hours

- ◆ Supply deficient country
- ◆ As per NEPRA, Pakistan would be electricity surplus by end of 2020

	Actual		
	Production (MW)	Demand (MW)	Surplus / (Deficit) (MW)
FY10	15,144	21,029	(5,885)
FY11	15,430	18,753	(3,323)
FY12	14,483	21,536	(7,053)
FY13	16,846	21,605	(4,759)
FY14	18,121	23,505	(5,384)
	Projected		
	Production (MW)	Demand (MW)	Surplus / (Deficit) (MW)
FY15	20,324	26,317	(5,993)
FY16	20,888	26,940	(6,052)

Generation Mix (Fuel) and Cost

Source	FY15			FY14			FY13
	Generation (%)	Energy Cost (%)	Cost/Unit (PKR/KWh)	Generation (%)	Energy Cost (%)	Cost/Unit (PKR/KWh)	Cost/Unit (PKR/KWh)
RFO	32.0%	66.4%	13.0	38.3%	76.9%	15.6	15.8
Hydel	30.9%	0.5%	0.1	31.0%	0.3%	0.1	0.1
Gas	27.4%	21.9%	5.0	23.0%	15.8%	5.4	5.2
Nuclear	4.7%	0.9%	1.2	4.2%	0.7%	1.3	1.2
HSD	2.8%	7.8%	17.7	1.6%	4.5%	22.3	21.1
Mixed	1.0%	1.5%	8.9	1.1%	1.3%	9.3	10.0
Wind	0.4%	0.0%	0.0	0.3%	0.0%	0.0	0.5
Import	0.4%	0.7%	10.0	0.4%	0.5%	9.3	9.7
Bagasse	0.2%	0.2%	6.2	0.0%	0.0%	-	-
Coal	0.1%	0.1%	4.6	0.1%	0.1%	4.2	4.4
Gross NTDC + K-Electric	100%	100%	6.3	100%	100%	7.8	7.6

- ◆ Heavy reliance on RFO generation
- ◆ HSD – most expensive source of generation
- ◆ Hydel – cheapest source of generation
- ◆ Reduced cost / unit owing to decline in generation cost of RFO and HSD

Generation Mix (Entity) and Cost

Source	FY15			FY14			FY13
	Generation (%)	Energy Cost (%)	Cost/Unit (PKR/KWh)	Generation (%)	Energy Cost (%)	Cost/Unit (PKR/KWh)	Cost/Unit (PKR/KWh)
Thermal IPPs	42.4%	67.6%	10.0	42.1%	65.7%	12.2	12.1
WAPDA (Hydel)	29.9%	0.5%	0.1	30.0%	0.3%	0.1	0.1
GENCOs	11.2%	19.8%	11.1	12.4%	23.4%	14.7	12.2
K-Electric	8.8%	9.1%	6.4	8.4%	7.9%	7.4	7.9
Two Nuclear plants	4.7%	0.9%	1.2	4.2%	0.7%	1.3	1.2
Others (CPPs/SPPs)	1.0%	1.4%	8.9	1.2%	1.4%	9.4	9.8
Hydel IPPs	1.0%	0.1%	0.4	1.0%	0.0%	0.4	0.9
Wind IPPs	0.5%	0.0%	0.0	0.3%	0.0%	0.0	0.5
Mainly from Iran	0.4%	0.7%	10.0	0.4%	0.5%	9.3	9.9
	100%	100%	6.3	100%	100%	7.8	7.6

	FY15	FY14
Total Energy Price (PKR mln)	652,906	809,046
Total Capacity Price (PKR mln)	228,145	218,136
Total Price (PKR mln)	881,051	1,027,182

- ◆ IPPs continue to contribute significant share in generation followed by WAPDA
- ◆ GENCOs inefficient source

Consumption Mix

Consumption Centre	Share in Consumption				
	FY14	FY13	FY12	FY11	FY10
Domestic	47%	47%	46%	46%	46%
Industrial	29%	29%	29%	28%	27%
Agriculture	10%	10%	11%	12%	13%
Commercial	8%	8%	8%	8%	8%
Bulk Supply and Others	5%	6%	5%	5%	6%
Public Lighting	1%	1%	1%	1%	1%
Traction	0%	0%	1%	1%	0%
	100%	100%	100%	100%	100%

- ◆ Domestic users – largest consumers
- ◆ Largely sustained consumption pattern

Hydro Power Generation

- ◆ Potential of ~40,000 MW of hydropower generation
- ◆ Installed capacity – 7,116 MW
- ◆ Most (97%) of the installed hydro power capacity is owned by Pakistan Water and Power Development Authority (WAPDA) while only 3% is owned by private sector
- ◆ Currently contributing only 31% to the total national capacity

Hydro Power Generation

WAPDA Installed Capacity (MW)					
Sr. #	Project	share	June-15	June-14	June-13
1	Tarbela	50%	3,478	3,478	3,478
2	Ghazi Barotha	21%	1,450	1,450	1,450
3	Mangla	14%	1,000	1,000	1,000
4	Warsak	4%	243	243	243
5	Chashma	3%	184	184	184
6	Dubair Khwar	2%	130	130	-
7	Allai Khawar	2%	121	121	121
8	Jinnah	1%	96	96	96
9	Khan Khawar	1%	72	72	72
10	Rasul	0%	22	22	22
11	Jabban	0%	22	22	-
12	Dargai	0%	20	20	20
13	Gomal Zam	0%	17	17	17
14	Nandipur	0%	14	14	14
15	Shadiwal	0%	14	14	14
16	Chichoki	0%	13	13	13
17	Kurram Garhi	0%	4	4	4
18	Renala	0%	1	1	1
19	Chitral (Hydel)	0%	1	1	1
Total		100%	6,902	6,902	6,750

IPPs Installed Capacity (MW)					
Sr. #	Project	share	June-15	June-14	June-13
1	Laraib Energy	39%	84	84	84
2	Malakand - III	38%	81	81	81
3	Jagran AJ&K	14%	30	30	30
4	Pehur	8%	18	18	18
5	Garam Chashma	0%	1	1	1
Total		100%	214	214	214

◆ Tarbela – the largest source of hydel electricity generation

◆ Nominal addition in the capacity of WAPDA in recent years

Upcoming Hydro Projects

WAPDA Projects under construction			
Sr. #	Project	MW	Expected Completion
1	Neelum Jhelum	969	2017
2	Golen Gol	106	2017
3	Tarbela 4th Extension	1,410	2018
4	Keyal Khwar	122	2018
5	Dasu I	2,160	2021
6	Diamer Basha	4,500	2024
Total		9,267	

Upcoming IPPs			
Sr. #	Project	Location	Capacity (MW)
1	Suki Kinari Hydropower (Pvt.) Limited	Kunhar River, KPK	870
2	Azad Pattan	Jhelum River, KPK	640
3	Chakothe Hattian	Jhelum River, AJ&K	500
4	Karot	Jhelum River, Rawalpindi district	720
5	Patrind	Kunhar River, AJ&K	147
Total			2,877

Power Chain

Generation

Independent
Power Producers

Circular Debt

Outlook

Pakistan – IPPs

Sr. #	Power Policy	IPP	Fuel	Gross Capacity (MW)	Net Capacity (MW)	COD
1	2002	KAPCO	RFO	1,638	1,386	Dec-96
2	Prior to 1994	HUBCO	RFO	1,292	1,200	Mar-97
3	1994	Pakgen	RFO	365	350	Feb-98
4	1994	Lalpir	RFO	362	350	Nov-97
5	2002	Hubco Narowal	RFO	220	214	Apr-11
6	2002	Atlas	RFO	225	214	9-Dec
9	2002	Liberty Power Tech	RFO	200	196	Jan-11
7	2002	Nishat	RFO	200	195	Jun-10
8	2002	Nishat Chunian	RFO	200	195	Jul-10
16	2002	Attock-Gen	RFO	165	156	Mar-09
13	1994	Kohinoor	RFO	131	126	Jun-97
10	1994	Gul Ahmed	RFO	136	125	Nov-97
12	1994	Saba Power	RFO	125	125	Dec-99
11	1994	Japan Power	RFO	135	120	Mar-00
14	1994	Tapal Energy	RFO	126	120	Jun-97
15	1994	Southern Power	RFO	136	119	Jun-99
Total RFO (MW)				5,656	5,191	

- ◆ 30 IPPs in Pakistan
- ◆ KAPCO – the largest IPP
- ◆ RFO based net capacity – 5,118 MW (62% of the total net capacity)

Pakistan – IPPs

◆ Gas based net capacity – 2,028 MW (25% of the total net capacity)

◆ Dual fuel based net capacity – 1,039 MW (13% of the total net capacity)

Sr. #	Power Policy	IPP	Fuel	Gross Capacity (MW)	Net Capacity (MW)	COD
17	1994	Uch	Gas	586	551	Oct-00
18	1994	Rousch	Gas	450	395	Dec-99
19	2002	Uch II	Gas	404	375	Apr-14
20	2002	Engro Powergen	Gas	227	217	Mar-10
21	2002	Orient	Gas HSD	229	213	May-10
22	2002	Sapphire	Gas HSD	225	212	Oct-10
23	2002	TNB Liberty	Gas	235	211	Sep-01
24	2002	Saif	Gas HSD	229	209	Apr-10
25	2002	Halmore	Gas HSD	225	209	Jun-11
26	2002	Foundation Power	Gas	185	177	May-11
27	1994	Fauji Kabirwala	Gas	157	151	Oct-99
28	1994	Habibullah	Gas	140	126	Sep-99
29	1994	Altern	Gas	29	29	8-Sep
30	1994	Davis Energen	Gas	10	10	Jul-13
Total Gas & HSD (MW)				3,331	3,085	
Total IPPs (MW)				8,987	8,276	

Pakistan | Bagasse Production & Upcoming IPPs

Pakistan Sugar Industry 2014			
			Tonnes
	Days	Cane Crushed	Bagasse Production*
J.D.W - I	149	2,866,631	859,989
J.D.W - II	145	1,186,269	355,881
J.D.W.-III	139	1,504,768	451,430
JDW Total		5,557,668	1,667,300
R.Y.K Mills	143	1,261,098	378,329
Ramzan Sugar Mills	121	432,720	129,816

Total Industry		56,460,254	16,938,076
-----------------------	--	-------------------	-------------------

* Based on assumption that cane crushed to bagasse production ratio is 1:3

Pakistan Bagasse Driven Electricity Supply to NTDC (MWh)															
Company	Capacity (MW)	2014			2015										Total
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	
JDW I	27	9,772	6,119	14,835	12,300	11,500	13,600	17,200	11,100	17,900	18,300	17,600	11,670	-	161,896
JDW II	27	14,381	10,018	13,965	13,800	11,800	13,300	17,200	10,300	16,700	17,600	16,100	7,900	-	163,064
RYK	30	-	-	-	-	-	12,800	10,800	2,500	6,800	171	-	-	-	33,071
CPL	63	-	-	-	-	-	-	-	-	-	-	-	-	69	69
Total	146	24,153	16,137	28,800	26,100	23,300	39,700	45,200	23,900	41,400	36,071	33,700	19,570	69	358,100

Pakistan Bagasse Driven Electricity Supply to NTDC (MW)															
Company	Capacity (MW)	2014			2015										Average
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	
JDW I	27	14	8	21	17	16	19	24	15	25	25	24	16	-	17
JDW II	27	20	14	19	19	16	18	24	14	23	24	22	11	-	17
RYK	30	-	-	-	-	-	18	15	3	9	0	-	-	-	4
CPL	63	-	-	-	-	-	-	-	-	-	-	-	-	0	0
Total	146	34	22	40	36	32	55	63	33	58	50	47	27	0	38

Power Chain

Generation

Independent
Power Producers

Circular Debt

Outlook

Pakistan | Upcoming Bagasse Based Projects

▪ Pakistan total bagasse production for 2014: **~17 mln tonnes**

▪ Expected bagasse requirement for upcoming IPPs: **~1.9 mln tonnes**

Company	Location	Capacity (MW)	Milestone
Hamza Sugar Mill Limited	Khanpur, District Rahim Yar Khan, Punjab	15	LoS issued
Alliance Sugar Mills Limited	Rasheedabad, Ubauro, District Ghotki, Sindh	19	LoI issued
Layyah Sugar Mills Limited	Karoor Road, District Layyah, Punjab	41	LoI issued
Safina Sugar Mills Limited	Sargodha Road, Lalian, District Chiniot, Punjab	20	LoI issued
Almoiz Industries Limited	Adda Hameed Kot, District Mianwali, Punjab	36	LoI issued
Etihad Power Generation Limited	Mouza Karamabad, District Rahim Yar Khan, Punjab	67	LoI issued
Shahtaj Sugar Mills Limited	Mandi Bahauddin, Punjab	15	LoI issued
Chanar Energy Limited	District Faisalabad	22	LoI issued
Total		235	
Generation (On season 5.5 months)		930,600,000	KWh
Bagasse Consumption for Upcoming Plants		1,861,200	Tonnes

Bagasse Upfront Tariff

Tariff Components	1-10 years (PKR/KWh)	11-30 years (PKR/KWh)
Fuel Cost	5.98	5.98
Variable O&M Local	0.12	0.12
Variable O&M Foreign	0.34	0.34
Fixed O&M Local	0.32	0.32
Insurance	0.22	0.22
Working Capital	0.17	0.17
Debt Service	3.90	
Return on Equity	1.03	1.03
Total	12.09	8.19

Power Chain

Generation

Independent Power Producers

Circular Debt

Outlook

Upcoming Projects - Achieved Financial Close

Hydel

Sr. #	Number of Projects	Cumulative Capacity (MW)	Expected COD
1	1	147	2017

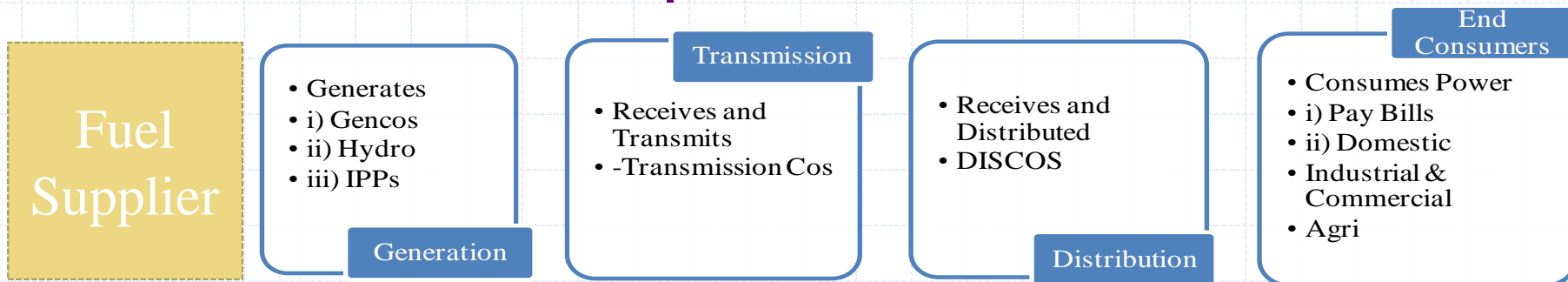
Wind

Sr. #	Number of Projects	Cumulative Capacity (MW)	Expected COD
1	1	50	2015
2	8	429	2016
	9	479	

Solar

Sr. #	Number of Projects	Cumulative Capacity (MW)	Expected COD
1	6	46	2016
2	3	150	2017
3	22	514	2018
	31	710	

Risk Bubble | Where to find it?



Circular Debt | Build up over the years

Receivables (PKR bln)		
	Jun-15	Jun-14
PSO	181	175
OGDCL	121	101
PPL	59	50
Attock & Shell	12	16
Total	373	342

	(PKR bln)	
	FY15	FY14
Subsidy	221	309
Loss to Discos	64	79
Short Recovery	81	120
Total	366	508
Circular Debt Settlement through PEPCO	0	(138)
Total Circular Debt	366	370

Sector Outlook

Challenges

Developments

Circular Debt

Expensive and unsustainable fuel mix

Tariff subsidies pressure on fiscal reserve

Supply deficit: Low capacity; High T&D losses

GENCOs: Inefficient; Expensive; Weak governance

High foreign investment (CPEC: 19 projects; 15,425MW; \$33.8bln)

Power subsidies reduced in FY16 budget (PKR 185bln; FY15: PKR 245bln) – positive step to curtail circular debt

479MW wind projects under construction; 1014MW wind projects in pre-financial close stage

710 MW solar projects expected to be completed by CY18

Power Chain

Generation

Independent Power Producers

Circular Debt

Outlook

Bibliography

1. Petitions filed by IESCO, PESCO, LESCO, GEPCO, FESCO, MEPCO, QESCO, HESCO, SEPCO and TESCO : [ww.nepra.org.pk/Tariff/Petitions/DISCOs/](http://www.nepra.org.pk/Tariff/Petitions/DISCOs/) : <http://www.nepra.org.pk/>
2. K-Electric Annual Report 2015: <http://www.ke.com.pk/investor/financial-data/index.html>
3. Decision of the Authority (NEPRA) in the matter of Fuel Charges Adjustment for 12 months (Jul14 –Jun15) : <http://www.nepra.org.pk/>
4. State of Industry Report 2013-2014 : <http://www.nepra.org.pk/industryreports.htm>
5. Private Power and Infrastructure Board (PPIB) : www.ppib.gov.pk

Note : All year wise Electricity Statistics of Pakistan relate to Fiscal Year (which starts from Jul and ends in Jun)

Analysts	Rana Nadeem Unit Head Ratings nadeem@pacra.com	Aisha Khalid Manager Ratings aisha@pacra.com	Zain Tariq Senior Financial Analyst zain.tariq@pacra.com
Contact Number: +92 42 3586 9504			

DISCLAIMER

PACRA has used due care in preparation of this document. Our information has been obtained from sources we consider to be reliable but its accuracy or completeness is not guaranteed. The information in this document may be copied or otherwise reproduced, in whole or in part, provided the source is duly acknowledged. The presentation should not be relied upon as professional advice.