Power & Energy Generation

January 2020

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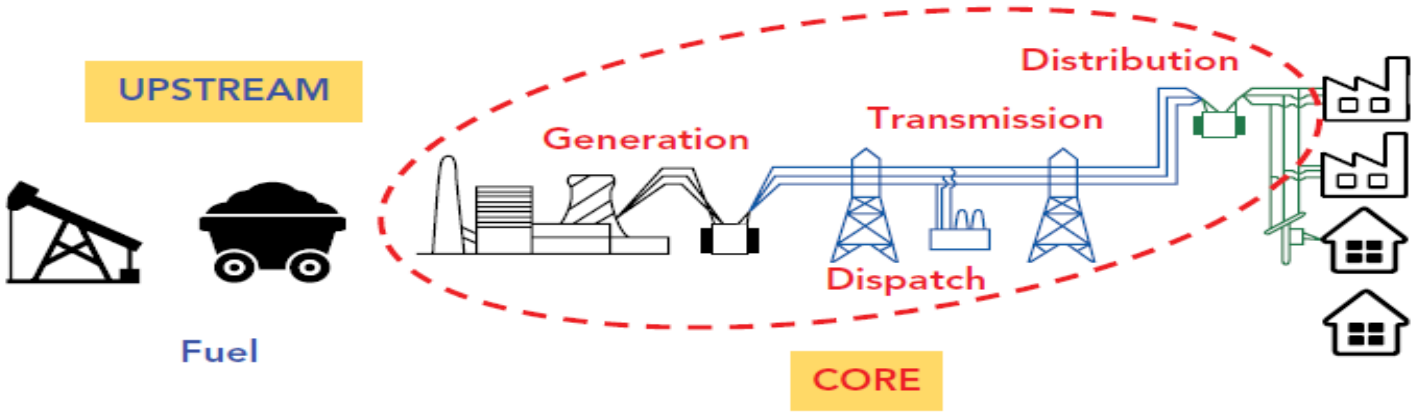
Power Supply Chain



Pakistan's Power Structure

Generation			Transmission	Distribution	Consumption
Thermal	Furnace Oil	Independent Power Plants, Generations Companies, and K-Electric	National Transmission and Dispatch Company	FESCO	
	Gas/RLNG			GEPCO	Domestic
	Coal			HESCO	
	Nuclear			IESCO	Industrial
Renewable	Water	Dams		LESCO	
	Solar	Independent Power Plants		MEPCO	Commercial
	Wind			PESCO	
	Bagasse			QESCO	Agriculture
	Hydel IPPs			TESCO	
				SEPCO	
			K-Electric	K-Electric	Others

Capacity & Generation

Energy Source		Dependable Capacity (MW)									
		Sep-19	Mix %	Jun-19	Mix %	Jun-18	Mix %	Jun-17	Mix %	Jun-16	Mix %
Thermal	RFO	4,783	13.9%	3,499	10.7%	4,783	14.7%	4,211	15.2%	4,888	20.5%
	RLNG	5,203	15.1%	6,198	19.0%	5,203	16.0%	3,480	12.6%	1,420	6.0%
	Gas	1,860	5.4%	1,860	5.7%	1,860	5.7%	1,954	7.1%	1,710	7.2%
	Coal	4,520	13.1%	2,759	8.5%	2,640	8.1%	1,320	4.8%	-	0.0%
	GENCOs	4,337	12.6%	4,337	13.3%	4,337	13.3%	4,762	17.2%	4,676	19.6%
	K-Electric	2,267	6.6%	2,267	7.0%	2,267	7.0%	2,267	8.2%	2,247	9.4%
	Nuclear plants	*1,295*	3.8%	*1,295*	4.0%	*1,295*	4.0%	*955*	3.4%	*615*	2.6%
	Sub-Total	*24,265*	70.3%	*22,215*	68.2%	*22,385*	68.6%	*18,949*	68.4%	*15,556*	65.4%
Renewable	WAPDA	6,902	20.0%	6,902	21.2%	6,902	21.2%	6,902	24.9%	6,902	29.0%
	IPPs/Hydel	1,337	3.9%	1,337	4.1%	1,337	4.1%	213	0.8%	213	0.9%
	Wind	1,185	3.4%	1,185	3.6%	836	2.6%	732	2.6%	304	1.3%
	Solar	388	1.1%	388	1.2%	487	1.5%	352	1.3%	400	1.7%
	Bagasse	93	0.3%	194	0.6%	313	1.0%	273	1.0%	139	0.6%
	Sub-Total	*9,905*	28.7%	*10,006*	30.7%	*9,875*	30.3%	*8,472*	30.6%	*7,958*	33.4%
Others	Mixed	353	1.0%	353	1.1%	353	1.1%	282	1.0%	282	1.2%
Total		***34,523***	**100%**	***32,574***	***100%***	***32,613***	***100%***	***27,703***	***100%***	***23,796***	***100%***

Generation (Actual)

Description	*Sep-19*	*Jun-19*	*Jun-18*	*Jun-17*	*Jun-16*
Dependable Generation Capacity (MW)	34,523	32,574	32,613	27,703	23,796
Actual Generation (MW)	22,096	16,693	16,900	13,012	12,827
Average Capacity Factor (Utilization)	66%	54%	60%	52%	54%
Actual Generation (GWh)	48,391	146,231	148,042	113,989	112,362
Growth (%)-SPLY	2.1%	-1.2%	29.9%	1.4%	6.6%

- Increasing trend in RLNG, Coal, Nuclear and Wind
- Volatility observed in RFO and Bagasse
- No change in remaining sources including thermal and renewable
- Actual generation slightly decreased ~1.2% during FY19 in comparison with the corresponding year.

<Ref: NEPRA's website>

Fuel Mix- World Vs Pakistan

Year	World-% Share | Fuel Wise					
	Oil	Coal	Gas	Hydro-Electricity	Nuclear Energy	Renewable Energy
2016	33%	28%	24%	7%	4%	3%
2017	34%	28%	23%	7%	4%	4%
2018	34%	27%	24%	7%	4%	4%

Year	Pakistan-% Share | Fuel Wise					
	Oil	Coal	Gas	Hydro-Electricity	Nuclear Energy	Renewable Energy
2016	29%	0%	36%	30%	1%	4%
2017	23%	5%	39%	26%	3%	5%
2018	20%	8%	38%	25%	4%	5%

- Overall world is generating significant electricity through thermal sources (i.e oil, gas, coal) instead of renewable energy sources (i.e wind, solar, hydro) whereas the Pakistan is generating significant portion thorough renewable energy which is environment friendly as well as cheap source.

<Ref: BP Statistical Review of World Energy>

Generation Mix (Fuel) and Cost

Category	Fuel	3MFY20			FY19			FY18			FY17		
		Generation (%)	Energy Cost (%)	Cost/ Unit (PKR/ KWh)	Generation (%)	Energy Cost (%)	Cost/ Unit (PKR/ KWh)	Generation (%)	Energy Cost (%)	Cost/ Unit (PKR/ KWh)	Generation (%)	Energy Cost (%)	Cost/ Unit (PKR/ KWh)
Thermal	RFO	6.0%	19.6%	19.1	5%	14.0%	14.2	18.9%	37.9%	10.3	31.7%	55.6%	8.9
	HSD	0.0%	0.0%	0.0	0%	0.0%	14.1	0.7%	1.8%	13.8	1.4%	3.8%	13.7
	Gas	32.9%	61.8%	11.0	42%	65.0%	8.3	35.9%	45.8%	6.6	30.6%	36.5%	6.0
	Coal	16.4%	16.3%	5.8	15%	18.6%	6.4	9.8%	10.3%	5.4	0.9%	0.6%	3.3
	Nuclear	5.5%	0.9%	0.9	4%	0.8%	1.1	7.2%	1.4%	1.0	5.0%	1.0%	1.0
Renewable	Hydel	37.1%	0.5%	-	29%	0.5%	0.0	23.4%	0.0%	-	27.2%	0.0%	-
	Wind	1.1%	0.0%	-	3%	0.0%	0.0	1.8%	0.0%	-	1.2%	0.0%	-
	Solar	0.5%	0.0%	-	0%	0.0%	0.0	0.6%	0.0%	-	0.6%	0.0%	-
	Bagasse	0.1%	0.1%	7.0	0%	0.1%	2.6	0.9%	1.0%	6.1	0.7%	0.8%	5.5
Import	Imported from Iran	0.4%	0.7%	11.6	0%	0.8%	11.6	0.5%	1.0%	11.0	0.4%	0.9%	10.6
Others	Mixed SPPs	0.1%	0.1%	6.8	0%	0.1%	7.0	0.6%	0.7%	6.8	0.2%	0.3%	6.8
Total		***100%***	***100%***	***6.3***	***100%***	***100%***	***5.6***	***100%***	***100%***	***5.8***	***100%***	***100%***	***5.1***

- Reliance on RFO generation gradually on a declining trend from 32% to 6% with aim to have better energy mix through addition of RLNG, Coal and Renewable power projects, hence to curb growing circular debt.
- HSD & RFO – most expensive source of generation.
- Hydel, Wind and Solar are among – cheapest source of generation.

<Ref: NEPRA's website>

Generation Mix (Entity) and Cost

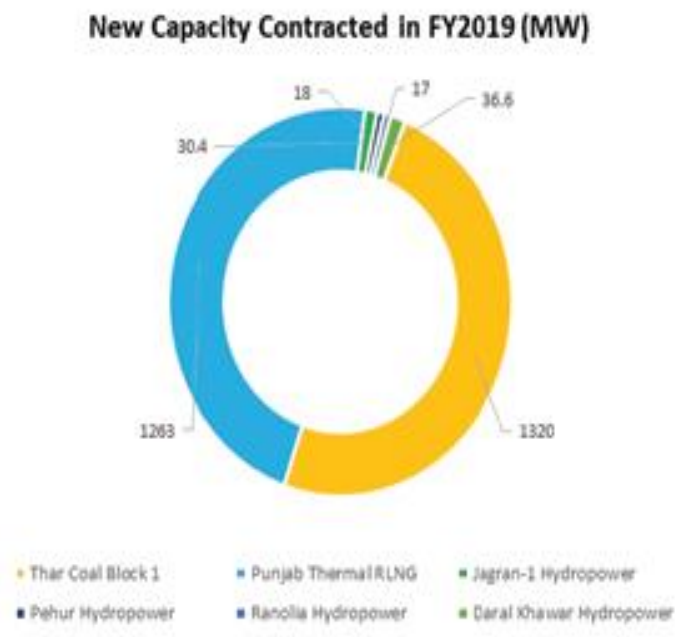
Category	Entity	3MFY20			FY19			FY18			FY17		
		Generation (%)	Energy Cost (%)	Cost/Unit (PKR/KWh)	Generation (%)	Energy Cost (%)	Cost/Unit (PKR/KWh)	Generation (%)	Energy Cost (%)	Cost/Unit (PKR/KWh)	Generation (%)	Energy Cost (%)	Cost/Unit (PKR/KWh)
Thermal	IPPs/Thermal	51.1%	84.3%	10.3	57.5%	86.1%	8.4	51.9%	69.4%	7.4	39.1%	59.6%	7.8
	GENCOs	7.6%	13.7%	11.2	8.1%	11.9%	8.2	11.5%	15.2%	7.4	16.0%	24.8%	7.9
	Neclear	5.1%	0.8%	0.9	3.8%	0.7%	1.1	6.2%	1.1%	1.0	5.1%	1.1%	1.1
Renewable	WAPDA (Hydel)	24.8%	0.2%	0.1	17.3%	0.4%	0.1	19.1%	0.3%	0.1	26.8%	0.7%	0.1
	Hydel IPPs	9.5%	0.2%	0.1	9.6%	0.1%	0.1	0.6%	0.04%	0.4	0.9%	0.1%	0.5
	Wind\ IPPs	1.0%	0.0%	0.0	2.7%	0.0%	0.0	1.1%	0.3%	1.6	1.2%	0.1%	0.6
	Solar	0.4%	0.0%	-	0.4%	0.0%	-	0.5%	0.2%	2.6	0.6%	0.2%	2.1
	Bagasse	0.1%	0.1%	7.0	0.2%	0.1%	2.6	0.7%	0.8%	6.7	0.8%	0.9%	5.8
Import	Mainly from Iran	0.3%	0.6%	11.6	0.3%	0.7%	11.6	0.4%	0.7%	10.8	0.4%	0.9%	10.6
Others	Mixed SPPs	0.1%	0.1%	6.8	0.1%	0.1%	7.0	0.5%	0.7%	7.3	0.2%	0.3%	6.8
Total		**100%**	**100%**	**6.3**	**100.0%**	**100.0%**	**5.6**	**100.0%**	**100.0%**	**5.8**	**100.0%**	**100.0%**	**5.1**

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

<Ref: NEPRA's website>

Contracted Capacity – CPPA-G

Sr No.	Technology	Contracted Capacity (MW)	
		FY18	FY19
1	Wind	-	-
2	Bagasse	-	-
3	Solar	-	-
4	Nuclear	-	-
5	Hydel	-	102
6	Coal	1,650	1,320
7	RLNG	-	1,263
Total		***1,650***	***2,685***



- During FY19, CPPA-G signed Six PPAs/EPAs on behalf of DISCOs, with the coal, Hydel and RLNG power plants, with a total 2,685MW of contracted capacity.
- Magnitude of these PPAs/EPAs when compared with the agreements signed last year i.e. 4 agreements with 1,650 MW.
- This because the country is gradually moving towards energy adequacy and the gap between supply & demand is steadily narrowing.

<Ref: CPPA Annual Report 2019>

Demand & Supply during Peak Hours

Year	Dependable Generation Capacity	Generation Capability (MW)	Demand during Peak Hours (MW)	Surplus / (Deficit) (MW)
Actual				
FY14	21,372	16,170	20,576	(4,406)
FY15	23,277	16,500	21,701	(5,201)
FY16	23,796	17,261	22,559	(5,298)
FY17	27,703	20,106	23,816	(3,710)
FY18	32,613	26,135	25,227	908
FY19	37,633	28,357	26,348	2,009
Projected				
FY20	39,821	29,314	27,420	1,894
FY21	45,622	34,124	28,601	5,523
FY22	50,156	36,422	29,822	6,600
FY23	54,556	39,345	31,095	8,250
FY24	58,881	41,197	32,429	8,768
FY25	62,184	47,750	33,816	13,934

- As per NEPRA's state of industry report, Pakistan has achieved electricity surplus in FY19.

<Ref: NEPRA's website>

Future Capacity

Future Capacity - MWs									
Year	Thermal		Renewable					Nuclear (Govt.)	Grand Total
	IPPs RLNG	IPPs Coal	WAPDA	IPPs	WIND	SOLAR	BAGASSE		
CY19		-	-	-	-	524	790	-	1,314
CY20	800	-	128	102	265	-		-	1,295
CY21 & Beyond	463	4,753	11,458	6,448	560	-	-	2,200	25,882
Grand Total	***1,263***	***4,753***	***11,586***	***6,550***	***825***	***524***	***790***	***2,200***	***28,491***

- Government has initiated various projects of RLNG, Coal, Hydel and RE. Thus, ailing power generation mix seems to be going in the right direction.
- Gains on improving energy mix to be met with serious work on the recovery, collection, distribution, and financial aspects of the energy chain.
- Coal, Renewable and Nuclear projects will add ~25,882MW beyond CY20.

<Ref: WAPDA, PPIB & AEDB's website>

Upcoming Projects - RLNG

IPPs RLNG					
Location	**Company**	**Capacity**	**Gas**	**Status**	**Expected Completion**
Jhang	Punjab Thermal Power Limited	800	RLNG	Under Construction-Open Cycle by 1st Quarter 2020	2020
Jhang	Punjab Thermal Power Limited	463	RLNG	Combined Cycle Cycle by last Quarter 2020	2021
Total		***1,263***			

- Privatization commission's board approved fast track privatization of two RLNG power plants i.e. 1,233MW Balloki Power plant and 1,230MW Haveli Bahadur Shah Power plant.
- RLNG placed at well above the RFO power plants in the Merit Order list for December 2019.

<Ref: PPIB's website>

Upcoming Coal Based - IPPs

IPPs COAL					
Location	**Company**	**Capacity**	**Coal**	**Status**	**Expected Completion**
Arifwala, Punjab	Grange Power Limited	163	Imported	Notice for Guarantee Encashme	N/A
Thar	Thar Energy Limited	330	Thar	Under Construction	Mar-21
Thar	Thal Nova Power (Pvt.) Limited	330	Thar	FC in progress	Mar-21
Thar	Thar Coal Block-I Power Generation Co. Ltd.	660	Thar	FC in progress-1st Unit	Aug-22
Port Qasim	Lucky Electric Power Company Ltd.	660	Thar	FC in progress	Mar-21
Thar Block II	Siddiqsons Energy Limited	330	Thar	FC in progress	Mar-22
Gawadar	China Communication Construction Co. Ltd.	300	Imported	FC in progress	Nov-22
Thar	Thar Coal Block-I Power Generation Co. Ltd.	660	Thar	FC in progress-2nd Unit	Feb-23
Thar Block VI	Oracle Coal Fields PLC England	1320	Thar	Issuance of NTP & LOI to Pha	Jun-23
Total		***4,753***			

- Pakistan has total coal reserves of 185 billion tonnes. The Thar coalfield in Sindh has 175 billion tonnes of coal
- Total reserves of Thar block II are sufficient to support 5,000MW energy for 50 years.
- NEPRA has proposed IRR for local coal ~17.21% and ROE in $ ~25%.
- Tariff dependent on size and capacity of the plant

<Ref: PPIB's website>

Upcoming Hydel Projects-WAPDA

WAPDA Projects under Construction					
Sr. #	**Project**	**Location**	**Capacity (MW)**	**Status**	**Expected Completion**
1	Keyal Khwar	Indus River, Kohistan, KPK	128	Physical progress ~90%	2020
2	Kurram Tangi Dam	32KMs North of Bannu City, FATA	83	Physical progress ~90%	2021
3	Tarbela 5th Extension	Indus River, Tarbela, KPK	1,410	PC-1 approved	2021
4	Dasu	Indus River, Kohistan, KPK	4,320	Pre-qualification of contractor completed	2023
5	Mangla Dam Up-gradation	Jhelum River, Punjab	310	In Process	2023
6	Harpo	Indus River Skardu District, Gilgit-Baltistan	35	Ready for construction	2025
7	Mohmand Dam	Mohmand Tribal District, KP	800	Ready for construction	2024
8	Diamer Basha	Indus River, Chilas, KPK	4,500	Ready for construction	2024
Total			***11,586***		

- Pakistan has a Potential of ~60,000 MW of hydel electricity generation.
- Installed capacity – 8,239 MW.
- Currently contributing ~24% to the total national capacity.
- KPK government – PEDO is in the process of constructing 350 micro dams which will generate ~3000 MW.
- KPK has an estimated power potential of generating nearly 30,000 MW.

<Ref: WAPDA's website>

Upcoming Hydel Projects-IPPs

Hydel IPPs					
Sr. #	Project	Location	Capacity (MW)	Status	Expected Completion
1	Gulpur Hydropower	Poonch River, Gulpur, AJ&K	102	Under Construction	Feb-20
2	Karot Hydropower	Jhelum River, Rawalpindi	720	FC achieved/Under Construction	Dec-21
3	Riali-II Hydropower Project	Ghori Wala Nullah, Muzaffarabad AJ&K	7	FC in progress	Apr-21
4	Suki Kinari Hydropower	Kunhar River, KPK	870	Under Construction	Dec-22
5	Kathai-II Hydropower	Kathai Nullah, Hattian, AJ&K	8	FC in progress	Apr-24
6	Azad Pattan Hydropower	Jhelum River, AJ&K	700	FC in progress	Jun-26
7	Kohala Hydropower	Jhelum River. Kohala AJ&K	1,124	FC in progress	Jun-26
8	Ashkot Hydropower	Neelum River, AJ&K	300	Project is under evaluation	Dec-26
9	MahI Hydropower	Jhelum River, AJ&K	640	LOS in progress	Jun-28
10	Kaigah Hydropower	Kaigah, Indus River, KPK	548	Feaseability study completed	Dec-28
11	Turtonas-Uzghor Hydropower	Golen Gol River, KPK	82	Feaseability study completed	Dec-28
12	Chakothi-Hattian Hydropower	Muzaffarabad, AJ&K	500	LOI in progress	Dec-28
13	Rajdhani Hydropower	Poonch River AJ&K	132	LOI in progress	Dec-28
14	Neckeherdim-Paur Hydropower	Yarkun River, Chitral Valley KP	80	LOI in progress	Dec-28
15	Madian Hydropower	Swat River, KP	157	LOI in progress	Dec-28
16	Sehra Hydropower	Poonch River, AJ&K	130	LOI in progress	Dec-28
17	Athmuqam Hydropower	Neelum River, AJ&K	450	Feaseability study completed	Dec-28
Total			***6,550***		

- Most (84%) of the installed hydro power capacity is owned by Pakistan Water and Power Development Authority (WAPDA) while only 16% is owned by private sector.

<Ref: WAPDA's website>

Upcoming Projects - Wind

IPPs Wind - RE				
Location	**Company**	**Capacity (MW)**	**Status**	**Expected Completion**
Jhimpir	Western Energy (Pvt.) Ltd	50	LOI Stage	2020
Gajju	Burj Wind Energy (Pvt.) Ltd	14	LOI Stage	2020
Jhimpir	Trans Atlantic Energy (Pvt.) Ltd	50	LOI Stage	2020
Jhimpir	Shaheen Renewable Energy - 1 (Pvt.) Ltd	51	LOI Stage	2020
Gharo	Zephyr Power Pvt. Limited	50	Under Construction	2020
Jhimpir	ACT2 Wind (Pvt.) Ltd	50	FC in Process	2021
Jhimpir	Artistic Wind Power (Pvt.) Ltd	50	FC in Process	2021
Jhimpir	Din Energy Ltd.	50	FC in Process	2021
Jhimpir	Gul Ahmed Electric Ltd	50	FC in Process	2021
Jhimpir	Indus Wind Energy Ltd	50	FC in Process	2021
Jhimpir	Lake Side Energy (Pvt.) Ltd	50	FC in Process	2021
Jhimpir	Liberty Wind Power-1 (Pvt.) Ltd	50	FC in Process	2021
Jhimpir	Liberty Wind Power-2 (Pvt.) Ltd	50	FC in Process	2021
Jhimpir	Master Green Energy Ltd	50	FC in Process	2020
Jhimpir	Metro Wind Power Ltd	60	FC in Process	2021
Jhimpir	NASDA Green Energy (Pvt.) Ltd	50	FC in Process	2021
Jhimpir	TriCom Wind Power (Pvt.) Ltd	50	FC in Process	2021
Total		***825***		

- Pakistan has the potential to generate more than 50,000 MW electricity through Wind. GoP tasked AEDB to produce 5% of total generation through RE by 2030.
- NEPRA has proposed IRR for Wind projects at 17.21%.
- Assumed capital cost of these projects is in the range of $ 1.5-1.8 million/ MW while worldwide average at the US $ 0.8 million, in India it is less than the US $ 0.7 million.
- AEDB Request for proposal (RFP) for solicitation of renewable energy on competitive terms is in finalization stage.

<Ref: AEDB's website & BR>

Upcoming Projects - Solar

IPPs SOLAR - RE				
Location	**Company**	**Capacity**	**Status**	**Expected Completion**
Bahawalnager	Bukhsh Solar (Pvt.) Ltd.	10	FC achieved	Mar-18
Bahawalnager	Safe Solar Power Pvt. Ltd	10	FC achieved	Apr-18
Jehlum	Access Solar Pvt. Ltd	11	FC achieved	Mar-18
Nooriabad	Integrated Power Solution	50	FC in progress	Jun-18
Nooriabad	Jafri & Associates	50	FC in progress	Jun-18
Nooriabad	Solar Blue Pvt. Ltd.	50	FC in progress	Jun-18
Jehlum	Access Electric Pvt. Ltd.	10	FC achieved	Mar-18
Dadu	R.E. Solar I Pvt. Ltd.	20	FC in progress	Mar-18
Dadu	R.E. Solar II Pvt. Ltd.	20	FC in progress	Mar-18
Rahim Yar Khan	Janpur Energy Limited SPV: Jan Solar (Pvt.) Ltd	12	FC in progress	Mar-18
Muzafargarh	Lalpir Solar Power (Pvt.) Ltd.	12	FC in progress	Mar-18
Chakwal	Siddiqsons Solar Ltd	50	FC in progress	Mar-18
Bahawalnager	Adamjee Power Generation Pvt. Ltd.	10	FC in progress	Dec-18
Attock	ET Solar (Pvt.) Ltd.	50	FC in progress	Dec-18
Thatta	ET Solar (Pvt.) Ltd.	25	FC in progress	Dec-18
Sindh	ACT Solar (Pvt.) Ltd.	50	FC in progress	Dec-18
Bahawalnagar	Asia Petrolium Limited	30	FC in progress	Dec-18
Chakwal	First Solar (Pvt.) Ltd.	2	FC in progress	Dec-18
Thatta	Forshine (Pakistan)	50	FC in progress	Jun-19
Sialkot	Crystal Energy (Pvt.) Ltd	2	FC in progress	May-19
Total		***524***		

- Pakistan has the potential to generate 2.9mln MW of solar energy potential.
- Projects highlighted in Red were supposed to be completed in 2018 & 2019.
- Delayed due to Tariff finalization.

<Ref: AEDB's website>

Upcoming Projects - Bagasse

IPPs BAGASSE				
Location	**Company**	**Capacity**	**Status**	**Expected Completion**
Ghotki	M/s Alliance Power (Pvt.) Ltd	30	LOI Stage	2018
Chiniot	Safina Sugar Mills Ltd.	20	LOI Stage	2018
Rahim Yar Khan	Etihad Power Generation Limited.	30	LOS Stage	2018
Mandi Bahaudin	Shahtaj Sugar Mills Ltd	30	LOS Stage	2018
Muzafargarh	Sheikhoo Power Ltd.	30	LOI Stage	2018
Rajanpur	M/s Indus Energy Limited.	30	LOS Stage	2018
Rahim Yar Khan	M/s Hamza Sugar Mill Ltd (Unit-II)	30	LOI Stage	2018
Jhang	M/s Hunza Power (Pvt.) Ltd.	50	LOS Stage	2018
Bahawalpur	M/s Bahawalpur Energy Ltd.	30	LOS Stage	2018
Tando Muhammad Khan	M/s Faran Power Ltd.	27	LOI Stage	2018
Bahawalpur	M/s Ittefaq Power (Pvt.) Ltd.	30	LOS Stage	2018
Tando Allahyar	M/s Mehran Energy Ltd.	27	LOI Stage	2018
D I Khan	M/s Alman Seyyam (Pvt.) Ltd	35	LOI Stage	2019
Rahim Yar Khan	M/s Sadiqabad Power (Pvt) Ltd.	45	LOI Stage	2019
Ghotki	M/s Gotki Power (Pvt) Ltd.	45	LOI Stage	2019
D I Khan	M/s Al-Mughnee Industries (Pvt.) Ltd	40	LOI Stage	2019
Mirpurkhas	M/s Digri Gen Limited	25	LOI Stage	2019
Khairpur	M/s Ranipur Energy (Pvt.) Ltd	60	LOI Stage	2019
Jhang	M/s Kashmir Power (Pvt) Ltd.	40	LOS Stage	2019
Tando Allahyar	M/s TAY Powergen Company (Pvt.) Ltd	30	LOS Stage	2019
Toba Tek Singh	M/s Two Star Industries Pvt Ltd.	50	LOS Stage	2019
Shaheed Banazir Abad	M/s HSM Energy Limited	27	LOS Stage	2019
Sargodha	M/s Popular Energy (Private) Limited	30	LOI Stage	2019
Total		***790***		

- Pakistan being the fifth largest sugarcane producer in the world has the potential to generate more than 2,000 MW electricity through Co-Generation.
- All projects are at LOI & LOS stage despite that were supposed to be completed in early 2018 & 2019.

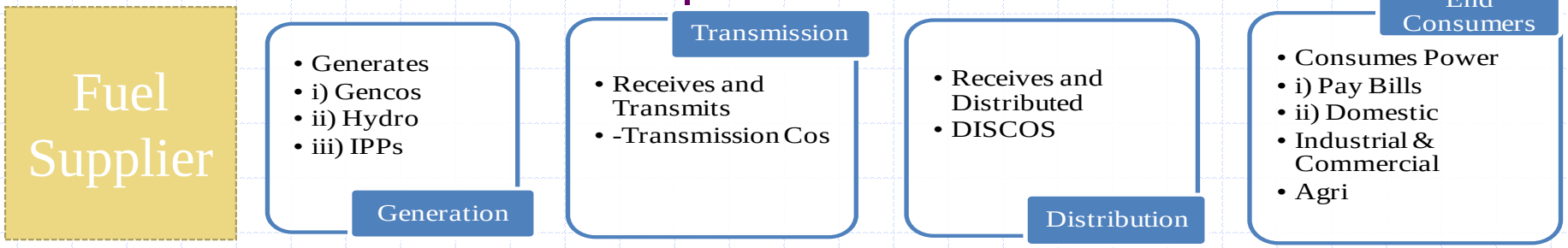
<Ref: AEDB's website>

Rating Universe – PACRA & VIS

Capacity Source	PACRA Universe	Capacity (MW)	Ratings
Hydel	WAPDA-Debt Instruments	8,348	AAA
K-Electric	K-Electric Limited	2,267	AA/A1+
Thermal	Hub Power Company Limited	1,292	AA+/A1+
	PakGen Power Limited	365	AA/A1
	LalPir Power Limited	362	AA/A1
	Kohinoor Energy Limited	131	AA/A1+
	Atlas Power Limited	225	AA-/A1+
	Foundation Power Company Daharki Limited	180	AA-/A1+
	Sapphire Electric Company Limited	225	AA-/A1+
	Narowal Energy Limited	214	AA-/A1+
	Nishat Power Limited	200	A+/A1
	Nishat Chunian Power Limited	200	A+/A1
	Halmore Power Generation Company Limited	225	A+/A1
	Saif Power Limited	225	A+/A1
	Liberty Power Tech Limited	196	A+/A1
	Habibullah Coastal Power Co (Pvt.) Limited	140	A/A1
	China Power Hub Generation Company (Pvt.) Limited	1,320	AA/A1+
	Lucky Electric Power Company Limited	660	A/A1
	Engro PowerGen Thar (Pvt.) Limited	660	A/A1
Wind	Master Wind Energy Limited	52.8	A/A1
	Master Green Energy Limited	50	A/A1
	ACT Wind (Pvt.) Limited	30	A/A1
Solar	Harappa Solar (Pvt.) Limited	18	A-/A1
	Oursun Pakistan Limited	50	A-/A2
Bagasse	Chanar Energy Limited	22	BBB-/A3
Total		**17,658**	

Capacity Source	VIS Universe	Capacity (MW)	Ratings
Hydel	Neelum Jhelum Hydropower Company | Debt Instrument	969	AAA
Thermal	KotAddu Power Company Limited	1,600	AA+/A1+
	National Parks Power Management Co (Pvt.) Ltd	2,550	AA+/A1+
	Quaid-e-Azam Thermal Power (Pvt.) Limited	1,180	AA/A1+
	FFBL Power Company Limited	118	AA-/A1
	Rousch (Pakistan) Power Limited	450	AA-/A1
Solar	Quaid-e-Azam Solar Power (Pvt.) Limited	1,000	AA-/A1
	Gharo Solar (Pvt) Ltd	50	A-/A2
K-Electric	K-Electric Limited	2,267	AA/A1
Wind	Foundation Wind Energy I Limited	50	A+/A1
	Foundation Wind Energy II Limited	50	A+/A1
	Zephyr Power (Pvt) Limited	50	A-/A2
	Artistic Energy (Pvt.) Limited	50	A/A1
Total		**10,384**	

Risk Bubble | Where to find it?



Circular Debt | Build up over the years

Receivables (PKR bln)						
Entity	**Sep-19**	**Jun-19**	**Jun-18**	**Jun-17**	**Jun-16**	**Jun-15**
PSO	210	220	246	213	180	181
OGDCL	264	243	164	119	111	121
PPL	259	227	143	99	57	59
Attock Petroleum	17	17	20	13	9	9
Total	***750***	***707***	***573***	***444***	***357***	***370***

- Total amount of circular debt has gone around PKR 1,700bln.
- During FY 2018-19 it is increased by PKR 465bln, of which PKR 171bln due to DISCOs inefficiencies, PKR 119bln delayed tariff adjustments, PKR 93bln financial costs and PKR 82bln include unbudgeted subsidies.
- Government has planned to control circular debt gradually and signed an agreement with foreign firm M/s FIELDFISHER which has prepared a structured finance plan to resolve the issue of circular debt.
- The plan envisaged; i) Govt. will issue new guarantees to transfer the costly CPPA-G payable to IPPs into PHPL, ii) Government will absorb PHPL into its budget, fully recognized the liabilities in PHPL as debt of the Government, iii) reduce the stock of outstanding payables through the use of power assets privatization proceeds, recoveries from the receivables and right sizing of sector-related subsidies.

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