REAL COST OF WHEELING

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Pakistan’s Wholesale Electricity Market Model

CTBCM

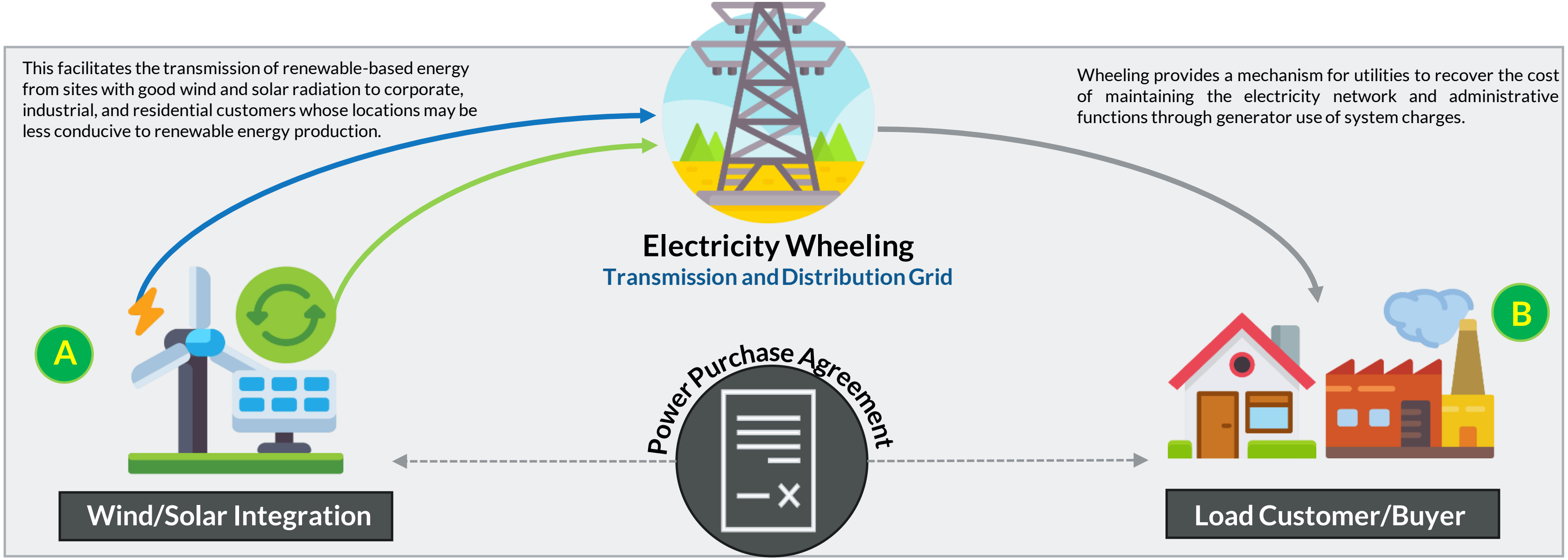
PEMO is needed to rescue Pakistan Electricity Sector
And Kick Start CTBCM
Pakistan Electricity Market Operator

WHEELING & CTBCM – EXECUTIVE SUMMARY

Losses to be Balanced by Wheeling Consumers	• For 11kV connected consumer total losses shall be balanced (3.05+9.08) = 12.13% • For 132kV connected consumer total losses shall be balanced (3.05+1.55) = 4.6% • For 220kV connected consumer total losses shall be balanced (3.05+0) = 3.05%
Use of System Charges for Wheeling Consumers	• For 11kV connected consumer total wheeling charges shall be = 4.75 Rupees / Unit • For 132kV connected consumer total wheeling charges shall be = 2.7 Rupees / Unit • For 220kV connected consumer total wheeling charges shall be = 1.54 Rupees / Unit • Ancillary services charges should be included after three years, once a significant number of consumers have entered the open market. Alternatively, these charges can currently be incorporated directly into the NTDC Use of System Charges (UoSC).
Stranded Capacity Cost	• Unutilized capacity from the centralized pool should be made available to market participants for direct utilization. • Allowing capacity auctions of existing plants in the CTBCM to Bulk Power Consumers (BPCs) will reduce the obligations of the Government of Pakistan (GoP) and benefit regulated customers. • The capacity of central plants with marginal prices higher than the average pool price (9.39 Rupees / kWh for FY 24-25) should be auctioned in the market. • The agency handling legacy contracts can trade these capacities in the open market.
Indexation of Wheeling Charges	• NTDC charges including SO & MO Fee will be reduced when extra electrons entered the system; so these shall be adjusted on annual basis. • To give long term indication in the market, Distribution Companies 132 kV & 11kV Use of System Charges shall be freezed with only CPI adjustment on annually.
CTBCM & PEMO	• The old role of CPPAG should be transferred to PPIB as a department since the independent auction role is very limited, and the market operator role requires proper separation. CPPA should be transformed into PEMO (Pakistan Electricity Market Operator) to focus exclusively on its independent market operator functions. • The System Operator (SO) and Market Operator (MO) can be merged into a single entity called PISMO (Pakistan Independent System & Market Operator). • Initially, the CTBCM can be launched with a certain cap for the open market, such as 500 MW for the first year, gradually increasing thereafter. • The Market Operator (CPPA) must promptly publish the System Marginal Price (SMP) and Capacity Unitary Price to enable consumers to calculate their imbalance costs.

WHAT IS WHEELING ?

Wheeling refers to the delivery of energy from a generator to an end-user located in another area through existing distribution or transmission networks. Wheeling does not mean that the specific electrons entering the network at point **A** will be used at point **B**. Wheeling essentially allows privately generated power to be transmitted across the national grid to customers who want it, in a willing buyer/willing seller model



OLD WHEELING REGULATIONS 2016

11 January 2021 - Authority Order Wheeling Cost of ~**1.5 Rs./Unit.**

But DISCOs have taken stay orders from court on this order.

National Electric Power Regulatory Authority
Islamic Republic of Pakistan

Registrar

NEPRA Tower, Attaturk Avenue (East), G-5/1, Islamabad
Ph: +92-51-9206500, Fax: +92-51-2600026
Web: www.nepra.org.pk, E-mail: registrar@nepra.org.pk

No. NEPRA/R/ADG(Tariff)/TRF-100/XWDISCOs/1080-1082
January 11, 2021

Subject: Decision of the Authority in the matter of Wheeling Costs to be included in the Tariff Determination of DISCOs under Annual & Multi-Year Tariff Regime (FY 2018-19 & FY 2019-20)

Dear Sir,

Please find enclosed herewith subject Decision of the Authority (07 pages).

National Electric Power Regulatory Authority (NEPRA)

NOTIFICATION

Islamabad, the 13.06 day of , 2016

S.R.O. 549 (I)/2016. In exercise of the powers conferred by Section 47 of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997, the National Electric Power Regulatory Authority, in order to facilitate wheeling of power is pleased to make the following regulations, namely:-

1. **Title and Commencement.**– (1) These regulations may be called the National Electric Power Regulatory Authority (Wheeling of Electric Power) Regulations, 2016.

(2) They shall come into force at once.

(3) These regulations shall be applicable in respect of wheeling services byTransmission Licensees/DISCOs.

DAWN
TODAY'S PAPER | AUGUST 26, 2022

Plan to auction 155MW power to industries hits snag

Manzoor Ali | Published February 23, 2021

Nepra disallows inclusion of stranded cost, cross subsidy in wheeling tariff

By Khalid Mustafa (https://www.thenews.com.pk/writer/khalid-mustafa) | January 12, 2021

ISLAMABAD: In a major development, Nepra has refused to include the stranded cost and cross subsidy demanded by DISCOs and CPPA in the wheeling charges, paving way for the country's industrial sector to thrive with lower cost of electricity.

Aug 26, 2022 PRINT EDITION BR MARKETS Dollar to PKR

BUSINESS RECORDER
Founded by M.A. Zuberi

Home Latest BR Research Markets

PRINT

Govt not happy with Nepra's decision on wheeling charges

Mushtaq Ghumman Published August 23, 2022

NEW WHEELING REGULATIONS - WHAT IS OPEN ACCESS?

The NEPRA Open Access (Interconnection and Wheeling of Electric Power) Regulations, 2022, outline the regulatory framework established by the National Electric Power Regulatory Authority (NEPRA) in Pakistan to facilitate open access to the national electricity grid. Below are the relevant clauses from NEPRA Open Access (Interconnection and Wheeling of Electric Power) Regulations, 2022.

NEPRA Open Access (Interconnection and Wheeling of Electric Power) Regulations, 2022

2. (m) **"open access"** means the access to a network licensee's system or its associated facilities for movement and delivery of electric power, subject to the terms and conditions as provided in the Act, these regulations and use of system agreement, on non-discriminatory basis to:

i. an electric power supplier for supply of electric power to its consumer(s); or

ii. a captive generating plant for delivery of the electric power from generation facility to the destination of its use; or

iii. any other person, including a licensee for delivery of electric power from a designated place to another designated place;

2. (q) "**Use of System Agreement**"

- means the agreement between an open access user and the concerned distribution licensee covering subjects as specified in Schedule I to these regulations; and

2. (r) "**Use of System Charges**"

- shall include all charges related to use of distribution system, use of transmission system, system operator services, market operator services, metering service provider services and any other charges as determined by the Authority that may arise due to advent of the open access and market liberalization.

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ELECTRICITY MARKETS & CTBCM

Let's explore Energy Markets

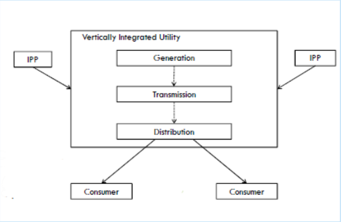
The 2018 amendment to the NEPRA Power Act (Regulation of Generation, Transmission, and Distribution of Electric Power Act 1997) facilitates the transition towards a wholesale electricity model and open access to the network, laying the groundwork for the Competitive Trading Bilateral Contracts Market (CTBCM). Electricity market structures can be categorized mainly into four types, each with distinct characteristics and degrees of regulation.

Electricity Markets

CTBCM

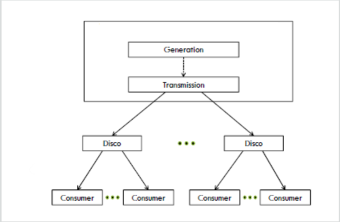
Vertically Integrated Utility

- Old WAPDA Model
- Unbundling of WAPDA in 1998



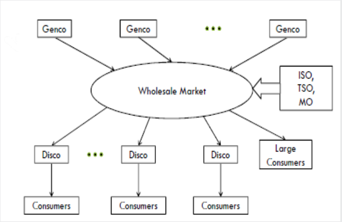
Purchasing Agency

- Current Structure of Single Buyer Model (CPPA) till date



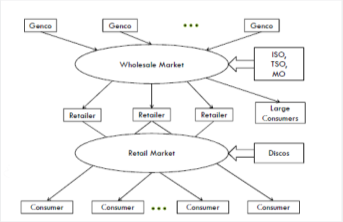
Wholesale Competition

- CTBCM
- To be implemented subject to resolution of UoSC and a few bottlenecks



Retail Competition

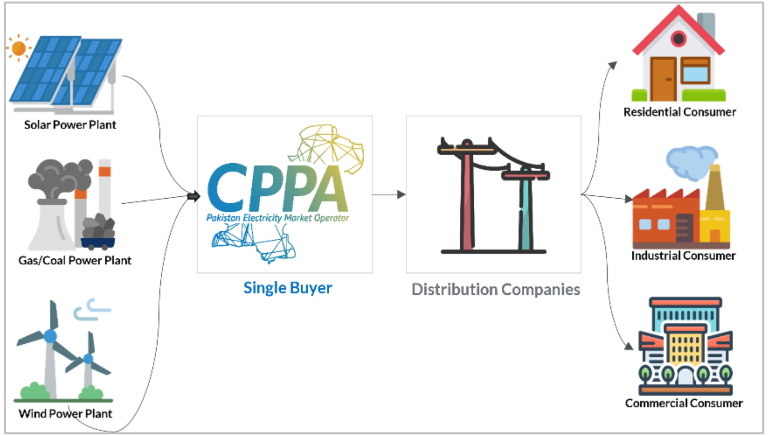
- Next Stage once Wholesale market is fully functional



SHIFT IN ELECTRICITY MODELS

CTBCM = Competitive Trading Bilateral Contract Market

CURRENTLY – SINGLE BUYER MODEL

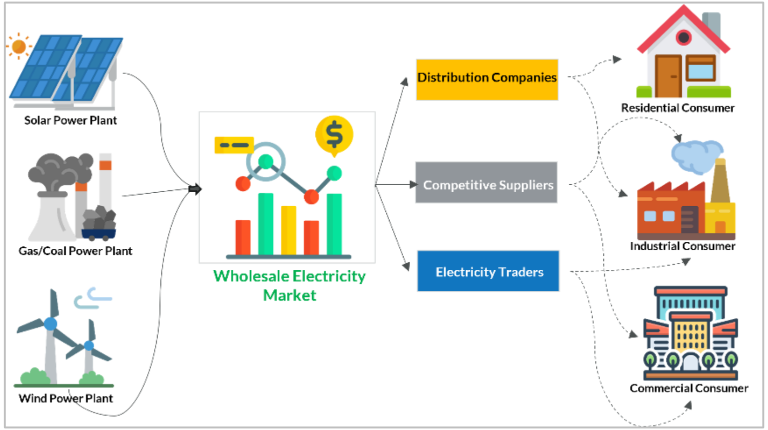


All electricity generated by power plants is initially purchased by a government agency, which then allocates a certain share to each DISCO based on their demand.

The government-owned DISCOs subsequently sell this electricity to various categories of consumers at a uniform average price, regardless of the actual cost of service for each consumer category.

This system aims to simplify pricing for consumers but may result in cross-subsidization, potentially impacting market efficiency and investment decisions in energy generation.

CTBCM – MULTIPLE BUYER MODEL



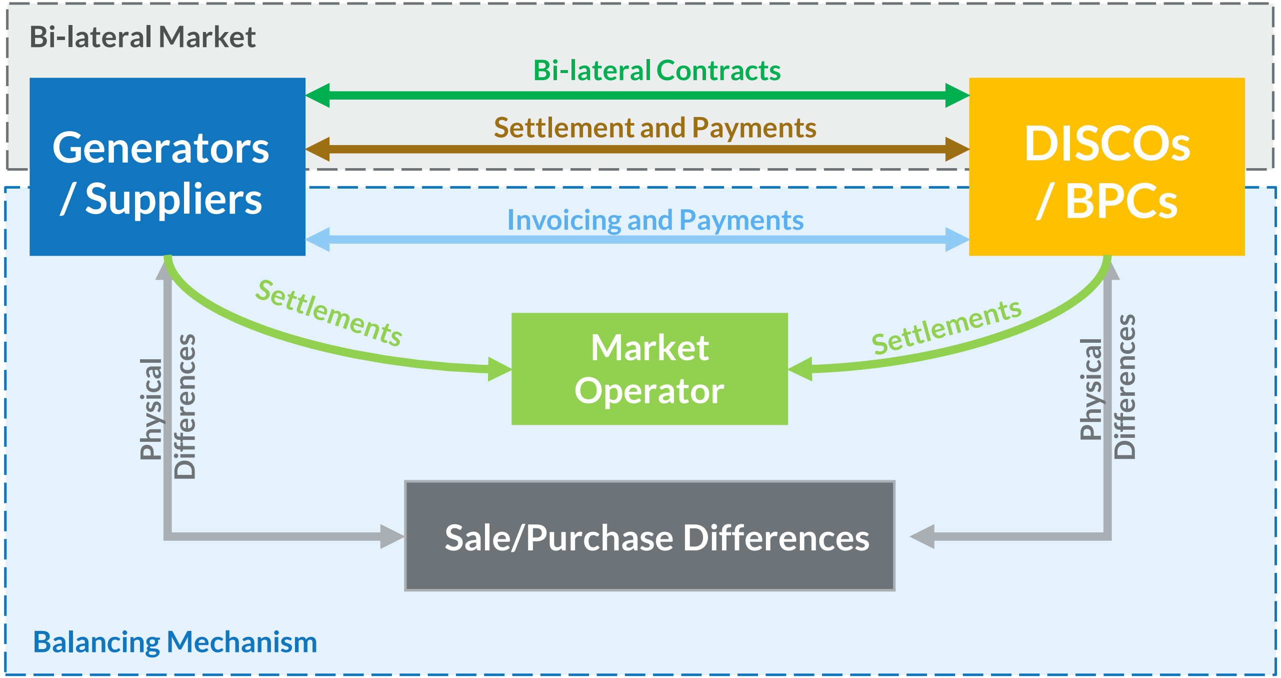
CTBCM represents a new approach to electricity procurement and sales, characterized by reduced government intervention.

In this model, power generators have the opportunity to directly sell electricity, reflecting actual production costs through differentiated tariffs, thereby fostering a competitive market environment.

Bulk Power Consumers (BPCs) can directly procure electricity from the generators or from competitive suppliers.

TRADING IN COMPETITIVE WHOLESALE MARKET

Bi-lateral market and Balancing mechanism explained



The CTBCM is constructed around bilateral contracts. No central entity

Eligible Consumers will be free to procure power from Competitive Suppliers.

The System Operator will establish marginal prices for trading including settlement of imbalances.

It is a mechanism through which both parties to a bilateral contract sale or purchase the differences between contractual and actual energy quantities injected to or extracted from the grid/market

The MO will calculate the imbalance prices for each trading period (Hourly at the start of Market)

Will require credit cover for cases of non-payment the amounts arising from this mechanism

Procedure:
The MO will receive the actual quantities generated and consumed from the metering system and will compare this with the information in the contract register to calculate imbalances

The System Operator will provide values of hourly marginal prices

The imbalances will be valued at the marginal price and charged accordingly

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CTBCM COMMERCIAL IMPLICATIONS

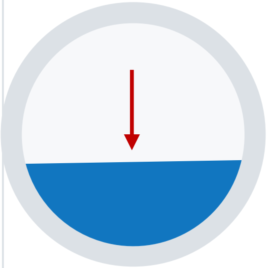
Each B2B transaction between Competitive Supplier and Bulk Power Consumer (BPC) will mainly be subject to following cost implications under CTBCM

1- Use of System Charge (UOSC)

Plus

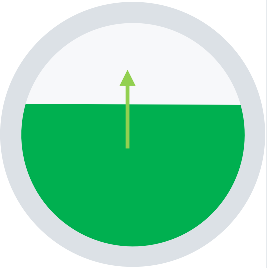
2- Cost of Capacity Balancing

SUPPLY
IN CRITICAL 50 HOURS



- Difference will be charged at capacity cost established under CTBCM
- Supply from generation plant

DEMAND
IN CRITICAL 50 HOURS

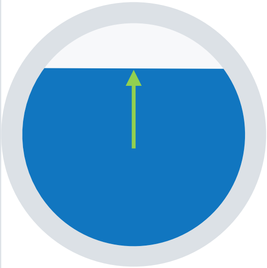


- Reserve Margin
- Transmission Loss
- T&D Loss of DISCO
- Consumption

&

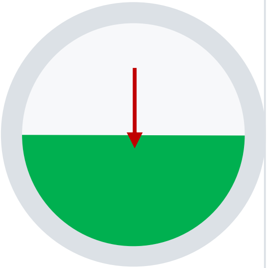
3- Cost of Energy Balancing

SUPPLY
IN EACH HOUR



- Difference will be charged at Marginal Price
- Supply from generation plant

DEMAND
IN EACH HOUR

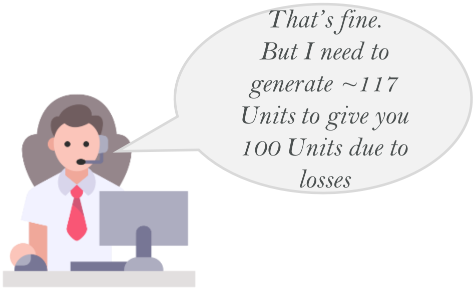


- Transmission Loss
- Distribution Loss of DISCO
- Consumption

ELECTRONS LOST IN WIRE NETWORK

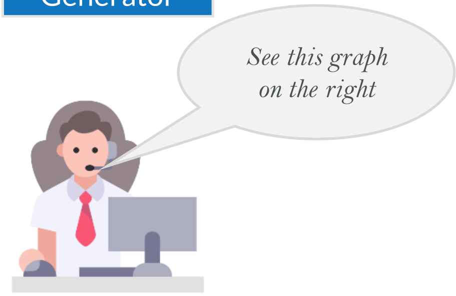
NEPRA has considered 3.05% NTDC transmission losses and 11.43% average distribution losses in the regulated average tariff, as determined on June 14, 2024. Assuming these losses apply uniformly to all users, a generator must produce 116.45 units to deliver 100 units to a Bulk Power Consumer (BPC) under the current loss parameters.

BPC



Generator

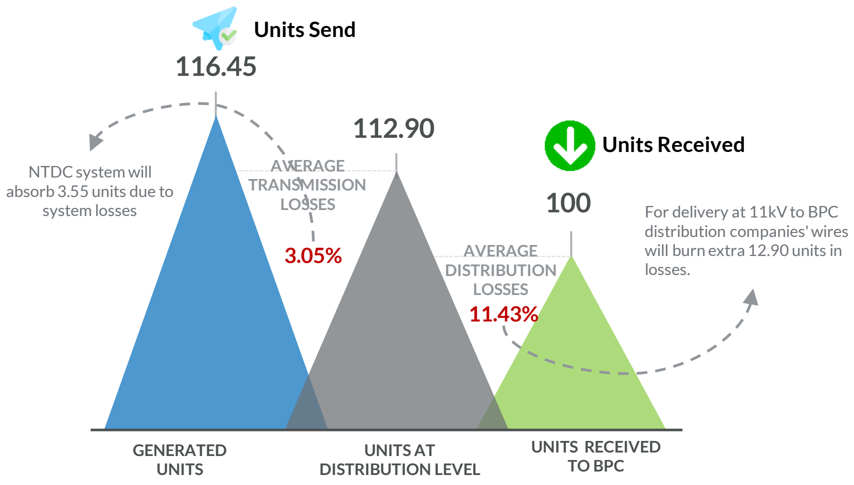
BPC



Generator

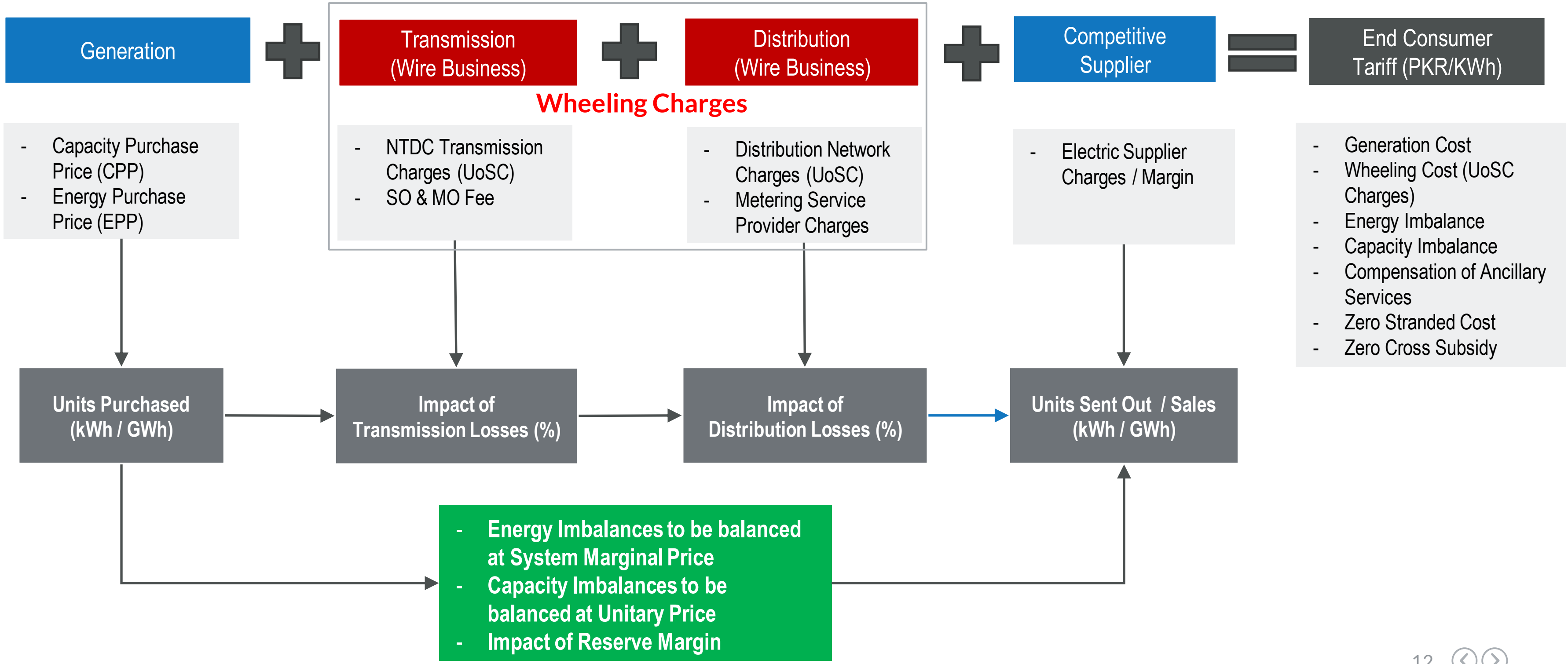
BPC (END USER) UNITS DELIVERED

To deliver 100 units to Bulk Power Consumer (BPC), a generator has to produce 116.45 units with current set of losses.



ELECTRICITY TARIFF COMPONENTS UNDER CTBCM

Final Tariff will have the costs of Generation + Wheeling + Supply Margin + Energy Imbalance + Capacity Imbalance + Ancillary Services + Govt. Charges



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Arzachel can develop various energy procurement solutions and optimize the energy mix to reduce energy input costs for consumers.

WHEELING COST – IN REGULATED TARIFF FY 24-25

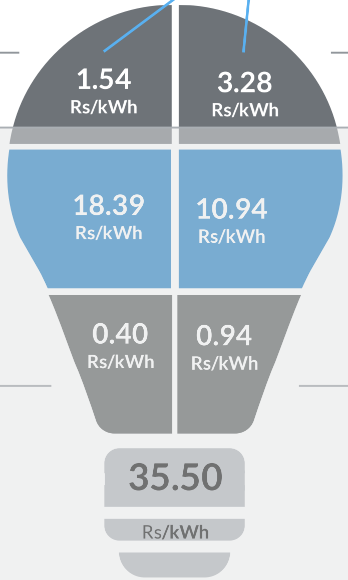
In the average regulated tariff of DISCOs to consumers calculated by NEPRA dated 14th June 2024, the pure network cost, also known as the average wheeling cost, is **4.82 Rupees / kWh** (1.54 + 3.28 Rupees per kWh).

TRANSMISSION CHARGES & MO FEE

O&M, Depreciation, RoE, Interest, Other Income, Prior Year Adjustment.

DISCOS WIRE NETWORK COST

O&M, Depreciation, RoE, Interest, Other Income, Prior Year Adjustment



CAPACITY CHARGES

Fixed O&M, ROE, ROEDC, IDC, Insurance, Debt Servicing etc.

ENERGY CHARGES

Fuel Cost + Variable O&M

SUPPLY MARGIN / COST

O&M , Other Income,

PRIOR YEAR ADJUSTMENT

Under/Over Recovery due to delay in notification/over under sales etc.

UoSC components applied by DISCOs

S.	UoSC Components	Comments
1.	Transmission Use of System Charge	NTDC, SO & MO Charges Shall be combines and NEPRA shall determined this as Wheeling Fee for all participants
2.	System Operator Charge / Fee	
3.	MSP Charge / Fee	Shall be included in the Transmission and Distribution UoSC, where the meter is installed
4.	Distribution Use of System Charge	132kV & 11kV UoSC shall be notified for open access users
5.	Cross Subsidy	Shall be zero, as government is already removing cross subsidy from Industrial Consumers
6.	Stranded Capacity Costs	Shall be zero, we should explore alternate methods to utilize excess capacity as suggested in following slides.

Cross-subsidies should be eliminated from the overall consumer tariff regime, and protected consumers should be subsidized directly through schemes like the Benazir Income Support Program.

WHEELING CHARGES & LOSSES FOR EACH CATEGORY

Why wheeling Charges at different Voltage Levels are different ??

Because of different infrastructure costs, less losses on higher voltages and O&M costs.

UoSC

Use of System Charges

400 V DISCOs

11 kV DISCOs

Z RS/KWH

CHARGES TO MAINTAIN 11KV NETWORK

Customers taking supply at 11kV have to pay X+Y+Z rupees per unit

132 KV DISCOs

Y RS/KWH

CHARGES TO MAINTAIN 132KV NETWORK

Customers taking supply at 132kV have to pay X+Y rupees per unit

220 KV NTDC

X RS/KWH

CHARGES OF NTDC + MO + SO

Customers taking supply at 220kV have to pay X rupees per unit

Same goes for % of Losses

220 kV Losses < 132 kV Losses < 11 kV Losses

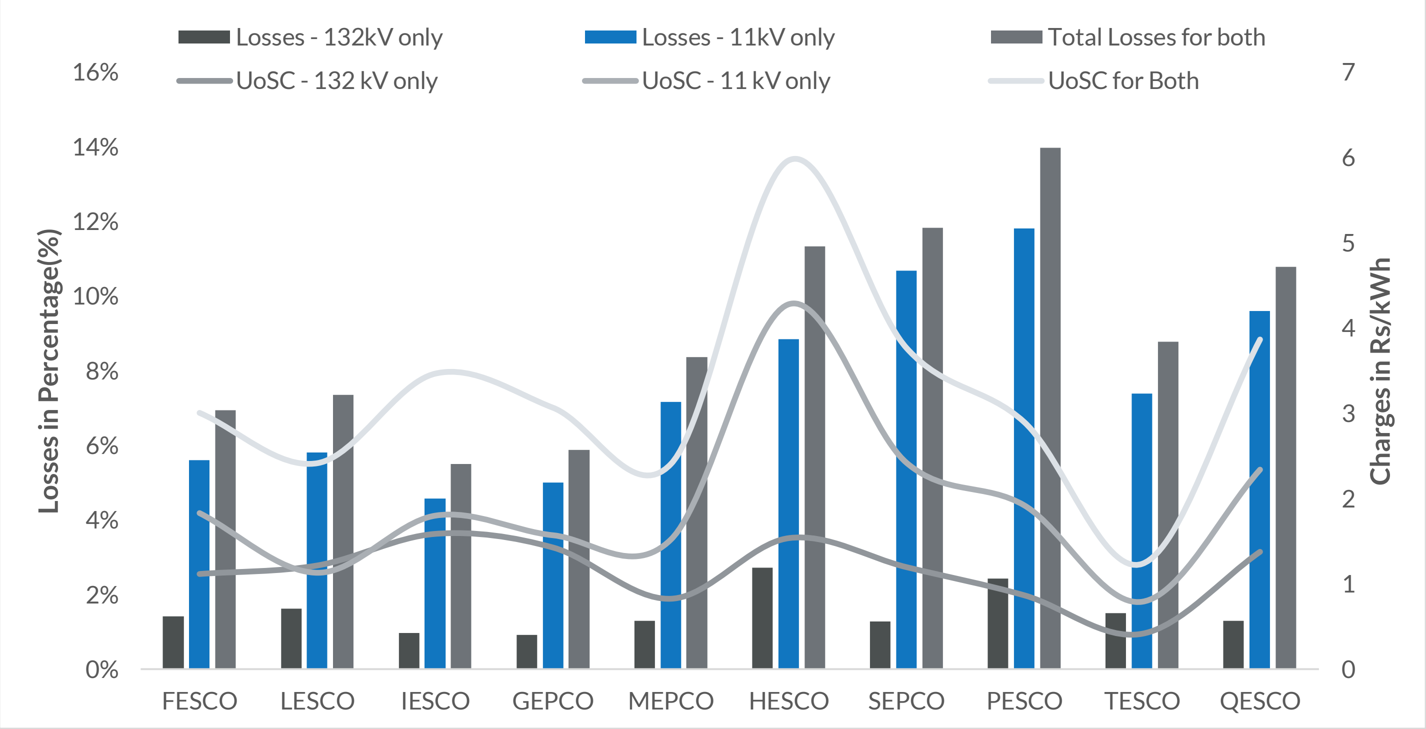
The addition of X+Y+Z is a simplified illustration for the common consumer. Actual calculations vary based on the real flow of electrons, losses at each level, and other influencing factors.

DISCOS ALLOWED – CHARGES & LOSSES

NEPRA has determined the following Use of System Charges (UoSC) and losses for each DISCO to charge the users of their systems as per the order dated June 14, 2024. The averages shown are simple averages, not weighted averages.

9.08%
Average losses to charge from 11kV Dx Users

1.55%
Average losses to charge from 132kV Tx Users



3.21 Rs./kWh
Average UoSC to charge from 11kV Dx Users

1.16 Rs./kWh
Average UoSC to charge from 132kV Tx Users

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RECOMMENDED TOTAL UOSC (WHEELING CHARGES)

Suggestion: Stranded Capacity Costs and Cross Subsidy Costs are all system inefficiency costs and shall be eliminated

Wheeling Charges for 132 kV Consumer

Use of System Charge Element	Use of System Charges (Rs/kWh)
NTDC Charges including SO & MO Fee	1.54
Distribution Company Charges for 132kV Users	1.16
Cross Subsidy	0
Stranded Capacity Costs	0
TOTAL	**2.7**

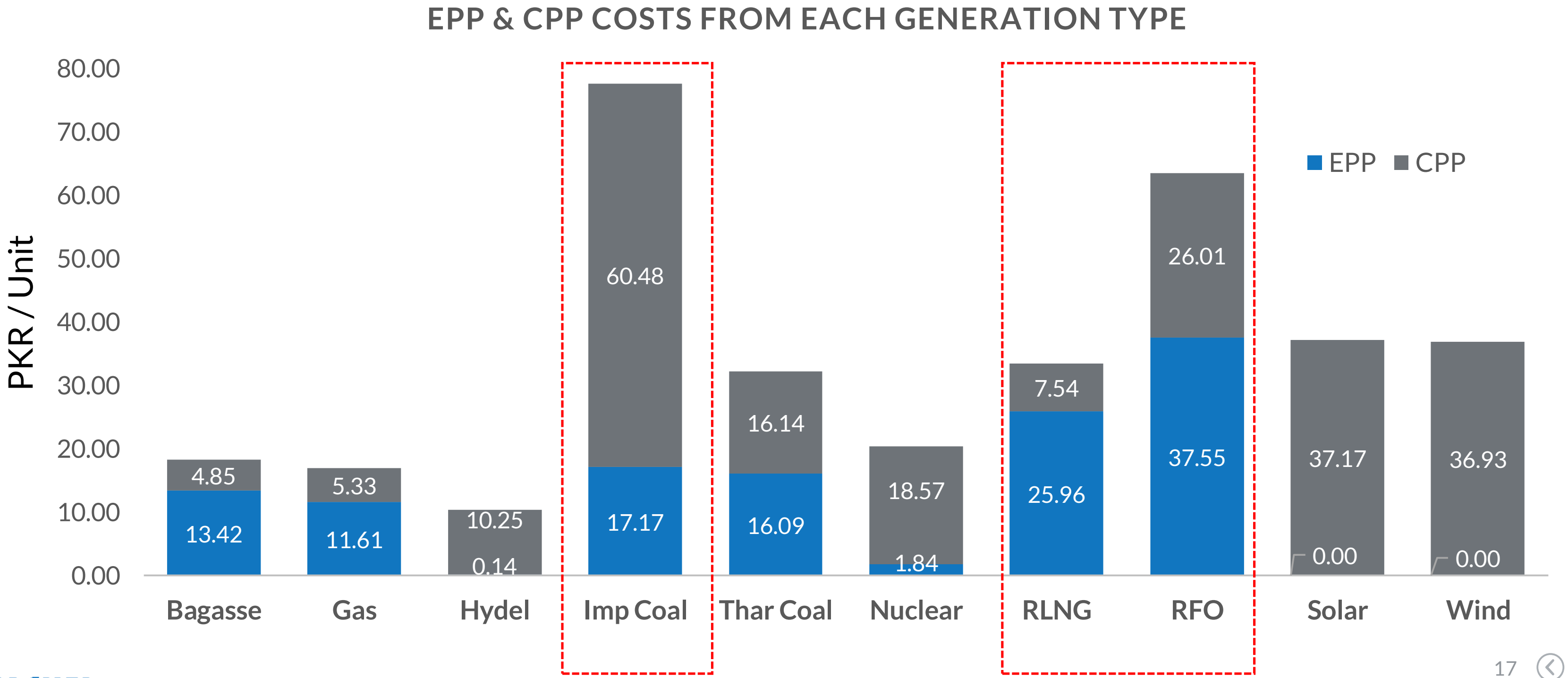
Wheeling Charges for 11 kV Consumer

Use of System Charge Element	Use of System Charges (Rs/kWh)
NTDC Charges including SO & MO Fee	1.54
Distribution Company Charges for 11kV Users	3.21
Cross Subsidy	0
Stranded Capacity Costs	0
TOTAL	**4.75**

Wheeling Charges for 220 kV Consumer shall be only NTDC charges including SO & MO Fee that is 1.54 Rupees / Unit.

HOW TO SOLVE CAPACITY (STRANDED) COST

From the NEPRA Approved PPP for FY 24-25 it is clear that **Imported Coal, RLNG, RFO and HSD** Plants are under utilized and their capacities are free. HSD plants are even not considered for Dispatch.



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HOW TO SOLVE CAPACITY (STRANDED) COST

- ✓ Allow partial allocation of existing capacity to ensure that pool prices do not increase.
- ✓ Decision on Marginal Prices of Power Plants:
  - ✓ **Less than 12 Rupees/Unit:** Capacity remains in the National Grid Pool.
  - ✓ **Between 13 to 34 Rupees/Unit:** Partial auction for wheeling is allowed, applicable to most plants using imported coal and RLNG.
  - ✓ **Above 34 Rupees/Unit:** As most of these plants are nearing retirement, their PPAs will be terminated. These plants will transition to a "Take & Pay" basis and be allowed to directly participate in the market.
- ✓ The Market Operator (MO) shall auction capacity requirement for few peak hours from the retired plants on monthly basis.
- ✓ Only plants with costs above pool prices shall be allowed to participate.
- ✓ A contractual framework can be easily created to carve out capacity from the pool.
- ✓ Allowing capacity auctions of existing plants in the CTBCM to Bulk Power Consumers (BPCs) will reduce the obligations of the Government of Pakistan (GoP) and benefit the customers.
- ✓ Renewable, nuclear, and hydel plants are must-run and not included in the merit list.
- ✓ BPCs shall be allowed to add new renewable sources including BESS, but existing thermal plant capacity shall be utilized in this way.

POWER PLANTS
MERIT ORDER LIST 01-JULY-2024

NATIONAL TRANSMISSION & DESPATCH COMPANY LTD.

PHONE: 051-8311557
EXCHANGE: 051-9258177, 9258178
FAX NO. 051-9250851

OFFICE OF THE
GENERAL MANAGER (SO)
NATIONAL POWER CONTROL CENTRE,
SECTOR H-8/1, ISLAMABAD.

No. 9103-16/GM (SO)/PPC/MO

Dated: 01/07/2024

OFFICE ORDER

SUBJECT: REVISED MERIT ORDER

Reference:
1. CPPA-G/MIT/6344 Dated: 01-07-2024
2. CPPA-G/MIT/6337-43 Dated: 28-06-2024

Revised Merit Order based on revised fuel prices (received to this office on 01-07-2024) for economic dispatch of thermal power plants (GENCO'S & IPPs) effective from 01-07-2024, is hereby issued for implementation.

GENERAL MANAGER (S.O)
NPCC, NTDC ISLAMABAD

What is a security constrained economic dispatch?

Security-constrained economic dispatch is an area-wide optimization process designed to meet electricity demand at the lowest cost, given the operational and reliability limitations of the area's generation fleet and transmission system.

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POWER PLANTS **MERIT ORDER LIST** 01-JULY-2024

Economical plants on top of merit list having marginal cost less than equal to 12 Rupees / Unit. These must stay in National Grid Pool.

Sr.No.	Plant Groups	Fuel Type	Specific Cost Rs. / kWh
1	UCH (upto 152,375 MWh)	Ges	**3.10880**
2	Thar Coal Block·I	Coal	**6.63090**
3	Engro Power Thar	Coal	**6.56630**
4	Thall NOVA	Coal	**669670**
5	Thar Energy Limited	Coal	**6.69670**
6	UBERTY Power (Upto 61,904 MWh)	Ges	**5.63700**
7	747 MW GUDDU (CC)	Gas	**8.38410**
8	Guddu (CC) B-1 (Unit 11-13)	Gas	**9.02860**
9	Foundation Power	Gas	**9.61345**
10	Guddu (CC) B-11 (Unit 5-10)	Ges	**10.02360**
11	Engro PowerGen	Gas	**10.03404**
12	747 MW GUOOU (OC)	Gas	**11.97090**
13	**UCH (above 152,375 MWh)**	**Gas**	**12.07316**

Sr.No.	Plant Groups	Fuel Type	Specific Cost Rs. / kWh
14	PORTQASIM	Coal	**13.49700**
15	Guddu(OC) B-1 (Unit 11-13)	Gas	**1360830**
16	lucky Electric Power Company	Coal	**14.03790**
17	UCH-11	Gas	**14.23393**
18	China Po.ver HUB Gen CO	Coal	**1440910**
19	Guddu(OC) B-11 (Unit 5-10)	Gas	**16.00096**
20	Sahiwal Power	Coal	**17.63230**
21	NPPMC-HBS (CC)	RLNG	**22.39236**
22	NPPMC • Balokl (CC)	RLNG	**22.61077**
23	QATPL· Bhikki (CC)	RLNG	**22.80790**
24	Punjab Thermal Power	RLNG	**22.88813**
25	LIBERTY Power (Above 61,904 MWh)	Gas	**24.04130**
26	Orient Power Company ltd	RLNG	**27.63976**
27	Halmore Power	RLNG	**27.78610**
28	Sapphire Electric Co	RLNG	**28.04226**
29	SaifPower	RLNG	**28.06862**
30	Nandipur (CC)	RLNG	**28.09860**
31	ROUSCH	RLNG	**30.67801**
32	ALTERN ENERGY LTO. (Ph-II)	RLNG	**3137290**
33	AttockGen	RFO	**31.66740**
34	Nishat Power ltd	RFO	**31.76060**
35	FKPCL	RLNG	**3322396**
36	Atlas Power	RFO	**3329180**
37	KEL	RFO	**33.57722**
38	**Uberty Power Tech Umited**	**RFO**	**3382648**

Plants with marginal costs ranging from 13 to 34 Rupees, primarily consisting of imported coal, imported RLNG, and RFO-based plants, should have their partial capacities auctioned in the open market.

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POWER PLANTS MERIT ORDER LIST 01-JULY-2024

Plants with specific costs above 34 Rupees per unit, primarily those operating on RFO, RLNG, and HSD, are mostly set to retire in the near future.
These plants should be allowed to participate in the open market.
For national grid obligations, peak hour monthly auctions should be conducted, with the lowest bidders being accepted on a take-and-pay basis.

Sr.No.	Plant Groups	Fuel Type	Specific Cost Rs. / kWh
39	Narowal Power	RFO	34.26970
40	Nishat Chunlan Power Ltd	RFO	34.72180
41	PAKGEN Power ltd.	RFO	36.21908
42	Davis Energen	RLNG	37.04311
43	LALPIR (Pvt) ltd	RFO	37.14696
44	Jamshoro B-1 (Unit 1)	RFO	37.48960
45	Muzaffargarh B-11 (Unit4)	RLNG	39.33160
46	Muzaffargarh B-1 (Unit -3)	RLNG	39.38700
47	ALTERN ENERGY LTD.(Ph-I)	RLNG	39.62180
48	Jamshoro B-II (Unit4)	RFO	40.09870
49	Muzaffargarh B-1 (Unit -1)	RLNG	40.22270
50	HUBCO	RFO	40.67900
51	Muzaffargarh B-1 (Unit -2)	RLNG	40.76080
52	Jamshoro B-11 (Unn 3)	RFO	40.95920
53	Muzaffargarh B-III (Unit -5)	RLNG	41.79120
54	**Jamshoro B-11 (Unit 2)**	**RFO**	42.09100

Sr.No.	Plant Groups	Fuel Type	Specific Cost Rs./ kWh
55	Muzaffargarh B-III (Unit -6)	RLNG	42.89230
56	SABA	RFO	43.86153
57	NPPMC- HBS (CC)	HSD	44.09573
58	Jamshoro B-11 (Unit 4)	RLNG	44.21310
59	Muzaffargarh B-11 (Unit 4)	RFO	44.97680
60	Mi.Jzaffargarh B-1 (Unit -3)	RFO	45.04370
61	Jamshoro B-11 (Unit 3)	RLNG	45.14890
62	Muzaffargarh B-1 (Unit -1)	RFO	46.02980
63	Jamshoro B-11 (Unit 2)	RLNG	46.35870
64	Muzaffargarh B-1 (Unit -2)	RFO	46.65110
65	Muzaffargarh B-III (Unit-S)	RFO	47.88080
66	Muzaffargarh B-III (Unit-6)	RFO	49.18590
67	Punjab Thermal Power	HSD	49.99446
68	QATPL - Bhikki (CC)	HSD	51.56449
69	NPPMC- Baloki (CC)	HSD	53.23605
70	Engro PowerGen	HSD	55.15776
71	Orient Power Company Ltd	HSD	57.24410
72	Halmore Power	HSD	57.26910
73	Sapphire Electric Co	HSD	57.81687
74	**Saif Power**	**HSD**	**57.82834**

PROPOSED ROLES ADJUSTMENT IN CTBCM

Proposing a new name for Market Operator

PEMO

(Pakistan Electricity Market Operator)

SAMPLE FRAMEWORK

to Auction the existing capacity in the open market

This Agent will take extra license of Electricity Trader

Legacy Generators → **Agency Role** (Who handle all IPPs contracts, who buys electricity on behalf of all Discos)

Agency Role → **DISCOs**: Full fill capacity requirement Of DISCOs say 30,000 MW

Agency Role → **Open Market**: Trade extra capacity directly in Market to the BPCs, may be On monthly and annual basis

- ✓ After consultation with System Operator and DISCOs, the Special Purpose Agent (that should be PPIB) will auction extra capacity directly in market. This will reduce burden of capacity on regulated consumers.

WHAT WE DO

Our team at Arzachel can help transform your project idea into a well-defined project layout, meticulously assessing various realization concepts. We conduct thorough investigations into the technical feasibility and financial viability of projects, laying the groundwork for potential project funding commitments.

Studies and Expert Appraisals

ENERGY MARKET ANALYSES

Comprehensive insights and research to identify market trends and opportunities, particularly focusing on CTBCM, to support informed decision-making.

FEASIBILITY STUDIES

Rigorous assessments of project viability, considering technical, economic, and logistical aspects to determine potential success.

POWER PURCHASE AGREEMENTS PPA ADVISORY SERVICES

A comprehensive range of Power Purchase Agreement (PPA/EPA) advisory services tailored to meet diverse client needs.

POWER PLANTS TARIFF STUDIES

We specialize in comprehensive tariff studies for power plants, with a focus on integrating renewable energy sources to optimize cost-efficiency, ensure regulatory compliance, and provide market-driven insights for informed decision-making.

TECHNO-ECONOMIC ANALYSES

Detailed evaluations of the technical and economic aspects of projects, providing a holistic understanding of their feasibility and profitability

ELECTRIC GRID, TRANSMISSION AND DISTRIBUTION INFRASTRUCTURE DESIGN

Comprehensive planning, design, and engineering of electric grid systems, including high-voltage transmission lines, substations, and robust distribution networks, to ensure efficient and reliable power delivery to end-users.

ABOUT US

At Arzachel, we are passionate team of experienced industry professionals with the vision to provide top-notch consultancy services to various industries. Our team has a diverse range of project experience in the power sector, having worked with top organizations such as NTDC, KE, WAPDA, DISCOs, SEC, DEWA, etc. We have also undertaken a number of industry and renewable energy projects. Our team of experts bring a wealth of knowledge and hands-on experience in the fields of power generation, transmission and distribution, renewable energy, project management, and energy market services. We are committed to provide innovative and effective solutions to our clients' most complex challenges, while maintaining the highest standards of quality and professionalism. With a proven track record of successful project delivery, we strive to exceed our clients' expectations and deliver value that makes a difference.

Our company name, "Arzachel," is a tribute to the renowned astronomer and astrologer from the Islamic Golden Age, al-Zarqālī, whose Latinized name was "Arzachel." Our name reflects the symbol of expertise and ingenuity of our ancestors, who were known for their ability to provide insightful solutions in their field. At Arzachel, we strive to embody those same qualities in our work, providing innovative and effective solutions to our clients' most complex challenges. By drawing inspiration from the past and leveraging modern technologies, we aim to continue the legacy of excellence that our name represents.

ARZACHEL

EMPOWERING YOUR ENERGY STRATEGY, TOGETHER.

ARZACHEL

Empowering Your Energy Strategy, Together

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List of Abbreviations

NEPRA	National Electric Power Regulatory Authority
CPPA-G	Central Power Purchasing Agency – Guarantee Limited
DISCOs	Distribution Companies
IAA	Independent Auction Administrator / Authority
NTDC	National Transmission & Dispatch Company
UOSC	Use of System Charges
MO	Market Operator
SO	System Operator
Tx	Transmission
Dx	Distribution
KWH	Kilo Watt Hour = Electricity Energy Unit
CTBCM	Competitive Trading Bilateral Contracts Market
PPA	Power Purchase Agreements
EPA	Energy Purchase Agreements
PPIB	Private Power & Infrastructure Board
BPC	Bulk Power Consumer (Load >= 1 MW)
SPA	Special Purpose Agent / Agency