NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
ISLAMIC REPUBLIC OF PAKISTAN

PERFORMANCE EVALUATION REPORT

OF

OPERATIONAL POWER PLANTS

FOR

FY 2023-24

UNDER

NEPRA PERFORMANCE STANDARDS (GENERATION) RULES, 2009

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FOREWORD

Electricity is the cornerstone of modern economies, powering industrial growth, driving technological innovation, and enhancing the overall quality of life. A reliable and consistent power supply is not only essential for daily living but also a critical enabler of national economic development. Beyond its mere availability, the affordability and reliability of electricity are fundamental to economic stability and societal well-being. For nations like Pakistan, where economic challenges are compounded by rising energy costs, ensuring affordable and reliable electricity is important for fostering sustainable development.

At the heart of any power system, the generation sector plays a pivotal role in determining the availability and cost of electricity. The efficiency, capacity, and reliability of this sector directly influence electricity prices, system stability, and the broader economic performance of the country. A well-functioning generation sector ensures that the power supply meets demand efficiently, while avoiding excessive capacity that can unnecessarily increase costs. In Pakistan, the cost of electricity generation constitutes a significant portion—nearly 82%—of the final price consumers pay. This disproportionate share places a heavy financial burden on households, businesses, and public services, making electricity unaffordable for many and exacerbating the country's economic challenges.

The high proportion of generation costs is primarily driven by surplus capacity, much of which was added under mechanisms where power plants are compensated based on their availability rather than their actual electricity production. This approach results in consumers bearing the cost of unused capacity, leading to higher electricity prices and inefficiencies in the power sector. The payments for idle plants often surpass the cost of actual electricity generation, creating a scenario where a significant portion of the electricity tariff is allocated to maintaining plants that do not actively contribute to the power supply. This inefficiency inflates electricity costs, increases the financial burden on consumers, and undermines the affordability and sustainability of the power system.

In addition to the issue of excessive generation capacity, the operational inefficiencies of different public power plants—such as Guddu 747 MW thermal power plant and 969 MW Neelum Jhelum hydroelectric power plant, etc.—have had a particularly detrimental impact on Pakistan's power sector. These inefficiencies not only drive up electricity prices for consumers but also place a significant financial burden on the national exchequer.

In addition to the challenges within the thermal power generation sector, Pakistan's transition to renewable energy (RE) also presents both opportunities and challenges. RE power plants—such as wind and solar—offer distinct advantages, including environmental sustainability, reduced dependence on fossil fuels, and no fuel cost. These plants contribute to a cleaner and greener energy mix, helping to mitigate the environmental impact of electricity generation. However, despite their clear environmental benefits, the tariffs of many older RE plants have escalated to levels that sometimes surpass those of conventional thermal power plants.

Moreover, the intermittent nature of renewable energy sources introduces financial complexities for the power sector. Unlike thermal plants, which can provide a steady supply of electricity, RE plants depend on weather conditions, time of day, and seasonal variations. This intermittency creates financial instability, as it often necessitates backup generation from more expensive and less environmentally friendly thermal plants to maintain grid stability. Additionally, the integration of renewable energy into the grid requires investment in energy storage technologies and flexible grid management, further adding to the financial burden on the power system.

The total installed capacity of RE Power Plants, including hydroelectric plants, as of June 30, 2024, stood 13,506.3 MW. However, it is important to note that due to fluctuation in primary energy sources such as hydrology, wind and solar irradiance, the actual available capacity at various instances has often been much lower as low as 1,478.5 MW. Therefore, in actual, despite having an installed capacity of around 45,123.9 MW, the all-time available capacity remains significantly lower.

The operational performance of Pakistan's electricity generation sector is not only constrained by internal challenges but is also significantly undermined by issues in the transmission and distribution sectors. Congestion in the transmission network hampers the ability of efficient power plants to operate at full capacity, preventing the optimal use of available generation. This results in the underutilization of cost-effective plants, forcing the system to rely on more expensive and less efficient sources of power.

Furthermore, the ongoing load shedding, exacerbated by high Aggregate Technical and Commercial (AT&C) losses—resulting from poor governance, mismanagement, weak billing systems, and systemic inefficiencies—contributes to the underutilization of existing power generation capacity that guarantees payment based on availability.

This report aims to evaluate the performance of Pakistan's electricity generation sector, providing a comprehensive analysis of how generation capacity, efficiency, and operational practices are impacting the power system. By reviewing this evaluation, stakeholders will gain valuable insights into how the sector can be optimized to ensure that electricity is not only reliable and sustainable but also affordable for all consumers. Addressing systemic inefficiencies, improving capacity utilization, and integrating renewable energy sources in a financially sustainable manner are essential steps toward securing a stable, cost-effective, and environmentally responsible power supply for Pakistan's future.

The findings of this report will serve as a crucial resource for policymakers, industry stakeholders, and consumers alike, offering actionable recommendations for reforming the power generation sector.

1. EXECUTIVE SUMMARY

The National Electric Power Regulatory Authority (NEPRA) is responsible for regulating Pakistan's power sector, ensuring the protection of both consumers' and power service providers' interests. In its regulatory capacity, NEPRA monitors the performance of generation, transmission, and distribution licensees.

To maintain transparency and ensure accountability in the power generation sector, NEPRA established the Performance Standards Generation Rules (PSGR) in 2009. Under these rules, generation companies are required to submit quarterly reports to NEPRA, detailing key performance parameters. These include metrics such as Installed Capacity, Reference Capacity, Net Generation, Service Hours, Standby Hours, Planned Outage Hours, Unplanned Outage Hours, Availability Factor, Net Capacity Factor, and Net Output Factor.

(a) **Installed Capacity**: The unit's total maximum potential generation capacity.
(b) **Reference Capacity**: The maximum generating capability, adjusted for Initial Dependable Capacity (IDC) or Annual Initial Dependable Capacity (AIDC), excluding auxiliary power consumption.
(c) **Net Generation**: The actual electricity generated, excluding power used for station service or auxiliary needs.
(d) **Service Hours**: The total time the unit was online and synchronized to the grid, actively generating power.
(e) **Standby Hours**: The time the unit was available but not utilized for economic reasons (e.g., lower cost plants being idle).
(f) **Planned Outage Hours**: The duration the unit was offline due to scheduled maintenance, overhauls, or planned repairs.
(g) **Unplanned Outage Hours**: The time the unit was offline due to unexpected issues such as equipment failures, delayed starts, or unforeseen shutdowns.
(h) **Availability Factor**: The ratio of Available Hours (when the unit could have operated) to Period Hours (total hours in the reporting period).
(i) **Net Capacity Factor (NCF)**: The ratio of Net Generation to the product of Net Capacity and Period Hours, reflecting plant efficiency.
(j) **Net Output Factor**: The ratio of Net Generation to the product of Net Capacity and Service Hours, indicating the actual output relative to available capacity.

As per the regulatory requirements, different generation licensees submitted their quarterly performance reports for the FY 2023-24. These reports have been thoroughly reviewed, and a comprehensive Performance Evaluation Report has been compiled.

The report highlights key findings on the operational performance of generation facilities across the sector, providing valuable insights into areas of strength, as well as identifying challenges and inefficiencies that need to be addressed to optimize the sector's overall performance. These findings are central to informing future regulatory decisions and operational improvements within the power generation sector.

Installed Capacity: In FY 2023-24, the country's total Installed Capacity (excluding CPPA-G's system SPPs/CPPs/NCPPs, import from Iran and net metering) was 45,123.9 MW, with the breakdown as follows:

- Thermal: 62% (27,847.6 MW)
- Hydel: 24% (10,648.6 MW)
- Renewable: 06% (3,007.7 MW)
- Nuclear: 08% (3,620 MW)

Reference Capacity: The total Reference Capacity was recorded at 42,250.1 MW, distributed as:

- Thermal: 60% (25,452.3 MW)
- Hydel: 25% (10,605 MW)
- Renewable: 07% (2,927.3 MW)
- Nuclear: 08% (3,265.5 MW)

Net Generation: The total Net Generation for FY 2023-24 reached 136,093 GWh, with the following contributions:

- Thermal: 49% (67,197 GWh)
- Hydel: 29% (39,958 GWh)
- Renewable: 05% (6,171 GWh)
- Nuclear: 17% (22,767 GWh)

CPPA-G System:

Thermal Power Plant: Several thermal plants, particularly those relying on imported fuels like RFO, RLNG, and imported coal, reported low service hours (ranging from 0% to 59.5%), mainly due to System Operator instructions. Consequently, the NCF for these plants varied between 0% and 37.3%, reflecting underutilization.

Both TPS Guddu and Guddu 747 experienced low service hours of 34.1% and 42.1%, respectively, primarily due to unplanned outages from technical faults. This resulted in Availability Factors of 38.6% and 46.6%, indicating reduced operational efficiency.

Nuclear Power Plants: The C2, C3, and C4 nuclear plants, with capacities ranging from 325 MW to 340 MW, maintained Availability Factors between 87.1% and 100%. These plants also demonstrated strong NCF, with C2 leading in net generation, producing 2,520,364 MWh. The plants performed reliably, with Net Output Factors above 95%, signaling robust operational efficiency.

The K2 and C1 nuclear plants exhibited lower Availability Factors (ranging from 74.5% to 78%) due to planned outages, which in turn led to reduced NCF between 53.4% and 66%. While the plants' performance was impacted by the outages, their operational resilience during non-outage periods remains noteworthy.

The K3 nuclear plant, with a capacity of 1,145 MW, demonstrated substantial net generation of 8,104,145 MWh and an impressive Availability Factor of 98.2%. It achieved a NCF of 90.7% and a Net Output Factor of 92.3%, reflecting exceptional operational performance and efficient

utilization of capacity.

Hydel Power Plants: Several hydel plants, including Ghazi Barotha, Warsak, and Chichoki, operated with low service hours (ranging from 27.7% to 59.2%) due to adverse hydrological conditions. This led to NCF ranging from 11.4% to 52.8%, reflecting lower-than-expected output due to resource availability issues.

Some hydel plants, such as Nandipur, Jinnah, and Neelum-Jhelum, encountered unplanned outages, which severely impacted their performance. These outages reduced their Availability Factors to between 45.3% and 71.9%, with NCF ranging from 19.1% to 31.1%. Additionally, Ranolia remained completely out of service throughout the fiscal year, recording 0% availability and capacity.

Wind Power Plants: Wind power plants exhibited Availability Factors ranging from 81.5% to 100%, indicating their capacity to remain operational. However, their NCF ranged from 11.7% to 38.6%, reflecting challenges in harnessing consistent energy due to the intermittency of wind conditions and system constraints.

Solar Power Plants: Solar plants showed Availability Factors ranging from 47.9% to 100%, which demonstrates their potential for grid integration. However, the NCF ranged from 12.8% to 24.9%, highlighting the challenges posed by weather conditions, particularly during periods of cloud cover or limited sunlight.

Baggase-Based Power Plants: Bagasse-based power plants exhibited Availability Factors ranging from 31.9% to 94.5% and NCF between 11% and 79.8%. Despite these variations, the Net Output Factors for these plants ranged from 36.5% to 98.6%, indicating a reasonable level of efficiency in converting available capacity into usable power, although operational consistency remains a concern.

KE System:
Several power plants within KE's system, including BQPS-I, KCCPP, Tapal, and Gul Ahmed, reported low service hour percentages, ranging from 9.3% to 30.9%. This underperformance was primarily due to their low ranking in the EMO, which kept them on standby for extended periods. Consequently, the NCF for these plants varied between 6.1% and 27.4%, indicating significant underutilization.

Both KGTPS and SGTPS reported alarmingly low NCF, ranging from 0.2% to 0.02%. These figures suggest severe operational challenges, pointing to fuel supply issues that are impeding their performance.

BQPS-III, despite achieving COD recently and ranking higher in the Economic Merit Order (EMO), also struggled with suboptimal performance. The plant recorded an Availability Factor of only 65.3% and a NCF of 52.9%, indicating notable downtime and underutilization. These figures suggest significant operational inefficiencies, raising concerns about the plant's reliability within the generation fleet.

2. OVERVIEW OF GENERATION SECTOR

Pakistan's power generation sector is critical to the country's energy infrastructure, directly impacting electricity supply and national economic stability. Despite substantial capacity, the sector faces numerous challenges that undermine its efficiency and drive up costs. As of June 2024, Pakistan's total installed generation capacity stands at 45,123.9 MW, with thermal power accounting for the majority. Renewable energy sources, including hydro, wind, solar, and bagasse, contribute a growing but still limited share of the overall energy mix. The sector remains heavily reliant on thermal generation, particularly from Independent Power Producers (IPPs), which makes up a significant portion of the installed capacity. Despite this, inefficiencies, underutilized capacity, transmission constraints, and the intermittency of renewable energy sources continue to strain the sector, impacting both performance and cost-effectiveness.

The financial burden on the sector is substantial, with over 82% of electricity costs in FY 2023-24 attributed to generation. A key issue driving these costs is overcapacity. While installed generation capacity is impressive, a significant portion remains underutilized, with many plants operating at part-load due to overestimated demand. Payments to these underutilized plants, based on their availability rather than actual output, further intensify financial pressures. These inefficiencies—stemming from factors such as outdated technology, poor fuel supply, and high start-up costs—are compounded by the challenges of integrating renewable energy into the grid.

Challenges in Thermal Power Generation:

Thermal power generation remains the backbone of Pakistan's electricity supply, with a significant portion of the country's capacity coming from thermal plants. Many of private sector thermal power plants remain underutilized or even idle. This underutilization is primarily due to low demand and their low ranking in the EMO, which prioritizes cheaper energy sources for dispatch. The consequence of these plants sitting idle or operating below capacity is an increased cost burden from the capacity component, which is passed on to consumers.

In stark contrast, a large portion of Pakistan's public sector thermal plants is old, outdated, and inefficient. Despite being technologically behind, many of these plants continue to remain in generation basket well beyond their designed lifespan, often receiving payments based on availability rather than actual power generation. This arrangement further strains the financial sustainability of the power sector, as the consumers are still obligated to pay for underperforming or idle units.

A case in point is the 747 MW Guddu Power Plant, one of the more efficient public sector plants, which is operating in open-cycle mode due to machine damage. This mode of operation severely limits the plant's efficiency and increases its operational costs.

Moreover, the reliance on imported fuels—such as Residual Furnace Oil (RFO), Re-gasified Liquefied Natural Gas (RLNG), and High-Speed Diesel (HSD)—further elevates generation costs. These fuels are more expensive and subject to international price fluctuations, leaving the power sector vulnerable to global market volatility. This not only drives up electricity prices but also makes the cost of power generation less predictable and unsustainable for consumers.

On the other hand, base-load plants like those powered by Thar coal and nuclear energy offer a more affordable and stable cost structure. Both of these energy sources are critical to ensuring long-term energy security at lower costs. However, their potential for cost-effectiveness can be

further enhanced if they operate at optimal load levels.

Renewable Energy and Intermittency Challenges:
While renewable energy sources in Pakistan, including hydro, wind, and solar, are growing, they still make up a relatively small portion of the overall energy mix, contributing around 30% of the total installed capacity. Despite their low operating costs, these sources face significant challenges due to intermittency. The generation of solar and wind energy is highly dependent on weather conditions, with output fluctuating based on factors like cloud cover, low wind speeds, or periods of low hydrology in the case of hydroelectric plants. This variability can lead to significant gaps in generation, making it difficult to rely on renewable energy sources as a stable and consistent power supply. As a result, thermal power plants are often required to compensate for the shortfall, further straining the sector and driving up overall generation costs.

In FY 2023-24, the underutilization of renewable energy plants was exacerbated by evacuation problems—primarily related to transmission bottlenecks and grid infrastructure limitations. Many renewable energy plants are not able to fully contribute to the grid during peak generation periods due to the lack of adequate transmission capacity to carry power from remote renewable sites to demand centers. This underutilization not only reduces the efficiency of renewable energy investments but also places greater pressure on thermal plants to meet electricity demand.

To address the intermittency challenges of renewable energy and improve grid stability, integrating energy storage solutions is critical. Technologies such as batteries or pumped hydro storage could help smooth out fluctuations in renewable generation, storing excess power during times of high availability and releasing it when generation drops. However, the scalability and cost-effectiveness of these storage solutions remain key factors in their feasibility. Until more affordable and scalable storage options are developed, renewable energy's role in the energy mix will continue to be limited by its intermittency.

In conclusion, while renewable energy sources offer significant potential for reducing reliance on fossil fuels, their intermittency poses ongoing challenges for grid stability and cost efficiency.

Evacuation Challenges Faced by Cheaper Power Plants:
A major inefficiency in Pakistan's power sector stems from a significant geographical mismatch between the locations of power generation and consumption. The majority of the country's more cost-effective generation capacity—primarily thermal and renewable plants, except of hydro—are concentrated in the southern regions. However, the largest demand centers are in the central parts of the country, often located 800-900 km away. This spatial misalignment is exacerbated by inadequate transmission infrastructure, which is unable to efficiently transport electricity from the southern generation hubs to the central load centers. As a result, cheaper, more efficient power plants in the south, including those utilizing local fuel sources, are underutilized, while more expensive plants—typically located closer to demand centers in the north—are dispatched to meet electricity demand.

This inefficiency in power evacuation significantly increases electricity generation costs. More expensive power plants, often reliant on imported fuels, are brought online to fill the gap created by the transmission constraints, driving up overall electricity prices. Consequently, consumers bear the financial burden of higher tariffs, which undermines efforts to make electricity more affordable. Additionally, the underutilization of cheaper, more efficient plants in the south further compounds the financial strain on the sector, as these plants still require fixed capacity payments, even when

they are not fully operational.

To address these challenges, there is an urgent need to improve Pakistan's transmission infrastructure.

Operational and Financial Inefficiencies:
The financial strain on the sector is further compounded by inefficiencies in plant operations. Pakistan's thermal plants often operate at part-load, which increases operational costs and contributes to a financial burden. In addition to the costs incurred from part-load operations, deviations from the EMO—which prioritizes dispatching lower-cost electricity—added a substantial amount to the overall cost of generation in FY 2023-24. Gas supply issues, including the constraints of long-term contracts, line pack limitations, and transmission bottlenecks, further exacerbate the financial inefficiencies within Pakistan's power sector.

Public sector plants, particularly those under GENCOs, continue to underperform due to outdated technology, poor maintenance, and a lack of investment in modernization. Many of these plants remain a financial burden on the system, as they receive payments based on their availability rather than their actual power generation. This leads to a situation where the government and consumers continue to pay for underperforming plants, exacerbating the financial challenges in the power sector.

Addressing the Challenges: Strategic Reforms:
To address these issues, Pakistan's power generation sector must undertake several critical reforms. First, the country must optimize the utilization of existing generation assets by improving operational efficiency and addressing the inefficiencies in both thermal and renewable plants. This could involve modernizing existing plants, decommissioning outdated ones, or restructuring inefficient power agreements. Second, to integrate renewable energy more effectively, the transmission and distribution systems must be upgraded to handle the variability and intermittency of wind and solar power. Energy storage solutions, if proven cost-effective, should be incorporated into the grid to provide reliable backup for renewable generation.

A more effective implementation of the EMO is also essential to reduce reliance on expensive thermal generation and prioritize the dispatch of lower-cost electricity. Improved fuel procurement and dispatch management will help reduce generation costs and relieve financial pressures on consumers. Additionally, adopting a more comprehensive planning approach—one that considers long-term sustainability, realistic demand forecasting, and energy transition goals—will help avoid overcapacity and ensure that new plants are only commissioned when they align with actual demand.

3. NEPRA PERFORMANCE STANDARDS (GENERATION) RULES, 2009

Under the powers conferred by Clause (k) of Section 46 of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997, in conjunction with Clause (c) of sub-section (2) of Section 7 and Section 34 of the same Act, the NEPRA, with prior approval from the Federal Government, established the Performance Standards (Generation) Rules, 2009. The purpose of these rules is to ensure that electric generation facilities and power plants operate efficiently, while maintaining reliable and adequate electricity service for transmission and distribution providers, all within prescribed operational parameters.

- **Quality of Supply**: According to Rule 3 of the NEPRA PSGR 2009, generation facilities are required to maintain performance standards by ensuring that the voltage and frequency of the electricity supplied fall within the normal operational limits as outlined in the relevant guidelines and documents.

- **Data Requirements**: As per Rule 4 of the NEPRA PSGR 2009, generation licensees must calculate key operational indicators for their generating facilities, as specified in Forms I and II of these rules. These data points must be reported on a regular basis to NEPRA under sub-rule (2) of Rule 5.

- **Reporting Requirement**: Rule 5(2) of the NEPRA PSGR 2009, stipulates that the performance reports, covering the key indicators mentioned in Rule 4, should be submitted on a quarterly basis. The first report was required following the publication of these rules in the official Gazette.

In compliance with the aforementioned reporting requirements, various generation licensees submitted their quarterly performance reports for the FY 2023-24. These reports, covering key performance indicators for operational generation facilities, have been reviewed, and a comprehensive Performance Evaluation Report has been prepared.

4. ASSESSMENT OF POWER PLANT PERFORMANCE IN PAKISTAN'S ELECTRICITY SECTOR

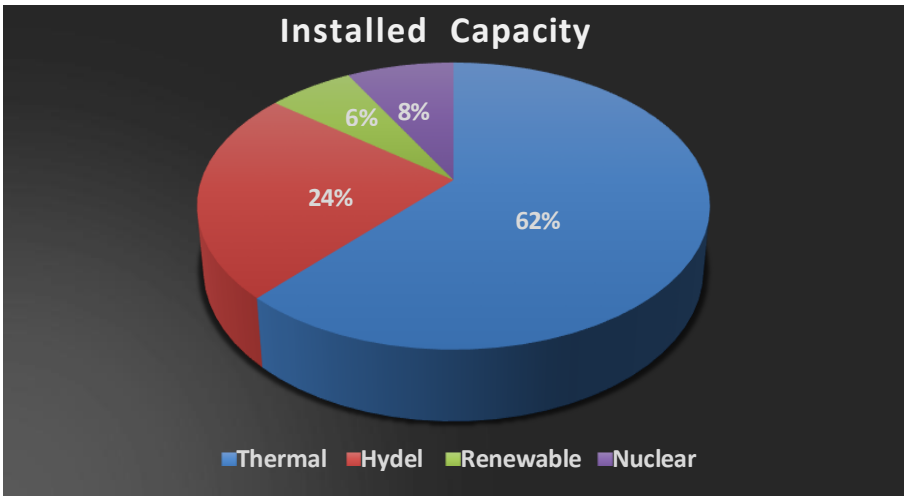
Assessing the performance of power plants in Pakistan's electricity sector is essential for evaluating the efficiency, reliability, and sustainability of the country's power generation. This involves analyzing a diverse mix of plants, including thermal, nuclear, hydropower, and RE sources, using key performance metrics such as NCF, availability factor, and output efficiency. Given the sector's heavy reliance on both conventional and intermittent renewable energy, performance assessments are critical for identifying inefficiencies, optimizing plant dispatch, and improving grid stability. By highlighting underperforming plants and addressing operational challenges, these assessments can help better planning, reduce operational costs, lower electricity prices for consumers, and support the long-term goal of a more reliable, cost-efficient, and sustainable energy system.

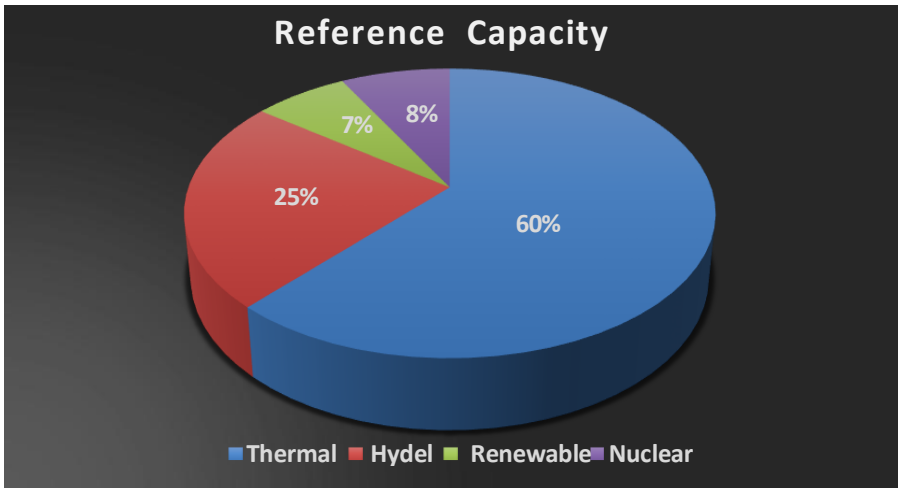
4.1 Performance Assessment of Power Plants Across Different Technologies:

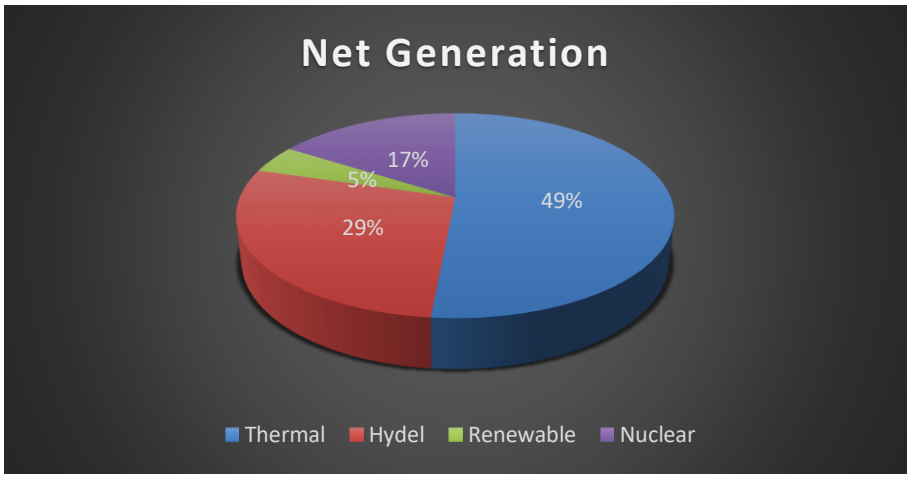
Performance assessment of power plants across different technologies involves evaluating the efficiency and reliability of various generation sources, including thermal, nuclear, hydropower, and RE plants. By examining key performance metrics such as NCF, availability, and output efficiency, this assessment helps identify strengths and weaknesses in each technology. The following table presents a performance assessment of Power Plants across various technologies:

Parameter	Thermal	Hydel	Renewable	Nuclear	Total
Count	53	34	58	6	**151**
Installed Capacity (MW)	27,847.6	10,648.6	3,007.7	3,620.0	**45,123.9**
Reference Capacity (MW)	25,452.3	10,605.0	2,927.3	3,265.5	**42,250.1**
Net Generation (GWh)	67,197	39,958	6,171	22,767	**136,093**
Average Service Duration (Hours)	3,600	4,858	6,219	7,783	**5,615**
Average Standby Duration (Hours)	4,028	2,329	1,259	0	**1,904**
Average Planned Outage Duration (Hours)	517	755	606	799	**669**
Average Unplanned Outage Duration (Hours)	460	605	407	195	**417**
Average Availability Factor (%)	86.8	81.8	85.1	88.6	**85.6**
Average Net Capacity Factor (%)	30.1	42.9	24.0	79.4	**36.7**
Average Net Output Factor (%)	67	77.2	33.9	80.8	**57.4**

Graphic Illustration:







Inference:

The data provided for the FY 2023-24, as shown in the table and graphs, presents the following distribution of energy sources across the power system:

- **Installed Capacity**: The total system capacity of 45,123.9 MW was predominantly made up of Thermal (62%, 27,847.6 MW), followed by Hydel (24%, 10,648.6 MW), Nuclear (8%, 3,620 MW), and Renewable (6%, 3,007.7 MW).
- **Reference Capacity**: The Reference Capacity for the system in FY 2023-24, totaling 42,250.1 MW, mirrored this distribution, with Thermal accounting for 60% (25,452.3 MW), Hydel 25% (10,605 MW), Nuclear 8% (3,265.5 MW), and Renewable 7% (2,927.3 MW).
- **Net Generation**: The total Net Generation for the fiscal year reached 136,093 GWh, with Thermal contributing 49% (67,197 GWh), Hydel 29% (39,958 GWh), Nuclear 17% (22,767 GWh), and Renewable 5% (6,171 GWh).

This data underscores the continued dominance of Thermal generation, which remains the largest contributor to both installed capacity and net generation. Hydel and Nuclear sources also play significant roles in the energy mix, contributing a substantial share to the total generation. Meanwhile, although the Renewable sector is expanding, it still represents a smaller portion of the total installed capacity and net generation.

4.2 Performance Metrics Overview:

Performance metrics overview in the power sector provides a framework for evaluating the efficiency, reliability, and economic viability of power plants. Key metrics, such as NCF, availability factor, and output efficiency, help assess how effectively plants are utilizing their installed capacity and meeting electricity demand. These metrics also enable comparisons across different plant technologies, from thermal to renewable sources, highlighting areas for improvement. By tracking performance over time, utilities and policymakers can optimize plant dispatch, reduce operational costs, and enhance the overall stability and cost-effectiveness of the power grid.

4.2.1 Plants Connected with NTDC System:

The NTDC system comprises a diverse mix of power plants, including thermal, nuclear, hydropower, and RE sources such as wind, solar, and bagasse-based stations. Most thermal plants receive fixed payments based on availability rather than actual dispatch, while RE plants like wind and solar are classified as "Must-Run" to prioritize renewable generation.

Hence, efficient planning is critical when incorporating plants that are paid for availability into the energy mix. Ensuring that added capacity aligns with actual demand is essential for optimizing plant utilization. Maximizing the utilization of plants with fixed payments based on availability, helps lower per-unit electricity costs. In Pakistan, the addition of capacity based on availability payments has at times exceeded demand, leading to underutilization and low NCF, which drives up electricity tariffs. Conversely, at other times, inadequate capacity has resulted in severe load shedding and economic losses. Strategic management of plants paid for availability, including aligning generation with actual demand and optimizing plant dispatch, is necessary to reduce inefficiencies and minimize the financial burden on consumers.

Unlike thermal plants, RE plants are not compensated based on availability but are classified as "Must Run". This classification helps maximize the use of clean energy, reduces greenhouse gas emissions, and enhances grid stability by minimizing curtailment and reliance on fossil fuels. RE plants also contribute to energy security, diversify the energy mix, and attract further investment in renewables. By prioritizing the consistent dispatch of RE plants, grids can lower costs, reduce dependence on imported fuels, and meet long-term sustainability and climate goals.

Furthermore, the integration of RE plants into the grid can significantly enhance energy resilience. Another key benefit of prioritizing RE plants is the potential for long-term economic growth. As the cost of renewable technologies continues to decrease, RE plants offer an increasingly competitive alternative to traditional fossil fuel-based generation. Moreover, the consistent operation of renewable plants reduces the need for costly peaking power plants, which are typically powered by fossil fuels and operate only during periods of high demand.

In addition, the transition towards a cleaner energy mix, with a higher share of RE generation, plays a pivotal role in meeting international climate commitments. Countries aiming to reduce their carbon footprints and meet targets set under agreements such as the Paris Climate Accord can achieve significant progress by enhancing the contribution of RE in their energy mix. This shift not only supports climate goals but also helps improve air quality, which has direct health benefits for the population.

However, RE plants face several challenges, including intermittency, and grid integration issues. Variability in Hydrology, wind and solar generation can cause mismatches between supply and demand, necessitating backup power from conventional sources or energy storage solutions. While grid infrastructure must be upgraded to accommodate these fluctuations, energy storage technologies remain costly and inefficient. In FY 2023-24, several thermal plants, especially those relying on imported fuels, underperformed due to low demand from DISCOs, leading to extended standby periods. This resulted in low NCFs, which reduced efficiency and increased electricity costs. Aligning generation with actual demand and optimizing dispatch is crucial to minimize inefficiencies and ensure cost-effective power generation for consumers.

In the following tables, the plants are categorized into different performance slabs based on their availability, NCF, and Net Output Factor (NOF) to assess their operational efficiency.

Availability Factor

The following sections break down how these power plants fall into different brackets of Availability Factors during FY 2023-24:

Availability Factor	No. of Plants	Combined Capacity	Name of Power Plants
%	**Nos.**	**MW**	**Names**
Above 90	87	19,707.4	**Thermal** (25 Nos. – 12,708 MW): Kohinoor Energy, CPHGC, Bhikki, Attock Gen, Hubco Narowal, Lalpir, Haveli Bahadur Shah (HBS), Liberty Power Tech., Balloki, Rousch Power, Thal Nova, Nishat Chunian, Thar Energy, Nishat Power, Foundation Power, Engro Powergen Qadirpur, CCPP Nandipur, Sapphire Electric, HUBCO, Orient Power, Lucky Electric, Engro Thar, Uch Power, Atlas Power, TNB Liberty Power. **Hydel** (18 Nos. – 3,014 MW): Karot, Renala, New Bong Escape, Patrind, Malakand-III, Gulpur, Daral Khwar, Shadiwal, Chichoki, Chitral, Allai Khwar, Duber Khwar, Ghazi Barotha, Khan Khwar, Shishi, Pehur, Reshun, Machai. **Wind** (35 Nos. – 1,789.075 MW): Artistic Wind, DIN Energy, Liberty Wind Power-II, Artistic Energy, 3 Gorges 3rd, Yunus Energy, ACT Wind, ACT 2 DIN, Liberty Wind Power-I, 3 Gorges 1st, Gul Ahmed Wind, 3 Gorges 2nd, Sachal Energy, UEP Wind, Hydro China Dawood, Gul Ahmed Electric, Zephyr Power, Tricon Boston – B, Foundation Wind-I, Foundation Wind-II, FFC Energy, Tricon Boston – C, Tricon Boston – A, Master Wind, NASDA Green Energy Ltd., Metro Wind, Metro Power, Lucky Renewables, Tenega Generasi, Lakeside Energy, Hawa Energy, Jhimpir Power, Indus Wind, Master Green, Sapphire Wind. **Solar** (5 Nos. – 268 MW): Atlas Solar, Helios, Harappa, HNDS, Meridian. **Baggase** (1 No. – 118.8 MW): Fatima Energy. **Nuclear** (3 Nos. – 1,810 MW): C2, K3, C4.
81-90	19	10,713.8	**Thermal** (10 Nos. – 6,702.8 MW): Sahiwal Coal, Halmore, Saba Power, Uch-II Power, Thar Coal Block (TCB)-1, Trimmu, Port Qasim, PakGen, Saif Power, Fauji Kabirwala (FKPCL). **Hydel** (4 Nos. – 3,550.4 MW): Dargai, Jagran-I, Jabban, Tarbela. **Wind** (1 Nos. – 56.4 MW): Zorlu Enerji. **Solar** (1 No. – 12 MW): AJ Power. **Baggase** (2 Nos. – 52.7 MW): JDW-II, JDW-III. **Nuclear** (1 No. – 340 MW): C3.

Availability Factor

Availability Factor	No. of Plants	Combined Capacity	Name of Power Plants
%	**Nos.**	**MW**	**Names**
71-80	9	5,262.76	**Thermal** (1 No. – 850 MW): TPS Jamshoro. **Hydel** (6 Nos. – 2,942.76 MW): Tarbela 4th Extension, Chashma, Rasul, Mangla, Nandipur, Warsak. **Nuclear** (2 Nos. – 1,470 MW): C1, K2.
61-70	3	1,462	**Thermal** (1 No. – 1,350 MW): TPS M/Garh. **Hydel** (2 Nos. – 112 MW): Golen Gol, Kurram Garhi.
51-60	3	1,014	**Hydel** (1 No. – 969 MW): Neelum Jhelum. **Baggase** (2 Nos. – 45 MW): RYK Mills, Hamza Sugar Mills.
41-50	7	1,279	**Thermal** (1 No. – 747 MW): Guddu 747. **Hydel** (1 No. – 96 MW): Jinnah Hydel. **Solar** (4 Nos. – 400 MW): Quaid-e-Azam Solar, Appolo Solar, Best Green Energy, Crest Energy. **Baggase** (1 No. – 36 MW): Al-Moiz Industries.
31-40	4	725.48	**Thermal** (1 No. – 600 MW): TPS Guddu. **Baggase** (3 Nos. – 125.48 MW): Chiniot Power, Thal Industries (Layyah), Chanar Energy.
21-30	1	17.4	**Hydel** (1 No. – 17.4 MW): Gomal Zam.
11-20	0	0	-
00-10	2	1,617	**Thermal** (1 No. – 1,600 MW): KAPCO. **Hydel** (1 No. – 17 MW): Ranolia.

Net Capacity Factor

The following sections break down how these power plants fall into different brackets of Net Capacity Factors**,** based on their utilization during FY 2023-24:

Net Capacity Factor	No. of Plants	Combined Capacity	Name of Power Plants
%	**Nos.**	**MW**	**Names**
Above 90	3	1,810	**Nuclear** (3 Nos. – 1,810 MW): C2, C4, K3.
81-90	2	926	**Thermal** (1 No. – 586 MW): Uch Power. **Nuclear** (1 No. – 349 MW): C3.
71-80	7	2,834.6	**Thermal** (5 Nos. – 2,781.9 MW): HBS, Thal Nova, Thar Energy, Foundation Power, Engro Thar. **Baggase** (2 Nos. – 52.7 MW): JDW-II, JDW-III.
61-70	6	3,961.5	**Thermal** (3 Nos. – 2,999.5 MW): TCB-1, Balloki, Uch-II Power. **Hydel** (2 Nos. – 206 MW): Chashma, Jabban. **Nuclear** (1 No. – 1,145 MW): K2.
51-60	6	3,733	**Hydel** (5 Nos. – 3,408 MW): Ghazi Barotha, Mangla, New Bong Escape, Khan Khwar, Karot. **Nuclear** (1 No. – 325 MW): C1.
41-50	6	4,225	**Thermal** (2 Nos. – 461 MW): TNB Liberty Power, Engro Powergen Qadirpur. **Hydel** (3 Nos. – 3,749 MW): Tarbela, Patrind, Allai Khwar. **Baggase** (1 No. 15 MW): Hamza Sugar Mills.
31-40	24	5,747.4	**Thermal** (5 Nos. – 3,410.8 MW): Orient Power, Bhikki, Guddu 747, Lucky Electric, TPS Guddu. **Hydel** (14 Nos. – 2,029.06 MW): Duber Khwar, Daral Khwar, Rasul, Dargai, Machai, Tarbela 4th Extension, Warsak, Pehur, Shadiwal, Malakand-III, Nandipur, Kurram Garhi, Reshun, Jagran-I. **Wind** (3 Nos. – 159.035 MW): Artistic Energy, Hawa Energy, Metro Wind. **Baggase** (2 Nos. – 148.8 MW): Fatima Energy, RYK Mills.

Net Capacity Factor

Net Capacity Factor	No. of Plants	Combined Capacity	Name of Power Plants
%	**Nos.**	**MW**	**Names**
21-30	40	4,153.32	**Thermal** (4 Nos. – 2,255.8 MW): Trimmu, Sapphire Electric, Nishat Power, CCPP Nandipur. **Hydel** (4 Nos. – 212.2 MW): Gulpur, Chitral, Chichoki, Jinnah Hydel. **Wind** (26 Nos. – 1,331.84 MW): Foundation Wind-II, Gul Ahmed Electric Ltd., Zephyr Power, Indus Wind, Lakeside Energy, NASDA Green Energy, ACT Wind, ACT 2 DIN, Sachal Energy, Tricon Boston – A, 3 Gorges 1st, Artistic Wind, Liberty Wind Power-II, DIN Energy, Liberty Wind Power-I, Tricon Boston – B, Tricon Boston – C, Master Green, Jhimpir Power, Zorlu Enerji, Tenega Generasi, FFC Energy, Hydro China Dawood, UEP Wind, Foundation Wind-I, Metro Power. **Solar** (4 Nos. – 250 MW): Atlas Solar, Helios, Meridian, HNDS. **Baggase** (2 Nos. – 103.48 MW): Thal Industies (Layyah), Chiniot Power.
11-20	30	5,179.2	**Thermal** (10 Nos. – 3,239.3 MW): Kohinoor Energy, Sahiwal Coal, Attock Gen, Nishat Chunian, Liberty Power Tech, Atlas Power, Saif Power, Lalpir, Halmore, Hubco Narowal. **Hydel** (5 Nos. – 1,097.3 MW): Neelum Jhelum, Golen Gol, Gomal Zam, Shishi, Renala. **Wind** (7 Nos. – 354.6 MW): 3 Gorges 2nd, Yunus Energy, Gul Ahmed Wind, Master Wind, Sapphire Wind, 3 Gorges 3rd Wind Farm, Lucky Renewables. **Solar** (6 Nos. 430 MW): Harappa, Crest Energy, Best Green Energy, Appolo Solar, Quaid-e-Azam Solar, AJ Power. **Baggase** (2 Nos. – 5,126.8 MW): Al-Moiz Industries, Chanar Energy.
00-10	11	8,840	**Thermal** (10 Nos. – 8,823 MW): Port Qasim, PakGen, FKPCL, Saba Power, CPHGC, Rousch Power, HUBCO, TPS Jamshoro, TPS M/Garh, KAPCO. **Hydel** (1 Nos. – 17.2 MW): Ranolia.

Net Output Factor

The following sections break down how these power plants fall into different brackets of Net Output Factors during FY 2023-24:

Net Output Factor	No. of Plants	Combined Capacity	Name of Power Plants
%	**Nos.**	**MW**	**Names**
Above 90	18	7,128.25	**Thermal** (7 Nos. – 2,191.5 MW): Nishat Chunian, Attock Gen, Nishat Power, Atlas Power, Uch Power, TPS Guddu, Hubco Narowal. **Hydel** (5 Nos. – 2,730.4 MW): Khan Khwar, Mangla, Gomal Zam, Allai Khwar, Ghazi Barotha. **Baggase** (2 No. – 56.35 MW): JDW-II, RYK Mills. **Nuclear** (4 Nos. – 2,150 MW): C2, C3, C4, K3
81-90	17	9,065.95	**Thermal** (6 Nos. – 5,353.4 MW): TCB-1, Uch-II Power, Guddu 747, HBS, Balloki, Thar Energy. **Hydel** (5 Nos. – 2,344.4 MW): Jagran-I, Karot, Tarbela 4th Extension, Patrind, Jabban. **Baggase** (5 Nos. – 223.15 MW): Hamza Sugar Mills, JDW-III, Fatima Energy, Thal Industries, Chanar Energy. **Nuclear** (1 No. – 1,145 MW): K2.
71-80	14	3,935.94	**Thermal** (7 Nos. – 3,327 MW): Engro Thar, Thal Nova, Rousch Power, Sahiwal Coal, Foundation Power, Sapphire Electric, FKPCL. **Hydel** (6 Nos. – 546.46 MW): Warsak, Chashma, New Bong Escape, Kurram Garhi, Shadiwal, Pehur. **Baggase** (1 No. – 62.48 MW): Chiniot Power.
61-70	18	10,223.3	**Thermal** (9 Nos. – 5,109.5 MW): TNB Liberty Power, Orient Power, Lalpir, Port Qasim, Lucky Electric, PakGen, CCPP Nandipur, Bhikki, Halmore. **Hydel** (8 Nos. – 4,788.8 MW): Tarbela, Duber Khwar, Malakand-III, Dargai, Nandipur, Neelum Jhelum, Jinnah Hydel, Chitral. **Nuclear** (1 No. 325 MW): C1.

Net Output Factor

Net Output Factor	No. of Plants	Combined Capacity	Name of Power Plants
%	**Nos.**	**MW**	**Names**
51-60	9	2,044.3	**Thermal** (4 No. – 1,807.1 MW): Trimmu, Liberty Power Tech, Saif Power, Saba Power. **Hydel** (3 Nos. – 137.2 MW): Gulpur, Chichoki, Rasul. **Wind** (1 No. – 50 MW): Artistic Wind. **Solar** (1 No. – 50 MW): Helios.
41-50	14	930.04	**Thermal** (2 Nos. – 357 MW): Kohinoor Energy, Engro Powergen Qadirpur. **Hydel** (3 No. – 114.8 MW): Reshun, Golen Gol, Machai. **Wind** (7 Nos. – 358.24 MW): Tricon Boston - A, Metro Wind, Tricon Boston - C, Tricon Boston - B, Hawa Energy, Artistic Energy, Gul Ahmed Wind. **Solar** (2 Nos. – 100 MW): HNDS, Meridian.
31-40	12	666.9	**Hydel** (1 No. – 36.6 MW): Daral Khwar. **Wind** (6 Nos. – 282.3 MW): Metro Power, ACT Wind, ACT 2 DIN, Sapphire Wind, Gul Ahmed Electric, Sachal Energy. **Solar** (4 Nos. – 312 MW): Crest Energy, Appolo Solar, Quaid-e-Azam Solar, AJ Power. **Baggase** (1 No. – 36 MW): Al-Moiz Industries.
21-30	24	1,258.335	**Hydel** (2 Nos. – 2.9 MW): Renala, Shishi. **Wind** (20 Nos. – 1,055.435 MW): Master Wind, Foundation Wind-II, Zorlu Enerji, Zephyr Power, Indus Wind, Master Green, Lakeside Energy, FFC Energy, UEP Wind, NASDA Green Energy, Liberty Wind Power-II, DIN Energy, Jhimpir Power, Liberty Wind Power-I, 3 Gorges 1st, 3 Gorges 2nd, Tenega Generasi, Yunus Energy, Hydro China Dawood, Foundation Wind-I. **Solar** (2 Nos. – 200 MW): Atlas Solar, Best Green.
11-20	4	1437.5	**Thermal** (1 No. – 1,320 MW): CPHGC. **Wind** (2 Nos. – 99.5 MW): 3 Gorges 3rd, Lucky Renewables. **Solar** (1 No. – 18 MW): Harappa.
00-10	5	5,109	**Thermal** (4 Nos. – 5,094 MW): TPS M/Garh, HUBCO, TPS Jamshoro, KAPCO. **Hydel** (1 Nos. – 17 MW): Ranolia.

4.2.2 Plants Connected with KE System:

Availability Factor

The following sections break down how these power plants fall into different brackets of Availability Factors during FY 2023-24:

Availability Factor	No. of Plants	Combined Capacity	Name of Power Plants
%	**Nos.**	**MW**	**Names**
Above 90	8	1,330.95	**Thermal** (7 Nos. – 1,326.69 MW): BQPS-II, KCCPP, Lucky Cement, SGTPS, KGTPS, Gul Ahmed, Tapal Energy. **Baggase** (1 No. – 4.26 MW): International Industries.
81-90	2	100	**Solar** (2 Nos. – 100 MW): Oursun, Gharo Solar.
71-80	2	71.14	**Thermal** (2 Nos. – 71.14 MW): International Steels, SNPC-I.
61-70	4	1,892.42	**Thermal** (4 Nos. – 1,892.42 MW): BQPS-I, FPCL, SNPC-II, BQPS-III.
51-60	0	0	-
41-50	0	0	-
31-40	0	0	-
21-30	0	0	-
11-20	0	0	-
00-10	0	0	-

Net Capacity Factor

The following sections break down how these power plants fall into different brackets of Net Capacity Factors**,** based on their utilization during FY 2023-24:

Net Capacity Factor	No. of Plants	Combined Capacity	Name of Power Plants
%	**Nos.**	**MW**	**Names**
Above 90	0	0	-
81-90	0	0	-
71-80	1	58	**Thermal** (1 No. – 58 MW): FPCL.
61-70	2	104.2	**Thermal** (2 Nos. – 104.2 MW): SNPC-I, SNPC-II.
51-60	2	1,514.99	**Thermal** (2 Nos. – 1,514.99 MW): BQPS-II, BQPS-III.
41-50	1	19.4	**Thermal** (1 No. – 19.4 MW): International Steels.
31-40	0	0	-
21-30	4	316.43	**Thermal** (2 Nos. – 262.17MW): Tapal Energy, Gul Ahmed. **Solar** (1 Nos. – 50 MW): Gharo Solar. **Baggase** (1 No. – 4.26 MW): International Industries.
11-20	3	919.73	**Thermal** (2 Nos. – 869.73 MW): Lucky Cement, BQPS-I. **Solar** (1 No. – 50 MW): Oursun.
00 -10	3	462.12	**Thermal** (3 Nos. – 462.12 MW): KCCPP, KGTPS, SGTPS.

Net Output Factor

The following sections break down how these power plants fall into different brackets of Net Output Factors during FY 2023-24:

Net Output Factor	No. of Plants	Combined Capacity	Name of Power Plants
%	**Nos.**	**MW**	**Names**
Above 90	6	512.99	**Thermal** (6 Nos. – 512.99 MW): KGTPS, SGTPS, SNPC-I, FPCL, SNPC-II, Gul Ahmed.
81-90	4	1,660.03	**Thermal** (4 Nos. – 1,660.03 MW): Tapal Energy, International Steels, BQPS-II, BQPS-III.
71-80	1	4.26	**Baggase** (1 No. – 4.26 MW): International Industries.
61-70	2	1087.5	**Thermal** (2 Nos. – 1087.5 MW): BQPS-I, KCCPP.
51-60	0	0	-
41-50	0	0	-
31-40	1	50	**Solar** (1 No. – 50 MW): Oursun.
21-30	1	50	**Solar** (1 No. – 50 MW): Gharo Solar.
11-20	1	29.73	**Thermal** (1 No. – 29.73 MW): Lucky Cement
00 -10	0	0	-

4.3 Technology-Wise and Plant-Wise

4.3.1 Thermal: (Plants Connected with NTDC System)

S. No.	Name of Power Plants	Main Fuel	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
1	Liberty Power Tech	RFO	200.26	196.139	239,940	2,150	6,238	253	143	95.5	13.9	56.9
2	PakGen	RFO	350	350	210,998	894	6,556	1,328	6	84.8	6.9	67.4
3	Lalpir	RFO	350	350	358,993	1,474	6,974	0	336	96.2	11.7	69.6
4	Atlas Power	RFO	219.16	213.856	261,668	1,320	6,667	336	461	90.9	13.9	92.7
5	Nishat Power	RFO	202.18	195.305	441,567	2,445	5,944	284	121	95.5	25.7	92.5
6	Nishat Chunian	RFO	200	195.72	246,838	1,311	6,923	230	320	93.7	14.4	96.2
7	Saba Power	RFO	134	125.46	54,379	830	6,952	720	282	88.6	4.9	52.2
8	Hubco Narowal	RFO	219.16	213.82	200,963	1,036	7,592	119	37	98.2	10.7	90.7
9	Attock Gen	RFO	164.95	156.178	206,469	1,410	7,228	123	225	98.3	15.1	93.8
10	HUBCO	RFO	1292	1200	0	0	8,130	654	0	92.6	0.0	0.0
11	Kohinoor Energy	RFO	131	124	142,547	2,830	5,256	660	38	92.1	13.1	40.6
12	Bhikki	RLNG	1180	1,119.849	3,668,966	5,230	3,543	0	10	99.9	37.3	62.6
13	Balloki	RLNG	1275.5	1,160.296	6,684,632	7,158	1,189	144	293	95.0	65.6	80.5
14	HBS	RLNG	1276.86	1,171.82	7,930,779	8,144	300	97	244	96.1	77.0	83.1
15	Sapphire Electric	RLNG	225	202.286	479,364	3,204	4,938	456	186	92.7	27.0	74.0
16	Rousch Power	RLNG	450	395	9,706	31	8,218	528	7	93.9	0.3	79.3
17	FKPCL	RLNG	157	151.5	92,012	799	6,528	1,080	9	83.4	6.9	76.0
18	Orient Power	RLNG	223.8	202.860	588,044	3,698	4,998	6	58	99.0	33.0	78.4
19	Saif Power	RLNG	209.79	209.786	220,588	1,978	5,462	1,344	1	84.7	12.0	53.2
20	Halmore	RLNG	225	205.54	207,699	1,633	6,179	890	58	88.9	11.5	61.9
21	CCPP Nandipur	RLNG	565.65	506	930,903	2,838	5,323	582	41	92.9	20.9	64.8
22	Trimmu	RLNG	1263	1244.21	3,147,450	4,204	3,332	0	1,248	85.8	28.8	60.2
23	Foundation Power	N.Gas	185	167.199	1,084,779	8,139	75	305	265	93.5	73.9	79.7
24	TNB Liberty Power	N.Gas	235	220.98	903,864	5,811	2,155	733	85	90.7	46.6	70.4
25	Uch Power	N.Gas	586	546.55	3,965,850	7,847	141	673	123	90.9	82.6	92.5
26	Uch-II Power	N.Gas	404	360.2975	2,025,720	6,486	1,268	884	146	88.3	64.0	86.7
27	Engro Powergen Qadirpur	N.Gas	226	223.8	813,512	8,063	107	512	102	93.0	41.4	45.1
28	TPS Guddu	N.Gas	600	530	366,033	754	99	0	1355	38.6	31.3	91.6
29	Guddu 747	N.Gas	747	720.79	2,276,682	3,694	396	78	4,616	46.6	36.0	85.5
30	TPS M/Garh	RFO/ RLNG	1350	1086.65	16	22	5,838	0	2,924	66.7	0.0	0.1

S. No.	Name of Power Plants	Main Fuel	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
31	TPS Jamshoro	RFO/ RLNG	850	649.02	-658	0	6,652	900	1,232	75.7	0.0	0.0
32	KAPCO	RFO/ RLNG	1600	1345	Despatch not given by NPCC due to expired PPA							
33	Engro Thar	Coal	660	602.6	3,766,214	7,809	191	648	136	91.1	71.2	80.0
34	Port Qasim	Coal	1320	1242.95	906,637	1,102	6,376	1,080	203	85.1	8.3	66.2
35	Sahiwal Coal	Coal	1320	1243.517	2,075,552	2,294	5,542	948	0	89.2	19.0	72.8
36	CPHGC	Coal	1320	1249	476,553	2,945	5,840	0	0	100.0	4.3	13.0
37	Lucky Electric	Coal	660	606.80	1,688,682	4,043	4,043	598	100	92.1	31.7	68.8
38	Thal Nova	Coal	330	300.7	1,979,840	8,244	0	527	13	93.9	75.0	79.9
39	Thar Energy	Coal	330	300.733	1,948,498	8,048	178	558	0	93.6	73.8	80.5
40	TCB-1	Coal	1320	1231	7,500,855	6,886	847	682	296	88.0	69.4	88.5
Sub-Total			**24,557.3**	**22,517.2**	**58,103,135**	-	-	-	-	-	-	-

Plants Connected with KE System

S. No.	Name of Power Plants	Main Fuel	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
1	BQPS-I	RFO/ RLNG	840	693.08	642,178	1,521	4,581	421	105	69.5	10.5	60.9
2	BQPS-II	RLNG	572.67	494.53	2,556,595	6,218	1,963	496	106	93.1	58.9	83.1
3	BQPS-III	RLNG	942.32	900	4,178,127	5,619	117	3,000	33	65.3	52.9	82.6
4	KCCPP	RLNG /HSD	247.50	210.77	112,130	813	7,726	236	9	97.2	6.1	65.4
5	KGTPS	RLNG	107.31	92.05	1,591	16	8,663	96	9	98.8*	0.2	100.0
6	SGTPS	RLNG	107.31	92.72	173	2	8,701	82	0	99.1*	0.0	93.1
7	Tapal Energy	RFO	126	123.5	288,337	2,635	5,336	191	359	90.7	27.4	88.6
8	Gul Ahmed	RFO	136.17	127.5	276,072	2,237	6,183	346	17	95.9	24.7	96.8
9	FPCL	Coal	58	52	324,533	6,112	0	2,004	668	69.6	71.0	100.0
10	SNPC-I	Gas	52.1	51.15	301,732	5,898	261	125	2,500	70.1	67.2	100.0
11	SNPC-II	Gas	52.1	51.53	297,468	5,772	268	240	2,504	68.8	65.7	100.0
12	International Steels	Gas	19.04	18.34	76,808	4,844	1,355	701	1,884	70.6	47.7	86.5
13	Lucky Cement	Gas	29.73	27.894	37,810	8,689	95	0	0	100.0	15.4	15.6
Sub-Total			**3,290.25**	**2,935.06**	**9,093,553**	-	-	-	-	-	-	-
Grand Total (NTDC+KE)			**27,847.6**	**25,452.3**	**67,196,688**	-	-	-	-	-	-	-

4.3.1.1 1st Quarter (July-Sept, 2023)

S. No.	Name of Power Plants	Main Fuel	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
NTDC System												
1	Liberty Power Tech	RFO	200.26	196.139	128,934	714	1473	2	19	99.0	29.8	92.1
2	PakGen	RFO	350	350	107,496	483	1723	0	2	99.9	13.9	63.6
3	Lalpir	RFO	350	350	155,336	654	1242	0	312	85.9	20.1	67.9
4	Atlas Power	RFO	219.16	213.856	106,194	550	1247	60	351	81.4	22.5	90.3
5	Nishat Power	RFO	202.18	195.305	218,928	1235	817	141	15	92.9	50.8	90.8
6	Nishat Chunian	RFO	200	195.72	148,451	778	1022	198	210	81.5	34.4	97.5
7	Saba Power	RFO	134	125.46	36,261	578	1588	0	42	98.1	13.1	50.0
8	Hubco Narowal	RFO	219.16	213.82	104,152	579	1626	0	3	99.9	22.1	84.1
9	Attock Gen	RFO	164.95	156.178	87,071	598	1608	0	204	99.9	25.2	93.2
10	HUBCO	RFO	1292	1200	0	0	1830	378	0	82.9	0.0	0.0
11	Kohinoor Energy	RFO	131	124	82,322	810	1298	86	14.	95.5	30.1	82.0
12	Bhikki	RLNG	1180	1,119.849	617005	889	1319	0	0	100.0	25.0	62.0
13	Balloki	RLNG	1275.5	1,160.296	1,891,067	2142	15	0	51	97.7	73.8	76.1
14	HBS	RLNG	1276.86	1,171.82	1,889,203	2006	62	0	140	93.7	73.0	80.4
15	Sapphire Electric	RLNG	225	202.286	279,182	1879	266	0	63	97.1	62.5	73.5
16	Rousch Power	RLNG	450	395	0	0	2208	0	0	100.0	0.0	0.0
17	FKPCL	RLNG	157	151.5	46,463	393	1813	0	2	99.9	13.9	78.0
18	Orient Power	RLNG	223.8	202.860	309467	2033	150	0	25	98.9	69.1	75.0
19	Saif Power	RLNG	209.79	209.786	188,255	1705	503	0	1	100.0	40.6	52.6
20	Halmore	RLNG	225	205.54	192778	1500	674	0	34	98.5	42.5	62.5
21	CCPP Nandipur	RLNG	565.65	506	628,082	1855	351	0	2	99.9	56.2	66.9
22	Trimmu	RLNG	1263	1244.21	1,744,240	2061	0	0	147	93.3	63.5	68.0
23	FoundationPower	N.Gas	185	167.199	294,598	2092	0	0	116	94.7	79.8	84.2
24	TNB Liberty Power	N.Gas	235	220.98	297,578	1884	303	3	18	99.0	61.0	71.5
25	Uch Power	N.Gas	586	546.55	1,067,567	2196	4	0	8	99.6	88.5	88.9
26	Uch-IIPower	N.Gas	404	360.2975	675,665	2114	88	0	6	99.7	84.9	88.7
27	Engro Powergen Qadirpur	N.Gas	226	223.8	212391	2193	0	0	15	99.3	43.0	43.3
28	TPS Guddu	N.Gas	600	530	366,033	754	99	0	1355	38.6	31.3	91.6
29	Guddu 747	N.Gas	747	720.79	411,140	672	0	0	1536	30.4	25.8	84.9

S. No.	Name of Power Plants	Main Fuel	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
30	TPS M/Garh	RFO/ RLNG	1350	1086.65	9	11	1461	0	736	66.7	0.0	0.1
31	TPS Jamshoro	RFO/ RLNG	850	649.02	0	0	2,208	0	0	100.0	0.0	0.0
32	KAPCO	RFO/ RLNG	1600	1345	Despatch not given by NPCC due to expired PPA							
33	Engro Thar	Coal	660	602.6	1162995	2104	0	0	104	95.3	87.4	91.7
34	Port Qasim	Coal	1320	1242.95	337710.5	453	1750	0	5	99.8	12.3	60.0
35	Sahiwal Coal	Coal	1320	1243.517	561258.6	720	1140	348	0	84.2	20.4	62.7
36	CPHGC	Coal	1320	1249	313093	486	1722	0	0	100.0	11.4	51.6
37	Lucky Electric	Coal	660	606.80	853,189	1983	162	0	63	97.1	63.7	70.9
38	Thal Nova	Coal	330	300.7	578,199	2197	0	0	11	99.5	87.1	87.5
39	Thar Energy	Coal	330	300.733	607,906	2208	0	0	0	100.0	91.5	91.5
40	TCB-1	Coal	1320	1231	2245630	1973	0	0	235	89.4	82.6	92.5
Sub Total			**24,557.3**	**22,517.2**	**18,945,849**	-	-	-	-	-	-	-

S. No.	Name of Power Plants	Main Fuel	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
KE System												
1	BQPS-I	RFO/ RLNG	840	693.08	136193.43	304	1837	44	20	97.0	8.9	64.6
2	BQPS-II	RLNG	572.67	494.53	600687	1533	532	100	43	93.5	55.0	79.2
3	BQPS-III	RLNG	942.32	900	1779183.6	2138	0	46	23	96.8	89.5	92.5
4	KCCPP	RLNG /HSD	247.50	210.77	3493.91	16	2190	0	2	99.9	0.8	103.6
5	KGTPS	RLNG	107.31	92.05	0	0	2201	7	0	99.7*	0.0	0.0
6	SGTPS	RLNG	107.31	92.72	32.52	0	2199	9	0	99.6*	0.0	0.0
7	Tapal Energy	RFO	126	123.5	124083	1086	960	119	42	92.7	45.5	92.5
8	Gul Ahmed	RFO	136.17	127.5	113981.6	926.14	1201.84	72	8	96.4	40.5	96.5
9	FPCL	Coal	58	52	77,658	1564	0	627	17	70.8	67.6	95.5
10	SNPC-I	Gas	52.1	51.15	63,583	1243	0	0	965	56.3	56.3	100.0

S. No.	Name of Power Plants	Main Fuel	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
11	SNPC-II	Gas	52.1	51.53	61,730	1198	0	0	1010	54.3	54.3	100.0
12	International Steels	Gas	19.04	18.34	19,636	1167	277	282	482	65.4	48.5	91.7
13	Lucky Cement	Gas	29.73	27.894	10621	2113	95	0	0	100	17.2	18
Sub Total			**3,290.25**	**2,935.06**	**2,990,883**	-	-	-	-	-	-	-
Total (NTDC+KE)			**27,847.6**	**25,452.3**	**21,936,732**	-	-	-	-	-	-	-

4.3.1.2 2nd Quarter (Oct-Dec, 2023)

S. No.	Name of Power Plants	Main Fuel	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
NTDC System												
1	Liberty Power Tech	RFO	200.26	196.139	13,844	78	1886	239	5	88.9	3.2	90.5
2	PakGen	RFO	350	350	45,320	173	707	1328	0	39.9	5.9	74.8
3	Lalpir	RFO	350	350	5,214	26	2158	0	24	98.9	0.7	57.3
4	Atlas Power	RFO	219.16	213.856	29,768	147	1893	98	70	92.4	6.3	94.7
5	Nishat Power	RFO	202.18	195.305	23,451	150	1894	133	31	92.6	5.4	80.0
6	Nishat Chunian	RFO	200	195.72	8,133	45	2086	20	57	96.5	1.9	92.3
7	Saba Power	RFO	134	125.46	279	6	1259	720	223	57.3	0.1	37.1
8	Hubco Narowal	RFO	219.16	213.82	7,112	33	2098	72	5	96.5	1.5	100.0
9	Attock Gen	RFO	164.95	156.178	23,148	155	2008	38	7	98.0	6.7	95.6
10	HUBCO	RFO	1292	1200	0	0	2208	0	0	100.0	0.0	0.0
11	Kohinoor Energy	RFO	131	124	13,666	119	2058	23	8	98.6	5.0	92.6
12	Bhikki	RLNG	1180	1,119.849	581540	880	1317	0	10	99.5	23.5	59.0
13	Balloki	RLNG	1275.5	1,160.296	1,262,973	1293	775	127	13	93.7	49.3	84.2
14	HBS	RLNG	1276.86	1,171.82	1,874,248	1987	170	0	51	97.7	72.4	80.5
15	Sapphire Electric	RLNG	225	202.286	8,413	61	1578	456	113	74.2	1.9	68.2
16	RouschPower	RLNG	450	395	0	0	1677	528	3	76.0	0.0	0.0
17	FKPCL	RLNG	157	151.5	0	0	1840	0	0	83.3	0.0	0.0
18	Orient Power	RLNG	223.8	202.860	38336	219	1957	3	5	98.6	8.6	86.3
19	Saif Power	RLNG	209.79	209.786	0	0	864	1344	0	39.1	0.0	0.0
20	Halmore	RLNG	225	205.54	0	0	1488	720	0	67.4	0.0	0.0
21	CCPP Nandipur	RLNG	565.65	506	29,546	123	1581	504	0	77.2	2.6	47.5

S. No.	Name of Power Plants	Main Fuel	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
22	Trimmu	RLNG	1263	1244.21	262,142	381	729	0	1098	50.3	9.5	55.3
23	FoundationPower	N.Gas	185	167.199	272,820	2068	30	70	40	95.0	73.9	78.9
24	TNB Liberty Power	N.Gas	235	220.98	210,688	1318	853	10	27	98.3	43.2	72.3
25	Uch Power	N.Gas	586	546.55	876,650	1707	13	435	53	77.9	72.6	94.0
26	Uch-IIPower	N.Gas	404	360.2975	314,638	1034	390	720	64	64.5	39.6	84.5
27	Engro Powergen Qadirpur	N.Gas	226	223.8	162511	1723	13	403	69	78.6	32.9	42.1
28	TPS Guddu	N.Gas	600	530	0	0	0	0	2208	0.0	0.0	0.0
29	Guddu 747	N.Gas	747	720.79	451,750	680	12	0	1516	31.3	28.4	92.2
30	TPS M/Garh	RFO/ RLNG	1350	1086.65	0	0	1472	0	736	66.7	0.0	0.0
31	TPS Jamshoro	RFO/ RLNG	850	649.02	0	0	1,488	720	0	67.4	0.0	0.0
32	KAPCO	RFO/ RLNG	1600	1345	Despatch not given by NPCC due to expired PPA							
33	Engro Thar	Coal	660	602.6	996167	1980	0	228	0	89.7	74.9	83.5
34	Port Qasim	Coal	1320	1242.95	320163.6	452	1756	0	0	100.0	11.7	57.0
35	Sahiwal Coal	Coal	1320	1243.517	168224.1	179	1429	600	0	72.8	6.1	75.6
36	CPHGC	Coal	1320	1249	83562	1234	975	0	0	100.0	3.0	5.4
37	Lucky Electric	Coal	660	606.80	633,515	1548	30	598	32	71.5	47.3	67.4
38	Thal Nova	Coal	330	300.7	436,165	1679	0	527	2	76.0	65.7	86.4
39	Thar Energy	Coal	330	300.733	571,666	2208	0	0	0	100.0	86.1	86.1
40	TCB-1	Coal	1320	1231	1627010	1418	0	678	38	64.2	59.9	93.2
Sub Total			**24,557.3**	**22,517.2**	**11,352,663**	-	-	-	-	-	-	-

S. No.	Name of Power Plants	Main Fuel	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
KE System												
1	BQPS-I	RFO/ RLNG	840	693.08	175932.78	354	701	28	21	47.8	11.5	71.7
2	BQPS-II	RLNG	572.67	494.53	884387.07	1966	174	67	1	96.9	81.0	91.0
3	BQPS-III	RLNG	942.32	900	372330.93	423	0	1785	0	19.2	18.7	97.8

S. No.	Name of Power Plants	Main Fuel	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
4	KCCPP	RLNG /HSD	247.50	210.77	34105.03	215	1989	4	0	100.0	17.2	18.0
5	KGTPS	RLNG	107.31	92.05	63.23	1	2193	14	0	99.8*	7.3	75.3
6	SGTPS	RLNG	107.31	92.72	140.21	2	2185	22	0	99.4*	0.0	68.7
7	Tapal Energy	RFO	126	123.5	81392	798	1352	58	1	99.0	0.1	75.6
8	Gul Ahmed	RFO	136.17	127.5	89436.4	711.56	1322.05	171.37	3.01	97.4	29.8	82.6
9	FPCL	Coal	58	52	105,377	1939	0	0	269	92.1	31.8	98.6
10	SNPC-I	Gas	52.1	51.15	74,720	1461	32	21	694	87.8	91.8	100.0
11	SNPC-II	Gas	52.1	51.53	74,221	1440	34	65	669	67.6	66.2	100.0
12	International Steels	Gas	19.04	18.34	23,511	1460	194	80	474	66.8	65.2	100.0
13	Lucky Cement	Gas	29.73	27.894	13365	2208	0	0	0	74.9	58.1	87.8
Sub Total			**3,290.25**	**2,935.06**	**1,928,982**	-	-	-	-	-	-	-
Total (NTDC+KE)			**27,847.6**	**25,452.3**	**13,281,644**	-	-	-	-	-	-	-

4.3.1.3 3rd Quarter (Jan-Mar, 2024)

S. No.	Name of Power Plants	Main Fuel	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
NTDC System												
1	Liberty Power Tech	RFO	200.26	196.139	81,331	1268	809	12	95	95.1	19.0	32.7
2	PakGen	RFO	350	350	58,182	238	1942	0	4	99.8	7.6	69.8
3	Lalpir	RFO	350	350	154,445	617	1567	0	0	100.0	20.2	71.5
4	Atlas Power	RFO	219.16	213.856	94,157	458	1508	178	40	90.0	20.2	96.1
5	Nishat Power	RFO	202.18	195.305	87,963	458	1670	0	66	97.4	20.6	98.3
6	Nishat Chunian	RFO	200	195.72	52,978	282	1847	12	43	97.5	12.4	96.0
7	Saba Power	RFO	134	125.46	17,839	246	1921	0	17	99.2	6.5	57.8
8	Hubco Narowal	RFO	219.16	213.82	68,687	320	1858	3	3	99.7	14.7	100.0
9	Attock Gen	RFO	164.95	156.178	74,836	505	1634	36	9	97.9	21.9	94.9
10	HUBCO	RFO	1292	1200	0	0	2028	156	0	92.9	0.0	0.0
11	Kohinoor Energy	RFO	131	124	0	1483	148	551	2	74.7	0.0	0.0

S. No.	Name of Power Plants	Main Fuel	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
12	Bhikki	RLNG	1180	1,119.849	1027229	1645	539	0	0	100.0	42.0	55.8
13	Balloki	RLNG	1275.5	1,160.296	1,648,190	1798	230	17	139	92.9	65.0	79.0
14	HBS	RLNG	1276.86	1,171.82	2,003,000	2058	16	97	14	95.0	78.3	83.1
15	Sapphire Electric	RLNG	225	202.286	1,147	11	2173	0	0	100.0	0.3	51.5
16	RouschPower	RLNG	450	395	0	0	2184	0	0	100.0	0.0	0.0
17	FKPCL	RLNG	157	151.5	0	0	1104	1080	0	50.5	0.0	0.0
18	Orient Power	RLNG	223.8	202.860	38336.35	218.71	1956.9	3.25	5.14	99.6	8.7	86.4
19	Saif Power	RLNG	209.79	209.786	594	10	2174	0	0	100.0	0.1	28.3
20	Halmore	RLNG	225	205.54	0	0	2028	156	0	92.9	0.0	0.0
21	CCPP Nandipur	RLNG	565.65	506	139	8	2134	42	0	98.1	0.0	3.4
22	Trimmu	RLNG	1263	1244.21	4,188	16	2166	0	2	99.9	0.2	21.0
23	FoundationPower	N.Gas	185	167.199	226,578	1876	45	235	28	88.0	62.0	72.2
24	TNB Liberty Power	N.Gas	235	220.98	168,406	1144	317	720	3	66.9	34.9	66.6
25	Uch Power	N.Gas	586	546.55	951,807	1845	95	238	6	88.8	79.7	94.4
26	Uch-IIPower	N.Gas	404	360.2975	464,296	1554	564	0	66	97.0	59.0	82.9
27	Engro Powergen Qadirpur	N.Gas	226	223.8	217005	2142	39	0	3	99.9	44.4	45.3
28	TPS Guddu	N.Gas	600	530	0	0	0	0	2184	0.0	0.0	0.0
29	Guddu 747	N.Gas	747	720.79	589,358	1100	242	45	797	61.4	37.4	74.3
30	TPS M/Garh	RFO/ RLNG	1350	1086.65	7	11	1449	0	724	66.8	0.0	0.1
31	TPS Jamshoro	RFO/ RLNG	850	649.02	-273	0	1,864	180	140	85.3	0.0	0.0
32	KAPCO	RFO/ RLNG	1600	1345	Despatch not given by NPCC due to expired PPA							
33	Engro Thar	Coal	660	602.6	620536	1659	74	420	31	79.3	47.2	62.1
34	Port Qasim	Coal	1320	1242.95	0	0	1272	792	96	58.2	0.0	0.0
35	Sahiwal Coal	Coal	1320	1243.517	695157.1	711	1473	0	0	100.0	25.6	78.6
36	CPHGC	Coal	1320	1249	0	1092	1092	0	0	100.0	0.0	0.0
37	Lucky Electric	Coal	660	606.80	15,842	51	2130	0	3	99.9	1.2	51.2
38	Thal Nova	Coal	330	300.7	491,509	2184	0	0	0	100.0	74.8	74.8
39	Thar Energy	Coal	330	300.733	368,759	1626	0	558	0	74.5	56.1	75.4
40	TCB-1	Coal	1320	1231	1748131	1697	465	4	19	99.0	65.0	83.7
Sub Total			**24,557.3**	**22,517.2**	**11,970,359**	-	-	-	-	-	-	-

S. No.	Name of Power Plants	Main Fuel	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
KE System												
1	BQPS-I	RFO/ RLNG	840	693.08	42623.79	117	1170	349	3	58.9	2.8	52.6
2	BQPS-II	RLNG	572.67	494.53	278467.01	819	982	323	59	82.5	25.8	68.8
3	BQPS-III	RLNG	942.32	900	757819.71	1175	96	893	5	58.2	38.6	71.7
4	KCCPP	RLNG /HSD	247.50	210.77	565.63	3	2034	145	2	93.3	0.1	89.5
5	KGTPS	RLNG	107.31	92.05	0	0	2153	24	7	98.6*	0.0	0.0
6	SGTPS	RLNG	107.31	92.72	0	0	2136	48	0	97.8*	0.0	0.0
7	Tapal Energy	RFO	126	123.5	35961	338	1677	14	156	92.3	13.3	86.1
8	Gul Ahmed	RFO	136.17	127.5	17327.4	144.71	1956.081	82.06	1.15	96.2	6.2	93.9
9	FPCL	Coal	58	52	33,854	631	0	1377	176	28.9	29.8	100.0
10	SNPC-I	Gas	52.1	51.15	68,724	1343	75	15	751	64.9	61.5	100.0
11	SNPC-II	Gas	52.1	51.53	71,792	1393	73	29	689	67.1	63.8	100.0
12	International Steels	Gas	19.04	18.34	16,184	1036	410	27	711	66.2	40.4	85.2
13	Lucky Cement	Gas	29.73	27.894	5592	2184	0	0	0	100.0	9.2	9.2
Sub Total			**3,290.25**	**2,935.06**	**1,328,911**	-	-	-	-	-	-	-
Total (NTDC+KE)			**27,847.6**	**25,452.3**	**13,299,270**	-	-	-	-	-	-	-

4.3.1.4 4th Quarter (Apr-June, 2024)

S. No.	Name of Power Plants	Main Fuel	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
NTDC System												
1	Liberty Power Tech	RFO	200.26	196.139	15,831	90	2070	0	24	98.9	3.7	89.7
2	PakGen	RFO	350	350	0	0	2184	0	0	100.0	0.0	0.0
3	Lalpir	RFO	350	350	43,998	177	2007	0	0	100.0	5.8	71.0
4	Atlas Power	RFO	219.16	213.856	31,549	165	2019	0	0	100.0	6.8	89.4
5	Nishat Power	RFO	202.18	195.305	111,225	602	1563	10	9	99.1	26.1	0.0
6	Nishat Chunian	RFO	200	195.72	37,276	206	1968	0	10	99.5	8.7	0.0
7	Saba Power	RFO	134	125.46	0	0	2184	0	0	100.0	0.0	0.0
8	Hubco Narowal	RFO	219.16	213.82	21,012	104	2010	44	26	96.8	4.5	94.5
9	Attock Gen	RFO	164.95	156.178	21,414	152	1978	49	5	97.5	6.3	90.2
10	HUBCO	RFO	1292	1200	0	0	2064	120	0	94.5	0.0	0.0
11	Kohinoor Energy	RFO	131	124	46,559	418	1752	0	14	99.4	17.2	89.8
12	Bhikki	RLNG	1180	1,119.849	1443192	1816	368	0	0	100.0	57.0	68.5
13	Balloki	RLNG	1275.5	1,160.296	1,882,402	1925	169	0	90	95.9	74.3	84.3
14	HBS	RLNG	1276.86	1,171.82	2,164,328	2093	52	0	39	98.2	84.6	88.2
15	Sapphire Electric	RLNG	225	202.286	190,622	1253	921	0	10	99.5	43.1	75.2
16	RouschPower	RLNG	450	395	9,706	31	2149	0	4	99.8	1.1	79.3
17	FKPCL	RLNG	157	151.5	45,549	406	1771	0	7	99.7	13.8	74.1
18	Orient Power	RLNG	223.8	202.860	201905	1227	934	0	23	98.9	45.6	81.1
19	Saif Power	RLNG	209.79	209.786	31,739	263	1921	0	0	100.0	6.9	57.5
20	Halmore	RLNG	225	205.54	14921	133	1989	14	24	97.2	3.3	54.6
21	CCPP Nandipur	RLNG	565.65	506	273,136	852	1257	36	39	96.6	24.7	63.4
22	Trimmu	RLNG	1263	1244.21	1,136,880	1746	437	0	1	100.0	41.8	52.3
23	FoundationPower	N.Gas	185	167.199	290,783	2103	0	0	81	96.3	79.6	82.7
24	TNB Liberty Power	N.Gas	235	220.98	227,192	1465	682	0	37	98.3	47.1	70.2
25	Uch Power	N.Gas	586	546.55	1,069,826	2099	29	0	56	97.4	89.6	93.3
26	Uch-IIPower	N.Gas	404	360.2975	571,121	1784	226	164	10	92.0	72.6	88.9
27	Engro Powergen Qadirpur	N.Gas	226	223.8	221605	2005	55	109	15	94.3	45.3	49.4
28	TPS Guddu	N.Gas	600	530	0	0	0	0	2184	0.0	0.0	0.0

S. No.	Name of Power Plants	Main Fuel	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
29	Guddu 747	N.Gas	747	720.79	824,434	1242	142	33	767	63.4	52.4	92.1
30	TPS M/Garh	RFO/ RLNG	1350	1086.65	0	0	1456	0	728	66.7	0.0	0.0
31	TPS Jamshoro	RFO/ RLNG	850	649.02	-385	0	1,092	0	1,092	50.0	0.0	0.0
32	KAPCO	RFO/ RLNG	1600	1345	Despatch not given by NPCC due to expired PPA							
33	Engro Thar	Coal	660	602.6	986516	2066	117	0	1	100.0	75.0	79.2
34	Port Qasim	Coal	1320	1242.95	248762.8	197	1598	288	102	82.2	9.2	101.6
35	Sahiwal Coal	Coal	1320	1243.517	650912.6	684	1500	0	0	100.0	24.0	76.5
36	CPHGC	Coal	1320	1249	79898	133	2051	0	0	100.0	2.9	48.1
37	Lucky Electric	Coal	660	606.80	186,136	461	1721	0	2	99.9	14.0	66.5
38	Thal Nova	Coal	330	300.7	473,967	2184	0	0	0	100.0	72.2	72.2
39	Thar Energy	Coal	330	300.733	400,167	2006	178	0	0	100.0	60.9	66.3
40	TCB-1	Coal	1320	1231	1880084	1798	382	0	4	99.8	69.9	84.9
Sub Total			**24,557.3**	**22,517.2**	**15,834,263**	-	-	-	-	-	-	-

S. No.	Name of Power Plants	Main Fuel	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
KE System												
1	BQPS-I	RFO/ RLNG	840	693.08	287427.7	746	873	0	61	74.1	19.0	55.6
2	BQPS-II	RLNG	572.67	494.53	793053.92	1900	275	6	3	99.6	73.4	0.0
3	BQPS-III	RLNG	942.32	900	1268792.8	1883	21	276	5	87.2	64.5	74.9
4	KCCPP	RLNG /HSD	247.50	210.77	73965.61	579	1513	87	5	95.8	16.1	60.6
5	KGTPS	RLNG	107.31	92.05	1527.51	15	2116	51	2	97.6*	0.8	0.0
6	SGTPS	RLNG	107.31	92.72	0	0	2181	3	0	99.9*	0.0	0.0
7	Tapal Energy	RFO	126	123.5	46901	413	1347	0	160	91.7	19.8	0.0
8	Gul Ahmed	RFO	136.17	127.5	55326.3	454.82	1703.36	21.02	4.8	98.8	19.9	95.4
9	FPCL	Coal	58	52	107,644	1978	0	0	206	90.6	94.8	100.0
10	SNPC-I	Gas	52.1	51.15	94,705	1851	154	89	90	91.8	84.8	0.0
11	SNPC-II	Gas	52.1	51.53	89,725	1741	161	146	136	87.1	79.7	100.0
12	ISL	Gas	19.04	18.34	17,477	1181	474	312	217	75.8	28.7	53.1
13	Lucky Cement	Gas	29.73	27.894	8232	2184	0	0	0	100.0	13.5	13.5
Sub Total			**3,290.25**	**2,935.06**	**2,844,778**	-	-	-	-	-	-	-
Total (NTDC+KE)			**27,847.6**	**25,452.3**	**18,679,041**	-	-	-	-	-	-	-

*The availability factor of KGTPS and SGTPS, as reported by KE, primarily accounts for outages due to maintenance or faults. It is important to note that these plants faced fuel supply issues during the period. The reported availability should be interpreted accordingly.

Inference:

i. Plants connected with NTDC System: Above table clearly indicates that several power plants, predominantly those relying on imported fuels such as RFO, RLNG, and Imported Coal, experienced significantly low service hours during FY 2023-24. Plants including Liberty, Pakgen, Lalpir, Atlas, Nishat Power, Nishat Chunian, Saba, HUBCO, Hub Narowal, Attock Gen, Kohinoor, Rousch, Fauji Kabirwala, Orient, Saif, Sapphire, Halmore, Bhikki, Trimmu, TPS Jamshoro, TPS Muzaffargarh, CCPP Nandipur, Port Qasim, Sahiwal Coal, Lucky Electric and China Power Hub exhibited service hour Percentages ranging from 0% to 59.5%. These plants spent a considerable portion of the year on standby mode due to System Operator instructions on account of being expensive/low ranked in the Economic Merit Order, resulting in NCF ranging from 0% to 37.3%.

Similarly, TPS Guddu and Guddu 747 experienced low service hours of 34.1% and 42.1%, primarily due to unplanned outages accounting for 61.4% and 52.6% of the time, respectively, attributed to technical faults. Consequently, these plants had Availability Factors of 38.6% and 46.6%. Similarly, TPS Jamshoro and TPS Muzaffargarh experienced high unplanned outage hours of 14.0% and 33.3% respectively. Consequently, these plants had Availability Factors of 75.7% and 66.7%. In this regard, it is pertinent to highlight that each power plant is allowed certain number of unplanned outage hours in an agreement year in its Power Purchase Agreement. In case any power plant exceeds the unplanned outage allowance as specified in its Power Purchase Agreement, Liquidated Damages are usually imposed by the Power Purchaser in accordance with the relevant provisions of the Power Purchase Agreement.

Furthermore, several power plants, including Liberty, Pakgen, Lalpir, Saba, HUBCO, Saif, Halmore, CCPP Nandipur, Engro Powergen Qadirpur, TPS Jamshoro, TPS Muzaffargarh, Port Qasim, Lucky Electric and China Power Hub, exhibited low Net Output Factors during FY 2023-24. The Net Output Factors ranged from 0% to 69.6%.

Plants connected with KE System: Plants like BQPS-I, KCCPP, Tapal and Gul Ahmed exhibited service hour percentages ranging from 9.3% to 30.9%. These plants spent a considerable portion of the year on standby mode on account of being expensive/low ranked in the Economic Merit Order, resulting in NCF ranging from 6.1% to 27.4%. Similarly, KGTPS and SGTPS show lower NCF ranging from 0.2% to 0.02%, suggesting severe operational challenges, pointing to fuel supply issues that are impeding their performance. Likewise, BQPS-III, which achieved COD in the recent past and is strategically positioned high in the EMO due to its capacity and economic viability. However, the plant's operational performance during FY 2023-24 presents concerns, as its availability factor remained at only 65.3%, and the NCF was limited to just 52.9%. These figures indicate significant downtime and underutilization, which is concerning given the plant's critical role in the generation fleet. Such performance is not only below expectations but also raises reliability concerns in meeting the grid's demand. The lower-than-expected availability and capacity factor call for immediate attention to identify and address underlying causes to improve the plant's operational performance.

4.3.2 Hydel:

S. No.	Name of Power Plants	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
1	Allai Khwar	121	120.5	463,425	4,024	4,179	581	0	93.4	43.8	95.6
2	Chashma Hydel	184	183.1	978,869	6,815	258	716	996	80.5	60.9	78.4
3	Chichoki	13.2	12.9	29,736	3,976	4,283	425	99	94.0	26.2	58.0
4	Chitral Hydel	1	0.9	2,039	3,722	4,537	0	527	94.0	25.8	60.9
5	Daral Khawar	36.6	36.6	124,378	8,681	38	48	17	99.3	38.7	39.1
6	Dargai	20	19.6	67,249	4,951	2,925	886	22	89.7	39.1	69.3
7	Duber Khwar	130	129.5	444,120	4,926	3,268	470	130	93.3	39.0	69.6
8	Ghazi Barotha	1450	1447	6,447,074	4,901	3,272	611	3	93.0	50.7	90.9
9	Golen Gol	108	107.7	107,555	2,432	3,438	386	30	66.8	11.4	41.1
10	Gomal Zam	17.4	17	27,130	1,676	62	5,940	1,108	19.8	18.2	93.2
11	Gulpur	102	100.98	268,073	4,467	3,927	377	13	95.6	30.2	59.4
12	Jabban Hydel	22	21.8	117,226	6,592	1,184	920	87	88.5	61.2	81.6
13	Jinnah Hydel	96	95.4	211,028	3,603	377	234	4,537	45.3	25.2	61.4
14	Karot	732	712.8	3,166,065	5,201	3,574	2	6	99.9	50.6	85.4
15	Khan Khwar	72	71.5	331,727	4,372	3,656	751	5	91.4	52.8	100.0
16	Kurram Garhi	4	3.9	11,721	4,249	1,236	562	181	62.4	34.2	70.7
17	Machai	2.6	2.6	7,069	5,592	3,336	0	0	100.0	31.0	48.6
18	Malakand-III	81	81	225,060	4,011	4,478	36	259	96.6	31.6	69.3
19	Mangla	1000	997	5,233,188	5,354	1,227	2,203	16	74.9	59.8	98.0
20	Nandipur	13.8	13.5	36,925	3,965	2,347	470	2,004	71.9	31.1	69.0
21	New Bong Escape	84	84	415,968	6,424	2,171	194	2	97.8	56.4	77.1
22	Neelum Jhelum	969	969	1,623,900	2,469	2,042	1,914	2,358	51.4	19.1	67.9
23	Patrind	150	147	566,918	4,732	3,861	191	14	97.8	43.9	81.5
24	Pehur	18	18	54,182	7,039	1,734	0	35	99.9	34.3	42.8
25	Rasul	22	21.6	74,738	6,247	388	1,570	582	75.5	39.4	55.4
26	Renala	1.1	1	1,673	7,746	1,084	24	2	100.0	19.0	21.6
27	Ranolia	17	17	0	0	0	0	6,600	0.0	0.0	0.0
28	Jagran-I	30.4	30	105,004	4,288	2,981	397	80	82.8	39.8	81.6
29	Reshun	4.2	4.2	13,198	7,073	1,605	21	93	98.8	35.8	44.4
30	Shadiwal	13.5	13.2	38,005	4,004	4,297	483	0	94.5	32.8	71.9
31	Shishi	1.8	1.8	3,044	7,932	100	0	752	91.4	19.3	21.3
32	Tarbela	3478	3474	13,362,046	5,853	1,913	1,013	5	88.4	43.8	65.7
33	Tarbela 4th Ext	1410	1407	4,628,237	3,860	3,229	1,686	9	80.7	37.4	85.2
34	Warsak	242.96	241.96	771,743	4,001	2,185	2,568	14	70.4	36.3	79.7
Total		**10,648.6**	**10,605**	**39,958,312**	-	-	-	-	-	-	-

4.3.2.1 1st Quarter (July-Sept, 2023)

S. No.	Name of Power Plants	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
1	Allai Khwar	121	120.5	146559	1265	935	8	0	99.6	55.1	96.1
2	Chashma Hydel	184	183.1	271746	1913	0	37	258	86.6	67.2	77.6
3	Chichoki	13.2	12.9	10425	1340	867	1	0	100.0	36.6	60.3
4	Chitral Hydel	1	0.9	519.3	577	1150	0	481	78.2	26.1	100.0
5	Daral Khawar	36.6	36.6	29576	2136	38	28	6	98.5	36.6	37.8
6	Dargai	20	19.6	20487	1399	595	211	3	90.3	47.3	74.7
7	Duber Khwar	130	129.5	171196	1717	373	1	116	94.7	59.9	77.0
8	Ghazi Barotha	1450	1447	2246674	1686	507	11	3	99.3	70.3	92.1
9	Golen Gol	108	107.7	52272	686	250	0	0	42.4	22.0	70.8
10	Gomal Zam	17.4	17	1097	79	0	1092	1037	3.6	2.9	81.7
11	Gulpur	102	100.98	113002	1668	539	0	1	100.0	50.7	67.1
12	Jabban Hydel	22	21.8	36936	2109	63	15	21	98.4	76.7	80.3
13	Jinnah Hydel	96	95.4	48068	1105	0	1	1085	50.0	22.8	45.6
14	Karot	732	712.8	1037715	1695	507	0	6	99.7	65.9	85.9
15	Khan Khwar	72	71.5	153966	1127	1074	6	1	99.7	97.5	100.0
16	Kurram Garhi	4	3.9	3469	1465	501	0	2	89.0	40.3	60.7
17	Machai	2.6	2.6	2741	1791	441	0	0	100.0	47.7	58.9
18	Malakand-III	81	81	53411	925	1107	0	176	92.0	29.9	71.3
19	Mangla	1000	997	1135342	1106	595	505	7	77.0	51.6	100.0
20	Nandipur	13.8	13.5	13796	1408	792	8	0	99.6	46.3	72.6
21	New Bong Escape	84	84	62303	1184	1029	2	0	100.0	33.6	62.6
22	Neelum Jhelum	969	969	614697	937	331	96	844	57.4	28.7	67.7
23	Patrind	150	147	198007	1630	393	188	12	91.6	61.0	82.6
24	Pehur	18	18	18280	1929	278	0	1	100.0	46.0	52.6
25	Rasul	22	21.6	20171	1978	82	12	137	93.3	42.3	47.2
26	Renala	1.1	1	624	2231	1	0	0	100.0	28.3	28.0
27	Ranolia	17	17	0	0	0	0	2208	0.0	0.0	0.0
28	Jagran-I	30.4	30	49904	1891	242	28	47	96.6	75.3	88.0
29	Reshun	4.2	4.2	4810	2195	5	0	8	99.6	51.9	52.2
30	Shadiwal	13.5	13.2	9256	1104	1102	2	0	99.9	31.8	63.5
31	Shishi	1.8	1.8	1070	2208	0	0	0	100.0	26.9	26.9

S. No.	Name of Power Plants	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
32	Tarbela	3478	3474	6891848	2129	53	24	3	98.8	89.8	93.2
33	Tarbela 4th Extension	1410	1407	2882290	2162	31	14	1	99.3	92.8	94.8
34	Warsak	242.96	241.96	314636	1589	212	406	1	81.6	58.9	81.8
Total		**10648.56**	**10605.04**	**16,616,893**	-	-	-	-	-	-	-

4.3.2.2 2nd Quarter (Oct-Dec, 2023)

S. No.	Name of Power Plants	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
1	Allai Khwar	121	120.5	46636	394	1664	150	0	93.2	17.5	98.2
2	Chashma Hydel	184	183.1	252920	1737	45	193	233	80.7	62.6	79.5
3	Chichoki	13.2	12.9	6976	853	1156	99	99	91.0	24.5	63.4
4	Chitral Hydel	1	0.9	497	1099	1109	0	0	100.0	25.0	50.2
5	Daral Khawar	36.6	36.6	10791	2193	0	13	2	99.3	13.4	13.4
6	Dargai	20	19.6	16896	1326	593	289	0	86.9	39.0	65.0
7	Duber Khwar	130	129.5	39817	796	1226	181	5	91.6	13.9	38.6
8	Ghazi Barotha	1450	1447	1700898	1269	678	261	0	88.2	53.2	92.6
9	Golen Gol	108	107.7	36022	735	1094	379	21	82.8	15.1	45.4
10	Gomal Zam	17.4	17	18320	1068	35	1094	12	50.0	48.8	100.0
11	Gulpur	102	100.98	14848	667	1164	377	0	82.9	6.7	22.0
12	Jabban	22	21.8	25704	1466	438	304	0	86.2	53.4	80.4
13	Jinnah	96	95.4	75639	971	30	70	1121	45.3	35.9	81.7
14	Karot	732	712.8	288980	563	1642	2	0	99.9	18.4	72.0
15	Khan Khwar	72	71.5	24938	549	1657	2	0	99.9	15.8	63.5
16	Kurram Garhi	4	3.9	1965	731	55	144	6	35.6	22.8	68.9
17	Machai	2.6	2.6	1189	1161	1143	0	0	100.0	20.7	39.4
18	Malakand-III	81	81	33291	747	1449	12	0	99.5	18.6	55.0
19	Mangla	1000	997	1651763	1588	132	490	4	77.9	75.0	100.0
20	Nandipur	13.8	13.5	6501	751	836	88	534	71.9	21.8	64.1
21	New Bong Escape	84	84	128837	1925	241	42	0	98.1	69.5	79.7
22	Neelum Jhelum	969	969	350705	558	1147	503	0	77.2	16.4	64.9
23	Patrind	150	147	58131	615	1592	0	0	100.0	17.9	64.3
24	Pehur	18	18	20062	2194	14	0	0	100.0	50.5	50.8

S. No.	Name of Power Plants	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
25	Rasul	22	21.6	15313	1035	306	442	426	60.7	32.1	68.5
26	Renala	1.1	1	407	2184	24	24	0	100.0	18.4	18.6
27	Ranolia	17	17	0	0	0	0	2208	0.0	0.0	0.0
28	Jagran-I	30.4	30	12739	592	1295	301	21	85.5	19.2	71.7
29	Reshun	4.2	4.2	3323	1947	260	0	9	100.0	35.8	40.6
30	Shadiwal	13.5	13.2	13067	1104	1100	4	0	99.8	44.8	89.7
31	Shishi	1.8	1.8	733	2208	0	0	0	100.0	18.4	18.4
32	Tarbela	3478	3474	2113277	1282	583	341	1	84.5	27.6	47.5
33	Tarbela 4th Extension	1410	1407	707610	665	1455	87	0	96.0	22.8	75.6
34	Warsak	242.96	241.96	121644	637	924	641	2	70.7	22.8	78.9
Total		**10648.56**	**10605.04**	**7,800,439**							

4.3.2.3 3rd Quarter (Jan-Mar, 2024)

S. No.	Name of Power Plants	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
1	Allai Khwar	121	120.5	60734.0	517.1	1249.0	417.9	0.0	80.9	23.1	97.5
2	Chashma	184	183.1	181650.0	1415.8	138.5	356.8	272.9	71.2	45.4	70.1
3	Chichoki	13.2	12.9	3297.2	464.1	1402.9	317.0	0.0	85.5	11.7	55.1
4	Chitral	1	0.9	526.3	1056.5	1123.5	0.0	4.0	99.8	26.8	55.4
5	Daral Khawar	36.6	36.6	13154.0	2176.0	0.0	7.0	1.0	99.6	16.5	16.5
6	Dargai	20	19.6	9560.0	825.8	1052.3	306.0	0.0	86.0	22.3	59.1
7	Duber Khwar	130	129.5	38586.3	436.4	1465.0	282.4	0.3	87.1	13.6	68.3
8	Ghazi Barotha	1450	1447	1046944.0	833.2	1022.4	333.2	0.0	85.0	33.1	86.8
9	Golen Gol	108	107.7	14011.8	702.3	1453.9	0.0	3.8	98.7	6.0	18.5
10	Gomal Zam	17.4	17	2768.3	174.9	8.9	1980.5	19.7	8.4	7.5	93.1
11	Gulpur	102	100.98	37858.2	654.3	1517.7	0.0	12.0	99.5	17.2	57.3
12	Jabban	22	21.8	14621.6	934.2	610.3	588.9	50.5	70.7	30.7	71.8
13	Jinnah	96	95.4	37212.0	587.2	346.3	160.8	1089.6	42.7	17.9	66.4
14	Karot	732	712.8	390454.5	792.4	1391.6	0.0	0.0	100.0	25.1	69.1
15	Khan Khwar	72	71.5	48323.3	894.9	596.2	692.9	0.0	68.3	30.9	75.5
16	Kurram Garhi	4	3.9	3131	959	671	417	28	74.6	36.8	83.7
17	Machai	2.6	2.6	745.2	798.8	1385.2	0.0	0.0	100.0	13.1	35.9

S. No.	Name of Power Plants	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
18	Malakand-III	81	81	32111.8	743.7	1400.3	24.0	16.0	98.2	18.2	53.3
19	Mangla	1000	997	878733.6	1106.5	335.9	743.1	1.0	66.0	40.4	79.7
20	Nandipur	13.8	13.5	4296.4	492.5	593.8	366.7	731.0	49.7	14.6	64.6
21	New Bong Escape	84	84	94936.0	1446.9	588.8	146.4	1.9	93.2	51.7	78.1
22	Neelum Jhelum	969	969	253424.6	400.2	468.8	1315.0	0.0	39.8	12.0	65.4
23	Patrind	150	147	46635.8	531.5	1649.5	3.0	0.1	99.9	14.5	59.7
24	Pehur	18	18	5330.5	866.4	1293.6	0.0	0.0	98.9	13.6	34.2
25	Rasul	22	21.6	12709.0	1067.6	0.0	1112.5	3.9	48.9	26.9	55.1
26	Renala	1.1	1	209.9	1176.0	1032.0	0.0	0.0	100.0	9.6	17.8
27	Ranolia	17	17	0	0	0	0	0	0.0	0.0	0.0
28	Jagran-I	30.4	30	9091	591	1444	40	6	93.2	13.9	51.3
29	Reshun	4.2	4.2	2136.0	1209.0	921.7	0.0	53.3	97.6	23.3	42.1
30	Shadiwal	13.5	13.2	7103.1	704.0	1006.0	474.0	0.0	78.3	24.6	76.4
31	Shishi	1.8	1.8	1085.8	2116.0	76.0	0.0	0.0	100.0	27.6	28.5
32	Tarbela	3478	3474	1467271.0	1072.0	687.9	424.1	0.0	80.6	19.3	39.4
33	Tarbela 4th Extension	1410	1407	4179.0	4.6	752.2	1422.4	4.8	34.7	0.1	64.6
34	Warsak	242.96	241.96	99265.1	525.1	800.6	856.2	6.0	60.7	18.8	78.1
Total		**10648.56**	**10605.04**	**4,822,096**	-	-	-	-	-	-	-

4.3.2.4 4th Quarter (Apr-June, 2024)

S. No.	Name of Power Plants	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
1	Allai Khwar	121	120.5	209496	1848	331	5	0	99.8	79.6	94.1
2	Chashma	184	183.1	272553	1749	74	129	232	83.5	68.2	85.1
3	Chichoki	13.2	12.9	9038	1319	857	8	0	99.6	32.1	53.1
4	Chitral	1	0.9	496	989	1154	0	42	98.1	25.2	55.7
5	Daral Khawar	36.6	36.6	70857	2176	0	0	8	99.6	88.6	89.0
6	Dargai	20	19.6	20306	1400	685	80	19	95.5	47.4	74.0
7	Duber Khwar	130	129.5	194521	1977	204	6	9	99.9	68.8	76.0
8	Ghazi Barotha	1450	1447	1452558	1113	1065	6	0	99.7	46.0	90.2
9	Golen Gol	108	107.7	5249	309	640	7	5	43.5	2.2	15.8
10	Gomal Zam	17.4	17	4945	354	18	1773	39	17.0	13.3	82.2

S. No.	Name of Power Plants	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
11	Gulpur	102	100.98	102365	1478	706	0	0	100.0	46.4	68.6
12	Jabban	22	21.8	39964	2083	73	12	15	98.7	83.9	88.0
13	Jinnah	96	95.4	50109	940	1	2	1241	43.1	24.0	55.9
14	Karot	732	712.8	1448915	2151	33	0	0	100.0	93.1	94.5
15	Khan Khwar	72	71.5	104500	1801	329	50	4	97.5	66.9	81.2
16	Kurram Garhi	4	3.9	3156	1094	9	1	145	50.5	37.1	74.0
17	Machai	2.6	2.6	2394	1841	367	0	0	100.0	42.2	50.0
18	Malakand-III	81	81	106246	1595	522	0	67	96.9	60.1	82.2
19	Mangla	1000	997	1567349	1553	164	465	4	78.6	72.0	100.0
20	Nandipur	13.8	13.5	12332	1313	125	7	739	65.8	41.8	69.6
21	New Bong Escape	84	84	129892	1868	312	4	0	99.8	70.8	82.8
22	Neelum Jhelum	969	969	405073	574	95	0	1514	30.6	19.1	72.8
23	Patrind	150	147	264144	1955	226	0	2	99.9	82.3	91.9
24	Pehur	18	18	10509	2050	148	0	34	100.0	26.7	28.5
25	Rasul	22	21.6	26545	2166	0	3	15	99.2	56.3	56.7
26	Renala	1.1	1	432	2155	27	0	2	99.9	19.8	20.0
27	Ranolia	17	17	0	0	0	0	2184	0.0	0.0	0.0
28	Jagran-I	30.4	30	33270	1214	0	28	6	55.6	50.8	91.4
29	Reshun	4.2	4.2	2929	1722	418	21	23	98.0	31.9	40.5
30	Shadiwal	13.5	13.2	8579	1092	1089	3	0	99.9	29.8	59.5
31	Shishi	1.8	1.8	155	1400	24	0	752	65.2	3.9	6.2
32	Tarbela	3478	3474	2889650	1370	589	224	1	89.7	38.1	60.7
33	Tarbela 4th Extension	1410	1407	1034158	1028	991	163	3	92.4	33.7	71.5
34	Warsak	242.96	241.96	236198	1250	248	665	5	60.7	18.8	78.1
Total		**10648.56**	**10605.04**	**10,718,883**	-	-	-	-	-	-	-

Inference:

Throughout FY 2023-24, the hydel power plants, including Ghazi Barotha, Warsak, Chichoki, Shadiwal, Dargai, Allai Khwar, Duber Khwar, Khan Khwar, Tarbela 4th Extension, Golen Gol, Malakand-III, Gulpur, Patrind, Jagran-I and Karot faced notably low service hours ranging from 27.7% to 59.2%. These plants predominantly operated in standby mode for extensive periods, varying from 24.9% to 51.0%, attributed to apparent adverse hydrological conditions. This resulted in reduced NCF ranging from 11.4% to 52.8%.

Nandipur, Jinnah hydel and Neelum Jhelum experienced low service hours ranging from 28.1% to 45.1%, respectively, as they encountered unplanned outages ranging from 22.8% to 51.7% of the year due to technical faults. This resulted in reduced Availability Factors ranging from 45.3% to 71.9%, as well as diminished NCF ranging from 19.1% to 31.1%. Gomal Zam operated at 19.1% service hours, primarily on planned outage for 67.6% of the year due to scheduled maintenance. This led to a reduced Availability Factor of 19.8% and a lower NCF of 18.2%. Similarly, Mangla, Warsak, Rasul and Neelum Jhelum experienced high planned outage hours ranging from 17.9% to 29.2%. This resulted in reduced Availability Factors ranging from 51.4% to 75.5%, as well as diminished NCF ranging from 19.1% to 59.8%. In this regard, it is pertinent to highlight that each WAPDA hydel power plant is allowed certain number of total outage hours in an agreement year in the WAPDA's Power Purchase Agreement. In case any power plant exceeds the total outage allowance as specified in the WAPDA's Power Purchase Agreement, Liquidated Damages are usually imposed by the Power Purchaser in accordance with the relevant provisions of the Power Purchase Agreement. Whereas, the tariff of few hydel power stations such as Neelum Jhelum, Pehur and Machai is on "Take & Pay" basis, meaning thereby, that there is no outage allowance for these projects in their respective Power Purchase Agreements.

Ranolia Hydel Power Plant remained entirely out of service throughout FY 2023-24, resulting in 0% Availability Factor, 0% NCF, and 0% Net Output Factor.

Similarly, the Net Output Factors for several hydel power plants, including Tarbela, Renala, Chichoki, Nandipur, Rasul, Dargai, Jinnah hydel, Duber Khwar, Golen Gol, Malakand-III, Reshun, Machai, Shishi, Gulpur and Neelum Jhelum, were below 70%.

4.3.3 Renewable:

Plants Connected with NTDC System

S. No.	Name of Power Plants	Main Fuel	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
1	Sapphire Wind	Wind	52.8	52.8	79,434	4,884	3,445	33	423	94.8	17.1	30.8
2	Zephyr Power	Wind	50	50	121,765	8,284	390	20	66	98.7	27.7	29.4
3	Hydro China Dawood	Wind	49.5	49.5	89,406	8,704	0	0	80	99.1	20.6	20.8
4	Foundation Wind-I	Wind	50	50	110,949	8,337	316	21	110	98.5	25.3	26.6
5	Foundation Wind-II	Wind	50	50	125,581	8,310	296	26	151	98.0	28.6	30.2
6	Sachal Energy	Wind	49.5	43.09	115,073	8,230	499	16	39	99.4	30.4	32.4
7	Metro Wind	Wind	60	60	167,059	6,523	2,128	36	105	98.5	31.7	42.7
8	UEP Wind	Wind	99	96.36	173,537	6,734	1,981	6	58	99.2	20.5	26.7
9	Artistic Energy	Wind	49.3	49.3	167,142	8,122	532	34	100	98.5	38.6	41.7
10	Jhimpir Power	Wind	49.735	49.735	102,253	8,230	310	33	124	97.2	23.4	25.0
11	Hawa Energy	Wind	49.735	49.735	168,513	8,224	327	39	93	97.3	38.6	41.2
12	Tricon Boston - A	Wind	49.735	49.735	111,157	5,202	3,463	29	90	98.6	25.4	43.0
13	Tricon Boston - B	Wind	49.735	49.735	108,146	5,230	3,469	30	55	99.0	24.8	41.6
14	Tricon Boston - C	Wind	49.735	49.735	107,634	5,094	3,575	28	87	98.7	24.6	42.5
15	Tenega Generasi	Wind	49.5	49.5	94,583	8,076	509	30	169	97.7	21.8	23.7
16	FFC Energy	Wind	49.5	49.5	93,869	6,866	1,814	28	76	98.8	21.6	27.6
17	3 Gorges 1st Wind	Wind	49.5	49.5	108,340	7,492	1,210	37	45	99.1	24.9	29.2
18	3 Gorges 2nd Wind	Wind	49.5	49.5	86,944	7,901	817	54	12	99.2	20.0	22.2
19	3 Gorges 3rd Wind	Wind	49.5	49.5	50,754	7,781	964	27	12	99.5	11.7	13.2
20	Yunus Energy	Wind	50	50	80,202	6,791	1,766	119	61	97.4	18.3	23.6
21	ACT Wind	Wind	30	30	72,548	7,100	1,573	25	86	98.7	27.5	34.1
22	Master Wind	Wind	52.8	52.8	85,080	5,317	3,333	33	101	98.5	18.3	30.3
23	Gul Ahmed Wind	Wind	50	50	86,109	4,250	4,450	42	42	99.0	19.6	40.5
24	Lucky Renewables	Wind	50	50	71,693	7,135	1,464	118	91	97.9	16.3	20.1
25	Master Green	Wind	50	50	104,458	7,304	1,072	62	346	95.4	23.8	28.6
26	Zorlu Enerji	Wind	56.4	56.4	115,956	6,803	358	52	481	81.5	23.4	30.2
27	ACT 2 DIN	Wind	50	50	115,199	6,820	1,936	11	17	99.7	26.2	33.8
28	Artistic Wind	Wind	50	50	110,972	3,831	4,953	0	0	100.0	25.3	57.9
29	Indus Wind	Wind	50	50	119,971	8,199	251	24	227	96.2	27.3	29.3
30	Lakeside Energy	Wind	50	50	117,630	8,373	198	21	86	97.6	26.8	28.1

S. No.	Name of Power Plants	Main Fuel	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
31	Liberty Wind-I	Wind	50	50	109,203	8,738	18	2	2	99.7	24.9	25.0
32	DIN Energy	Wind	50	50	110,140	8,732	40	2	0	99.9	25.1	25.2
33	Gul Ahmad Electric	Wind	50	50	123,666	8,198	511	58	17	99.1	28.2	30.2
34	Liberty Wind-II	Wind	50	50	110,690	8,737	42	1	3	99.9	25.2	25.3
35	NASDA Green	Wind	50	50	115,612	8,655	0	91	38	98.5	26.3	26.7
36	Metro Power	Wind	50	50	125,326	8077	684	12	11	99.7	28.5	31.0
37	Atlas Solar	Solar	100	100	193,287	8808	0	0	0	100.0	22.0	22.0
38	Quaid-e-Azam Solar	Solar	100	100	155,113	4,396	0	1,243	3,145	50.0	17.7	35.3
39	Appolo Solar	Solar	100	100	157,572	4,235	0	216	4,333	48.2	17.9	37.2
40	Best Green	Solar	100	100	112,119	4,205	0	0	4,363	47.9	12.8	26.7
41	Crest Energy	Solar	100	100	158,748	4,211	0	0	4,357	47.9	18.1	37.7
42	Helios	Solar	50	50	44,904	1,774	1,826	0	0	100.0	24.9	50.6
43	HNDS	Solar	50	50	46,173	2,007	2,110	0	11	99.7	22.4	46.0
44	Meridian	Solar	50	50	47,039	1,895	1,982	0	11	99.7	24.2	49.6
45	AJ Power	Solar	12	12	19,636	4,171	3,167	0	1,446	83.5	18.6	39.2
46	Harappa	Solar	18	18	30,280	8,783	0	0	1	100.0	19.2	19.2
47	Chanar Energy	Baggase	22	20.78	20,091	1,168	1,637	5,659	320	31.9	11.0	82.8
48	RYK Mills	Baggase	30	16.42	76,270	4,713	56	4,014	26	54.3	52.9	98.6
49	JDW-II	Baggase	26.35	24.01	168,296	7,391	0	1,345	48	84.1	79.8	94.8
50	JDW-III	Baggase	26.35	24.04	165,689	7,908	0	843	33	90.0	78.5	87.2
51	Chiniot Power	Baggase	62.48	56.78	140,910	3,354	0	5,352	81	38.2	28.3	74.0
52	Fatima Energy	Baggase	118.8	108.1	348,843	3,871	4,428	453	33	94.5	36.7	83.4
53	Hamza Sugar	Baggase	15	13.69	57,215	4,641	36	4,089	18	53.2	47.6	90.1
54	Thal Industries	Baggase	41	22.4	56,269	3,006	0	5,757	21	34.2	28.6	83.6
55	Al-Moiz Industries	Baggase	36	20.65	29,282	3,885	0	4,899	7	44.2	16.1	36.5
Sub-Total			**2,903.46**	**2,823.3**	**5,984,332**	-	-	-	-	-	-	-
Plants connected with KE System												
1	Oursun	Solar	50	50	66,040	4,216	3,456	0	896	87.3	15.0	31.3
2	Gharo Solar	Solar	50	50	111,197	7,669	0	0	899	87.3	25.3	29.0
3	International Industries	Baggase	4.26	4	9463	3115	5629	27	61	99.0	28.0	75.9
Sub-Total			**104.26**	**104**	**186,700**	-	-	-	-	-	-	-
Grand Total			**3,007.72**	**2,927.30**	**6,171,032**	-	-	-	-	-	-	-

4.3.3.1 1st Quarter (July-Sept, 2023)

S. No.	Name of Power Plants	Main Fuel	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
NTDC System												
1	Sapphire Wind	Wind	52.8	52.8	38,290.97	1837.41	254.24	0	116.34	94.7	32.8	39.5
2	Zephyr Power	Wind	50	50	55,551	2184.65	18.45	0	4.9	99.8	50.3	50.9
3	Hydro China Dawood	Wind	49.5	49.5	41,942	2203.4	0	0	4.6	99.8	38.4	38.5
4	Foundation Wind-I	Wind	50	50	49,589	2161.63	23.07	0	23.3	98.9	44.9	45.9
5	FoundationWind-II	Wind	50	50	52,384	2151	24	3.24	28.76	98.5	47.4	48.7
6	Sachal Energy	Wind	49.5	43.09	44,870	2170	24.05	5.95	8	99.4	47.2	48.0
7	Metro Wind	Wind	60	60	71,196.230	2,105.87	91.7	1.98	16.06	99.5	53.7	56.3
8	UEP Wind	Wind	99	96.36	80,496	2002.26	194.5	1.96	9.28	99.5	37.8	41.7
9	ArtisticEnergy	Wind	49.3	49.3	63,051	2158	19	0	34	98.6	57.9	59.3
10	Jhimpir Power	Wind	49.735	49.735	47332.95	2167.08	19.45	0.57	17.24	99.0	43.1	43.9
11	Hawa Energy	Wind	49.735	49.735	45751.93	2154.57	19.41	0.28	32.03	98.5	41.7	42.7
12	Tricon Boston – A	Wind	49.735	49.735	50,683.099	1838.15	323.77	0.15	45.93	97.9	46.2	55.4
13	Tricon Boston – B	Wind	49.735	49.735	49,744.125	1859.31	330.64	1.98	16.06	99.2	45.3	53.8
14	Tricon Boston – C	Wind	49.735	49.735	49,458.092	1865.53	325.67	1.29	15.51	99.2	45.0	53.3
15	Tenega Generasi	Wind	49.5	49.5	44,471	2160.7	23.22	1.08	23	98.9	40.7	41.6
16	FFC Energy	Wind	49.5	49.5	39,328	2116	79	0	13	99.4	36.0	37.5
17	3 Gorges 1st Wind	Wind	49.5	49.5	45,217	2206	0	0	2	99.9	41.4	41.4
18	3 Gorges 2ndWind	Wind	49.5	49.5	39,857	2177	4	24	3	98.8	36.5	37.0
19	3 Gorges 3rd Wind	Wind	49.5	49.5	1,234	2039	160	5	4	99.6	1.1	1.2
20	Yunus Energy	Wind	50	50	39,909	1,996.85	179.31	13.35	18.5	98.6	36.1	40.0
21	ACT Wind	Wind	30	30	30596.12	1993	164	0	51	97.7	46.2	51.2
22	Master Wind	Wind	52.8	52.8	40,867	1854.62	298.94	0.58	53.91	97.5	35.1	41.7
23	Gul Ahmed Wind	Wind	50	50	39507.46	1973.61	207.09	4.2	23.1	98.8	35.8	40.0
24	Lucky Renewables	Wind	50	50	11,133	1692	434.44	43.44	38.12	96.3	10.1	13.2
25	Master Green	Wind	50	50	49,411	1993.26	144.25	3.67	66.81	96.8	44.8	49.6
26	Zorlu Enerji	Wind	56.4	56.4	49,652	1853.56	15	10.34	47.8	84.6	39.9	47.5
27	ACT 2 DIN	Wind	50	50	52508.52	1995.35	208.75	0	3.9	99.8	47.6	0.0
28	Artistic Wind	Wind	50	50	50,209	1397.4	810.6	0	0	100.0	45.5	71.9

S. No.	Name of Power Plants	Main Fuel	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
29	Indus Wind	Wind	50	50	54,448	2135.05	24.35	10.1	38.5	97.8	49.3	51.0
30	Lakeside Energy	Wind	50	50	53,965	2156.04	30.44	0.22	21.3	99.0	48.9	50.1
31	Liberty Wind Power-I	Wind	50	50	51,176	2206.59	1	0.2	0.21	100.0	46.4	46.4
32	DIN Energy	Wind	50	50	51251.42	2203	5	0	0	100.0	46.4	46.5
33	Gul Ahmad Electric	Wind	50	50	56,329	2,171.90	28.71	5	2.39	99.7	51.0	51.9
34	Liberty Wind Power-II	Wind	50	50	52,273	2206.77	0.97	0	0.26	100.0	47.3	47.4
35	NASDA Green	Wind	50	50	53300	2200	0	2	6	99.6	48.3	48.5
36	Metro Power	Wind	50	50	48487.76	2142	65	0	1	99.9	43.9	45.3
37	Atlas Solar	Solar	100	100	54470.64	2208	0	0	0	100	24.7	24.7
38	Quaid-e-Azam Solar	Solar	100	100	41,512	1179	0	0	1029	53.4	18.8	35.2
39	Appolo Solar	Solar	100	100	43076.52	1182.42	0	0	1025.58	53.6	19.5	36.4
40	Best Green Energy	Solar	100	100	41,572	1171.45	0	0	1036.55	53.1	18.8	35.5
41	Crest Energy	Solar	100	100	43,517.81	1175.4	0	0	1032.6	53.2	19.7	37.0
42	Helios	Solar	50	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
43	HNDS	Solar	50	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
44	Meridian	Solar	50	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
45	AJ Power	Solar	12	12	4909	1208	999	0	1	100.0	18.5	33.9
46	Harappa	Solar	18	18	8936.49	2207.94	0	0	0.06	100.0	22.5	22.5
47	Chanar Energy	Baggase	22	20.78	0	0	0	2208	0	0.0	0.0	0.0
48	RYK Mills	Baggase	30	16.42	1556.2	117.8	0.03	2112	2.14	5.3	4.3	80.5
49	JDW-II	Baggase	26.35	24.01	38,544.50	1,597.50	0	606.8	3.68	72.4	72.7	100.0
50	JDW-III	Baggase	26.35	24.04	51,829.16	2,183.80	0	0	24.2	98.9	97.6	98.7
51	Chiniot Power	Baggase	62.48	56.78	18800.58	349	0	1853	7	15.8	15.0	94.9
52	Fatima Energy	Baggase	118.8	108.1	104919	1008	1104	90	6	95.7	44.0	96.3
53	Hamza Sugar Mills	Baggase	15	13.69	-1,047	0	0	2208	0	0.0	0.0	0.0
54	Thal Industies (Layyah)	Baggase	41	22.4	0	0	0	2208	0	0.0	0.0	0.0
55	Al-Moiz Industries	Baggase	36	20.65	1518.02	125	0	2083	0.05	5.7	3.3	58.8
Sub Total			**2,903.5**	**2,823.3**	**2,149,585**	-	-	-	-	-	-	-

S. No.	Name of Power Plants	Main Fuel	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
KE System												
1	Oursun	Solar	50	50	22,034	1142.85	1065.15	0	0	100.0	20.0	38.6
2	Gharo Solar	Solar	50	50	21558	2208	0	0	0	100.0	19.5	19.5
3	International Industries	Baggase	4.26	4	3586	1101	1071	8	52	98.4	40.6	81.4
Sub Total			**104.26**	**104**	**47,178**	-	-	-	-	-	-	-
Total (NTDC+KE)			**3,007.72**	**2,927.30**	**2,196,763**	-	-	-	-	-	-	-

4.3.3.2 2nd Quarter (Oct-Dec, 2023)

S. No.	Name of Power Plants	Main Fuel	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
NTDC System												
1	Sapphire Wind	Wind	52.8	52.8	8,867.38	489.31	1605.24	15.9	97.55	94.9	7.6	34.3
2	Zephyr Power	Wind	50	50	10,510	2005.5	152.87	4.38	45.25	97.8	9.5	10.5
3	Hydro China Dawood	Wind	49.5	49.5	8,415	2162.8	0	0	45.24	98.0	7.7	7.9
4	Foundation Wind-I	Wind	50	50	16,480	2061.1	94.3	11.6	41.2	97.6	14.9	16.0
5	FoundationWind-II	Wind	50	50	20,982	2053	90.75	5.95	58.3	97.1	19.0	20.4
6	Sachal Energy	Wind	49.5	43.09	24,377	2120	78.68	3.38	6	99.6	25.6	26.7
7	Metro Wind	Wind	60	60	10,623.07	635.61	1558.07	7.99	6.33	99.4	8.0	27.9
8	UEP Wind	Wind	99	96.36	20,057	1450.75	732.55	1.5	19.2	98.9	9.4	14.3
9	ArtisticEnergy	Wind	49.3	49.3	34,929	2073	103	10	23	98.6	32.1	34.2
10	Jhimpir Power	Wind	49.735	49.735	10780.43	2074.55	99.55	16.54	26.14	98.5	9.8	10.4
11	Hawa Energy	Wind	49.735	49.735	10735.97	2036.44	100.25	17.27	33.26	96.8	9.8	10.6
12	Tricon Boston – A	Wind	49.735	49.735	10,737.30	646.43	1534.95	10.92	15.7	98.8	9.8	33.4
13	Tricon Boston – B	Wind	49.735	49.735	10,623.07	635.61	1558.07	7.99	6.33	99.4	9.7	33.6
14	Tricon Boston – C	Wind	49.735	49.735	10,721.24	562.98	1619.58	9.61	15.84	98.8	9.8	38.3
15	Tenega Generasi	Wind	49.5	49.5	8,830	1990.39	142.43	5.38	69.8	96.6	8.1	9.0
16	FFC Energy	Wind	49.5	49.5	18,987	1622	558	12.5	15.5	98.7	17.4	23.6
17	3 Gorges 1st Wind	Wind	49.5	49.5	20,483	1811.22	369.84	14.54	12.4	98.8	18.7	22.8

S. No.	Name of Power Plants	Main Fuel	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
18	3 Gorges 2nd Wind	Wind	49.5	49.5	10,313	1476.92	711.57	17.1	2.41	99.1	9.4	14.1
19	3 Gorges 3rd Wind	Wind	49.5	49.5	10,546	1404.29	782.61	16.73	4.36	99.0	9.6	15.2
20	Yunus Energy	Wind	50	50	10,659	1662	491	47.5	7.5	97.5	9.7	12.8
21	ACT Wind	Wind	30	30	12405.74	1664	520	13	11	98.9	18.7	24.9
22	Master Wind	Wind	52.8	52.8	9,359	568.3	1614.1	12.35	13.24	98.8	8.0	31.2
23	Gul Ahmed Wind	Wind	50	50	10739.52	1667	512	23.8	5.2	98.7	9.7	12.9
24	Lucky Renewables	Wind	50	50	11,133	1692	434.44	43.44	38.12	96.3	10.1	13.2
25	Master Green	Wind	50	50	10,064	1759.35	285.78	28.91	133.95	92.6	9.1	11.4
26	Zorlu Enerji	Wind	56.4	56.4	20,831	1700.823	72.92	12.78	142.6	80.3	16.7	21.7
27	ACT 2 DIN	Wind	50	50	11015.15	1534.91	660.76	4.8	7.53	99.4	10.0	14.4
28	Artistic Wind	Wind	50	50	10,696	241.5	1966.59	0	0	100.0	9.7	88.6
29	Indus Wind	Wind	50	50	11,043	2008.21	101.07	5.95	92.77	95.5	10.0	11.0
30	Lakeside Energy	Wind	50	50	11,341	2101	78.65	11.6	16.41	98.7	10.3	10.8
31	Liberty Wind Power-I	Wind	50	50	10,422	2202.9	4.45	0.05	0.6	100.0	9.4	9.5
32	DIN Energy	Wind	50	50	11166.75	2191	16	1	0	100.0	10.1	10.2
33	Gul Ahmad Electric	Wind	50	50	11,631	2065.88	102	33	7.06	98.2	10.5	11.3
34	Liberty Wind Power-II	Wind	50	50	10,236	2190.513	16.51	0	0.967	100.0	9.3	9.3
35	NASDA Green	Wind	50	50	11064	2192	0	13	3	99.3	10.1	10.1
36	Metro Power	Wind	50	50	27639.22	1911	285	12	0	99.4	25.0	28.9
37	Atlas Solar	Solar	100	100	34394.19	2208	0	0	0	100	15.6	15.6
38	Quaid-e-AzamSolar	Solar	100	100	33,725	965.2	0	1242.8	0	43.7	15.3	34.9
39	Appolo Solar	Solar	100	100	35409.79	973.69	0	0	1234.3	44.1	16.0	36.4
40	Best Green Energy	Solar	100	100	34,444	968.45	0	0	1239.55	43.9	15.6	35.6
41	Crest Energy	Solar	100	100	35,682	966.45	0	0	1241.55	43.8	16.2	36.9
42	Helios	Solar	50	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
43	HNDS	Solar	50	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
44	Meridian	Solar	50	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
45	AJ Power	Solar	12	12	5985	766	0	0	1442	34.7	22.6	65.1
46	Harappa	Solar	18	18	5260.96	2207.64	0	0	0.36	100.0	13.2	13.2
47	Chanar Energy	Baggase	22	20.78	3,498	251	1637	0	320	85.5	7.6	67.1
48	RYK Mills	Baggase	30	16.42	17738.3	1018	46.1	1143.67	0	48.2	48.9	106.1
49	JDW-II	Baggase	26.35	24.01	36,267.32	1,633.91	0	574.09	0	74.0	68.4	92.4
50	JDW-III	Baggase	26.35	24.04	29,135.23	1,362.29	0	842.8	2.92	61.7	54.9	89.0

S. No.	Name of Power Plants	Main Fuel	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
51	Chiniot Power	Baggase	62.48	56.78	37356.42	954	0	1226	29	43.2	29.8	69.0
52	Fatima Energy	Baggase	118.8	108.1	51258	676	1167	360	6	83.5	21.5	70.1
53	Hamza Sugar Mills	Baggase	15	13.69	13,394	1079.24	30.58	1094.28	3.9	50.3	44.3	90.7
54	Thal Industies (Layyah)	Baggase	41	22.4	13419.59	751.28	0	1440.4	16.32	34.0	27.1	79.7
55	Al-Moiz Industries	Baggase	36	20.65	5988.64	759	0	1449	1.1	34.4	13.1	38.2
Sub Total			**2,903.5**	**2,823.3**	**882,399**	-	-	-	-	-	-	-

S. No.	Name of Power Plants	Main Fuel	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
KE System												
1	Oursun	Solar	50	50	22,048	992.92	1215.08	0	0	100.0	20.0	44.4
2	Gharo Solar	Solar	50	50	22039	2208	0	0	0	100.0	20.0	20.0
3	International Industries	Baggase	4.26	4	2025	752	1471	5	4	100.7	22.9	67.3
Sub Total			**104.26**	**104**	**46,112**	-	-	-	-	-	-	-
Total (NTDC+KE)			**3,007.72**	**2,927.30**	**928,511**	-	-	-	-	-	-	-

4.3.3.3 3rd Quarter (Jan-Mar, 2024)

S. No.	Name of Power Plants	Main Fuel	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
NTDC System												
1	Sapphire Wind	Wind	52.8	52.8	8,106	814.9	1256.39	16.76	95.95	94.8	7.0	18.8
2	Zephyr Power	Wind	50	50	12,326	1977.56	163	4.72	14.69	98.0	11.3	12.5
3	Hydro China Dawood	Wind	49.5	49.5	8,877	2165.3	0	0	18.733	99.1	8.2	8.3
4	Foundation Wind-I	Wind	50	50	14,422	2010.35	128.35	7.6	37.7	97.9	13.2	14.3
5	FoundationWind-II	Wind	50	50	15,864	2005.4	129.3	6.95	42.35	97.7	14.5	15.8
6	Sachal Energy	Wind	49.5	43.09	17,181	1885	279.89	5	14	99.1	18.3	21.2
7	Metro Wind	Wind	60	60	16,890	1754.22	355.14	8.55	66.09	96.6	12.9	16.0

S. No.	Name of Power Plants	Main Fuel	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
8	UEP Wind	Wind	99	96.36	18,931	1417.48	742.65	2.88	20.99	98.9	9.0	13.9
9	ArtisticEnergy	Wind	49.3	49.3	23,389	1825	306	24	29	97.6	21.7	26.0
10	Jhimpir Power	Wind	49.735	49.735	11073.46	1916.38	160.41	15.59	15.4	95.1	10.2	11.6
11	Hawa Energy	Wind	49.735	49.735	11523	1908.25	177.11	21.05	16.46	95.5	10.6	12.1
12	Tricon Boston – A	Wind	49.735	49.735	11,078	903.15	1248.6	15.48	16.77	98.5	10.2	24.7
13	Tricon Boston – B	Wind	49.735	49.735	11,079	920.13	1231.64	18.24	13.99	98.5	10.2	24.2
14	Tricon Boston – C	Wind	49.735	49.735	11,270	869.27	1275.43	14.66	24.66	98.2	10.4	26.1
15	Tenega Generasi	Wind	49.5	49.5	9,701	1825.126	283.83	5.14	69.9	96.6	9.0	10.7
16	FFC Energy	Wind	49.5	49.5	13,129	1372	793	8	11	99.1	12.1	19.3
17	3 Gorges 1st Wind	Wind	49.5	49.5	14,841	1595.17	554.47	16.96	17.4	98.4	13.7	18.8
18	3 Gorges 2ndWind	Wind	49.5	49.5	9,187	2072	96	11	5	99.3	8.5	9.0
19	3 Gorges 3rd Wind	Wind	49.5	49.5	10,449	2158.5	19	4.57	1.93	99.7	9.7	9.8
20	Yunus Energy	Wind	50	50	462	1222.38	835.35	51.92	27.25	94.2	0.4	0.8
21	ACT Wind	Wind	30	30	9407.29	1526	646	0	12	99.5	14.4	20.5
22	Master Wind	Wind	52.8	52.8	8,843	1049.38	1097.25	18.86	18.52	98.3	7.7	16.0
23	Gul Ahmed Wind	Wind	50	50	9410.79	475.82	1693.5	7.34	7.34	99.3	8.6	39.6
24	Lucky Renewables	Wind	50	50	12,050	1744	443.3	12.92	7.76	100.0	11.0	13.8
25	Master Green	Wind	50	50	10,530	1682.95	390.43	16.13	94.48	94.9	9.6	12.5
26	Zorlu Enerji	Wind	56.4	56.4	15,134	1581.476	183.12	14.18	140.3	80.8	12.3	17.0
27	ACT 2 DIN	Wind	50	50	11783.28	1397.39	778.9	4.6	3.05	99.6	10.8	16.9
28	Artistic Wind	Wind	50	50	11,568	550.89	1633.11	0	0	100.0	10.6	42.0
29	Indus Wind	Wind	50	50	12,161	2012.15	100.56	1.63	69.66	96.7	11.1	12.1
30	Lakeside Energy	Wind	50	50	12,187	1992.1	65.5	9.3	11.7	94.2	11.2	12.2
31	Liberty Wind Power-I	Wind	50	50	10,571	2149.5	8.1	1.12	1.27	98.8	9.7	9.8
32	DIN Energy	Wind	50	50	10722.44	2171	13	0	0	100.0	9.8	9.9
33	Gul Ahmad Electric	Wind	50	50	12,195	1981	178	20	5	98.9	11.2	12.3
34	Liberty Wind Power-II	Wind	50	50	10,377	2137.58	19.9	1.06	1.44	98.8	9.5	9.7
35	NASDA Green	Wind	50	50	11078	2105	0	69	10	10.1	10.5	10.1
36	Metro Power	Wind	50	50	18582.63	1905	269	0	10	99.5	16.8	19.5
37	Atlas Solar	Solar	100	100	37783.8	2184	0	0	0	100	17.1	17.3
38	Quaid-e-Azam Solar	Solar	100	100	34,919	1034	0	0	1150	47.3	16.0	33.8

S. No.	Name of Power Plants	Main Fuel	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
39	Appolo Solar	Solar	100	100	36364.11	998.31	0	0	1185.69	45.7	16.7	36.4
40	Best Green Energy	Solar	100	100	36,103	993.23	0	0	1190.77	45.5	16.5	36.3
41	Crest Energy	Solar	100	100	36,707	992.47	0	0	1191.53	45.4	16.8	37.0
42	Helios	Solar	50	50	15657.85	635	781	0	0	100.0	22.1	49.3
43	HNDS	Solar	50	50	17283.3	868	1075.67	0	0.34	100.0	17.8	39.8
44	Meridian	Solar	50	50	17477.69	756	948	0	0	100.0	20.5	46.2
45	AJ Power	Solar	12	12	3478	1001	1183	0	0	100.0	13.3	29.0
46	Harappa	Solar	18	18	5796.2	2183.98	0	0	0.02	100.0	14.7	14.7
47	Chanar Energy	Baggase	22	20.78	16,593	917	0	1267	0	42.0	36.6	87.1
48	RYK Mills	Baggase	30	16.42	35632.1	1970	7.97	205.82	0	90.6	99.4	110.2
49	JDW-II	Baggase	26.35	24.01	44,653	2141	0	0	43	98.0	85.2	86.9
50	JDW-III	Baggase	26.35	24.04	32,574	2177.77	0	0	6.23	99.7	62.0	62.2
51	Chiniot Power	Baggase	62.48	56.78	63496.52	1649	0	491	44	75.5	51.2	67.8
52	Fatima Energy	Baggase	118.8	108.1	89628	1207	974	3	0	99.9	38.0	68.7
53	Hamza Sugar Mills	Baggase	15	13.69	27,872	2146.43	1.4	33.25	2.92	98.3	93.2	94.9
54	Thal Industies (Layyah)	Baggase	41	22.4	41261.42	2174.5	0	4.38	5.12	99.6	84.3	84.7
55	Al-Moiz Industries	Baggase	36	20.65	11807.69	1626	0	558	1.2	74.5	26.2	35.2
Sub Total			**2,903.5**	**2,823.3**	**1,041,466**	-	-	-	-	-	-	-

S. No.	Name of Power Plants	Main Fuel	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
KE System												
1	Oursun	Solar	50	50	21,958	1008.5	1175.5	0	0	100.0	20.1	43.5
2	Gharo Solar	Solar	50	50	24759	2176	0	0	8	99.6	22.7	22.8
3	International Industries	Baggase	4.26	4	1726	574	1608	0	2	99.9	19.8	75.2
Sub Total			**104.26**	**104**	**48,443**	-	-	-	-	-	-	-
Total (NTDC+KE)			**3,007.72**	**2,927.30**	**1,089,909**	-	-	-	-	-	-	-

4.3.3.4 4th Quarter (Apr-June, 2024)

S. No.	Name of Power Plants	Main Fuel	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
NTDC System												
1	Sapphire Wind	Wind	52.8	52.8	24,170	1742.27	328.71	0.24	112.78	94.8	21.0	26.3
2	Zephyr Power	Wind	50	50	43,378	2116.38	55.54	11.05	1.03	99.4	39.7	41.0
3	Hydro China Dawood	Wind	49.5	49.5	30,172	2172.2	0	0	11.83	99.5	27.9	28.1
4	Foundation Wind-I	Wind	50	50	30,458	2104	70	2	8	99.5	27.9	29.0
5	FoundationWind-II	Wind	50	50	36,351	2100.43	52.25	9.5	21.82	98.6	33.3	34.6
6	Sachal Energy	Wind	49.5	43.09	28,645	2055	116	2	11	99.4	30.4	32.3
7	Metro Wind	Wind	60	60	68,350	2027.34	123.33	17.14	16.19	98.5	52.2	56.2
8	UEP Wind	Wind	99	96.36	54,053	1863.94	311.74	0	8.32	99.6	25.7	30.1
9	ArtisticEnergy	Wind	49.3	49.3	45,773	2066	104	0	14	99.4	42.5	44.9
10	Jhimpir Power	Wind	49.735	49.735	33066.35	2072.26	30.19	0.04	65.15	96.3	30.4	32.1
11	Hawa Energy	Wind	49.735	49.735	100502	2124.47	30.29	0.03	11.15	98.7	92.5	95.1
12	Tricon Boston – A	Wind	49.735	49.735	38,659	1814.6	355.44	2.02	11.94	99.4	35.6	42.8
13	Tricon Boston – B	Wind	49.735	49.735	36,700	1815.08	348.62	2.06	18.24	99.1	33.8	40.7
14	Tricon Boston – C	Wind	49.735	49.735	36,185	1796.71	354.14	2.02	31.13	98.5	33.3	40.5
15	Tenega Generasi	Wind	49.5	49.5	31,581	2100	60	18	6	98.9	29.2	30.4
16	FFC Energy	Wind	49.5	49.5	22,425	1756.29	384.43	7.06	36.22	98.0	20.7	25.8
17	3 Gorges 1st Wind	Wind	49.5	49.5	27,799	1880	286	5	13	99.2	25.7	29.9
18	3 Gorges 2ndWind	Wind	49.5	49.5	27,587	2175	5	2	2	99.8	25.5	25.6
19	3 Gorges 3rd Wind	Wind	49.5	49.5	28,525	2179	2	1	2	99.9	26.4	26.4
20	Yunus Energy	Wind	50	50	29,172	1910	260	6	8	99.4	26.7	30.5
21	ACT Wind	Wind	30	30	20138.7	1917	243	12	12	98.9	30.7	35.0
22	Master Wind	Wind	52.8	52.8	26,011	1844.97	323.13	1.02	14.85	99.3	22.6	26.7
23	Gul Ahmed Wind	Wind	50	50	26451.31	133.66	2037.76	6.29	6.29	99.4	24.2	395.8
24	Lucky Renewables	Wind	50	50	37,377	2007	152	18	7	98.9	34.2	37.2
25	Master Green	Wind	50	50	34,453	1868	252	13	51	97.1	31.6	36.9
26	Zorlu Enerji	Wind	56.4	56.4	30,339	1667.61	86.6	14.64	150	80.3	24.6	32.3
27	ACT 2 DIN	Wind	50	50	39892.42	1892.66	287.12	1.51	2.71	99.8	36.5	42.2
28	Artistic Wind	Wind	50	50	38,499	1641.5	542.5	0	0	100.0	35.3	46.9

S. No.	Name of Power Plants	Main Fuel	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
29	Indus Wind	Wind	50	50	42,319	2043.15	24.53	6.45	26.53	94.7	38.8	41.4
30	Lakeside Energy	Wind	50	50	40,137	2124	23	0	37	98.3	36.8	37.8
31	Liberty Wind Power-I	Wind	50	50	37,034	2178.9	4.72	0.14	0.23	100.0	33.9	34.0
32	DIN Energy	Wind	50	50	36999.48	2167	6	1	0	99.5	33.9	34.1
33	Gul Ahmad Electric	Wind	50	50	43,511	1979	202.44	0	2.64	99.9	39.8	44.0
34	Liberty Wind Power-II	Wind	50	50	37,804	2202.49	4.8	0	0.65	100.0	34.6	34.3
35	NASDA Green	Wind	50	50	40170	2158	0	7	19	36.8	37.2	36.8
36	Metro Power	Wind	50	50	30616.31	2119	65	0	0	100	27.7	28.9
37	Atlas Solar	Solar	100	100	66637.87	2208	0	0	0	100	30.2	30.2
38	Quaid-e-AzamSolar	Solar	100	100	44,957	1218	0	0	966	55.8	20.6	36.9
39	Appolo Solar	Solar	100	100	42721.32	1080.87	0	216	887.13	49.5	19.6	39.5
40	Best Green Energy	Solar	100	100	0	1072.1	0	0	895.9	49.1	0.0	0.0
41	Crest Energy	Solar	100	100	42,841	1077.13	0	0	890.87	49.3	19.6	39.8
42	Helios	Solar	50	50	29245.92	1139	1045	0	0	100.0	26.8	51.4
43	HNDS	Solar	50	50	28889.7	1139	1034	0	11	99.5	26.5	50.7
44	Meridian	Solar	50	50	29561.5	1139	1034	0	11	99.5	27.1	51.9
45	AJ Power	Solar	12	12	5263.5	1196	985	0	3	99.9	20.1	36.7
46	Harappa	Solar	18	18	10286.21	2183.92	0	0	0.08	100.0	26.2	26.2
47	Chanar Energy	Baggase	22	20.78	0	0	0	2184	0	0	0	0
48	RYK Mills	Baggase	30	16.42	21343.6	1607	1.75	552.02	23.57	73.7	59.5	80.9
49	JDW-II	Baggase	26.35	24.01	48,831	2018.33	0	164.02	1.65	92.4	93.1	100.8
50	JDW-III	Baggase	26.35	24.04	52,151	2184	0	0	0	100.0	99.3	99.3
51	Chiniot Power	Baggase	62.48	56.78	21256.12	402	0	1782	1	18.4	17.1	93.1
52	Fatima Energy	Baggase	118.8	108.1	103038	980	1183	0	21	99.0	43.6	97.3
53	Hamza Sugar Mills	Baggase	15	13.69	16,996	1415	4.39	753	11.55	65.0	56.8	87.7
54	Thal Industies (Layyah)	Baggase	41	22.4	1588.3	80.354	0	2103.8	0	3.7	3.2	88.2
55	Al-Moiz Industries	Baggase	36	20.65	9967.87	1375	0	809	4.4	63.0	22.1	35.1
Sub Total			**2,903.5**	**2,823.3**	**1,910,879**	-	-	-	-	-	-	-

S. No.	Name of Power Plants	Main Fuel	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
KE System												
1	Oursun	Solar	50	50	25,447	1173.18	1010.82	0	0	100.0	23.3	43.4
2	Gharo Solar	Solar	50	50	30972	2184	0	0	0	100.0	28.4	28.4
3	International Industries	Baggase	4.26	4	2125.4	688	1479	15	2	99.2	24.3	77.2
Sub Total			**104.26**	**104**	**58,544**	-	-	-	-	-	-	-
Total (NTDC+KE)			**3,007.72**	**2,927.30**	**1,969,423**	-	-	-	-	-	-	-

Inference:

i. **Plants connected with NTDC System:** The wind-based power plants demonstrated availability factors ranging from 81.5% to 100%. NCF ranged from 11.7% to 38.6%, with the net output factor ranging from 13.2% to 57.9%. Solar power plants showed availability factors of 47.9% to 100%. Their NCF ranged from 12.8% to 24.9%, with the net output factor ranging from 19.2% to 50.6%. Baggase-based power plants exhibited availability factors ranging from 31.9% to 94.5%, with NCF varying from 11% to 79.8% and net output factors ranging from 36.5% to 98.6%.

ii. **Plants connected with KE System:** Solar-based power plants like Gharo and Oursun showcased availability factors of 87.3%. NCF ranged from 15% to 25.3%, and net output factors varied from 29% to 31.3%. Baggase- based power plant in the KE system i.e. International Industries Limited displayed availability factor of 99.0%, with NCF of 28.0% and net output factor of 75.9%.

4.3.4 Nuclear:

S. No.	Power Plants	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
1	K2	1145	1017.5	5,900,713	6,547	0	1,963	301	74.5	66.0	88.6
2	K3	1145	1017.5	8,104,145	8,630	0	0	85	98.2	90.7	92.3
3	C1	325	301.188	1,412,724	6,848	0	1,372	563	78.0	53.4	68.5
4	C2	325	300.959	2,520,364	8,784	0	0	0	100.0	95.3	95.3
5	C3	340	314.163	2,331,325	7,650	0	964	171	87.1	84.5	97.0
6	C4	340	314.2078	2,497,881	8,241	0	494	49	93.8	90.5	96.5
Total		**3,620**	**3,265.518**	**22,767,152**	-	-	-	-	-	-	-

4.3.4.1 1st Quarter (July-Sept, 2023)

S. No.	Power Plant	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
1	K2	1145	1017.5	2,074,950	2152.6	0	0	55.4	97.5	92.4	94.7
2	K3	1145	1017.5	2,304,130	2196.33	0	0	0	99.5	100.0	100.0
3	C1	325	301.188	547,786	1886.82	0	0	321.18	85.5	82.4	96.4
4	C2	325	300.959	678,206	2208	0	0	0	100.0	100.0	100.0
5	C3	340	314.163	324,734	1107.58	0	963.92	136.92	50.2	46.8	93.3
6	C4	340	314.2078	663,556	2159.03	0	0	48.97	97.8	95.7	97.8
Total		**3,620**	**3,265.518**	**6,593,362**	-	-	-	-	-	-	-

4.3.4.2 2nd Quarter (Oct-Dec, 2023)

S. No.	Power Plant	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
1	K2	1145	1017.5	260,170	272	0	1963	0	12.3	11.6	94.0
2	K3	1145	1017.5	2,050,337	2150.5	0	0	0	97.4	91.3	93.7
3	C1	325	301.188	5,525	1936.63	0	271.42	0	87.7	0.8	0.9
4	C2	325	300.959	650,891	2208	0	0	0	100.0	97.9	97.9
5	C3	340	314.163	692,475	2208	0	0	0	100.0	99.8	99.8
6	C4	340	314.2078	655,680	2208	0	0	0	100.0	94.5	94.5
Total		**3,620**	**3,265.518**	**4,315,078**	-	-	-	-	-	-	-

4.3.4.3 3rd Quarter (Jan-Mar, 2024)

S. No.	Power Plant	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
1	K2	1145	1017.5	1,564,536	2055.77	0	0	128.23	94	70	75
2	K3	1145	1017.5	1,715,927	2184	0	0	0	100	77	77
3	C1	325	301.188	216,540	841	0	1100.7	242.2	39	33	85
4	C2	325	300.959	646,793	2184	0	0	0	100	98	98
5	C3	340	314.163	648,630	2150.05	0	0	33.95	98	95	96
6	C4	340	314.2078	665,215	2184	0	0	0	100	97	97
Total		3,620	3,265.518	5,457,641	-	-	-	-	-	-	-

4.3.4.4 4th Quarter (Apr-June, 2024)

S. No.	Power Plant	Inst. Cap. (MW)	Ref. Cap. (MW)	Net Gen. (MWh)	Service Hours	Standby Hours	Planned Outage Hours	Unplanned Outage Hours	Availability Factor (%)	Net Capacity Factor (%)	Net Output Factor (%)
1	K2	1145	1017.5	2,001,057	2066.6	0	0	117.4	95	90	95
2	K3	1145	1017.5	2,033,751	2098.767	0	0	85.23	96	92	95
3	C1	325	301.188	642,873	2184	0	0	0	100	98	98
4	C2	325	300.959	544,474	2184	0	0	0	100	83	83
5	C3	340	314.163	665,486	2184	0	0	0	100	97	97
6	C4	340	314.2078	513,430	1690.38	0	493.62	0	77	75	97
Total		**3,620**	**3,265.518**	**6,401,071**	-	-	-	-	-	-	-

Inference:

The provided data pertains to the performance metrics of power plants K2, K3, C1, C2, C3, and C4. Notably, K3 with a capacity of 1,145 MW, demonstrated substantial net generation of 8,104,145 MWh and high availability factor of 98.2%, with NCF and net output factor reaching 90.7% and 92.3% respectively, reflecting effective operational performance. Similarly, C2, C3 and C4, with installed capacities ranging from 325 MW to 340 MW, demonstrated consistent performance with notable net generation figures. Particularly, C2 showcased the highest net generation of 2,520,364 MWh. C2, C3 and C4 displayed high availability factors ranging from 87.1% to 100%, underscoring their reliability. Additionally, these plants maintained robust NCF, reflecting efficient utilization of their installed capacities. The net output factors for these plants remained above 95%, indicating effective power generation relative to their installed capacities.

However, K2 and C1 experienced low Availability Factors ranging from 74.5% to 78%, primarily due to high planned outage hours ranging from 15.6% to 22.3%. This resulted in reduced NCF ranging from 53.4% to 66%. The Net Output Factors of K2 and C1 remained 88.6% and 68.5% respectively.