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Rethinking Use of System Charges for Pakistan's Competitive Electricity Market 2025

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Executive Summary

Use of System Charge (UoSC) is a key component of the Competitive Trading Bilateral Contracts Market (CTBCM)

- The Use of System Charge (also referred to as the wheeling charge) is the fee paid by market participants for accessing the government's transmission and distribution network under the Competitive Trading Bilateral Contracts Market (CTBCM) regime. It comprises the Transmission Use of System (TUoS), Distribution Margin, Market Operator Fee (MOF), and technical transmission and distribution losses.
- In addition, two other components — stranded costs and cross-subsidies — are often included, though their inclusion remains a subject of ongoing controversy and debate.

The proposed use of system charge by the XW—DISCOs has been deemed unattractive and unfeasible by businesses, stalling the launch of competitive market

- In response to NEPRA's hearing notification issued in November 2023, the XW-DISCOs proposed an average Use of System Charge (UoSC) of PKR 25.93/kWh, calculated in accordance with NEPRA's Open Access Regulations 2022.
- The proposed charges were rejected wholesale by the industrial community, who deemed them unattractive and unfeasible for business, and instead demanded that the charge be lowered and brought within the range of PKR 5 to 8/kWh, in order to ensure local and regional competitiveness.

Stranded costs and subsidies made up more than 80% of the UoSC proposed by XW-DISCOs, highlighting the need for a well-planned long-term and phased approach

- Notably, more than 80% of the proposed UoSC by XW-DISCOs consisted of stranded costs and cross-subsidies, which are not part of the actual cost of transmission or distribution. Experts raised concerns over the inclusion of non-transmission-related costs under this category.
- While removing these costs could significantly reduce the UoSC, it would shift the burden to non-CTBCM consumers.
- In July of 2025, the Cabinet Committee on Energy (CCoE) approved a wheeling charge of PKR 12.55/kWh for an initial 800 MW of market quantum, to be allocated for competitive bilateral trade.
- While this approach is conducive to initial market uplift, long term frameworks are needed for sustainable rationalization of the use of system charges which simultaneously ensure both the affordability of costs for ordinary consumers and clarity of outlook for investors.

A backloaded recovery method with simultaneous reduction of stranded assets is recommended to keep the UoSC attractive and equitable, encouraging growth of a competitive market

- In this paper, a UoSC model has been developed for stranded cost recovery, providing a future market outlook across four scenarios with varying market sizes and cost allocation techniques.
- While simple recovery (the government's previous approach) results in fixed per-unit stranded costs that heavily burden early market participants, subsidized cost (the government's current approach) cannot remain sustainable in the longer-term. Our results suggest that growth-based backloaded recovery can lead to lower and more uniform wheeling rates over time, encouraging market participation and ensuring sustainability.

Use of System Charge (UoSC) is a key component of the Competitive Trading Bilateral Contracts Market (CTBCM)

UoSC is the fee paid by Bulk Power Consumers (BPCs) for using the government's transmission and distribution network within a competitive electricity market. According to NEPRA, the UoSC consists of six main components.

Transmission Use of System Charge (TUoS)
Currently applicable TUoS Charges, as determined by NEPRA, compositely represent the charges relating to **Transmission Network Operator(s)/Licensee(s), System Operator** and **Metering Service Provider** in the XW-DISCOs petitions.
Entitled Entity: NTDC

Market Operator Fee (MOF)
The charge for the development and implementation of competitive power markets based on policy guidelines of the government and/or requirements of NEPRA
Entitled Entity: CPPA
Mechanism: As per Chapter 11 of the Market Commercial Code

Distribution Margin
The charge for the usage of the 132kV and below network managed by XW-DISCOs. Charged as per the voltage level and consumer category-wise for all possible BPCs.
Entitled Entity: Distribution Licensees (DISCOs)

Transmission & Distribution Losses
Voltage-wise energy losses as a percentage of received units calculated based on sales data of a fiscal year.
Overall Effective Losses Target as per NEPRA: 7.31%
Entitled Entity: CPPA
Mechanism: As per Market Commercial Code

Cross-subsidy
The difference between revenue requirement and cost of service. Imposed consumer category-wise for all possible BPCs to provide electricity at cheaper rates to lifeline consumers.
Entitled Entity: Distribution Licensees (DISCOs) with pass-through to lifeline consumers

Stranded Costs
The costs arising from **market liberalization** and the **advent of open access.** Includes **costs** of **capacity payments and distribution assets** which were created for the BPCs while they were still in the pool market.
Entitled Entity: Distribution Licensees

The XW-DISCOS proposed an average UOSC of 25.93PKR/kWh in NEPRA's hearing in November 2023, more than 80% of which comprised stranded costs and cross-subsidy

The XW-DISCOs proposed UoSCs using the Fully Allocated Cost of Service Study (FACOS) model

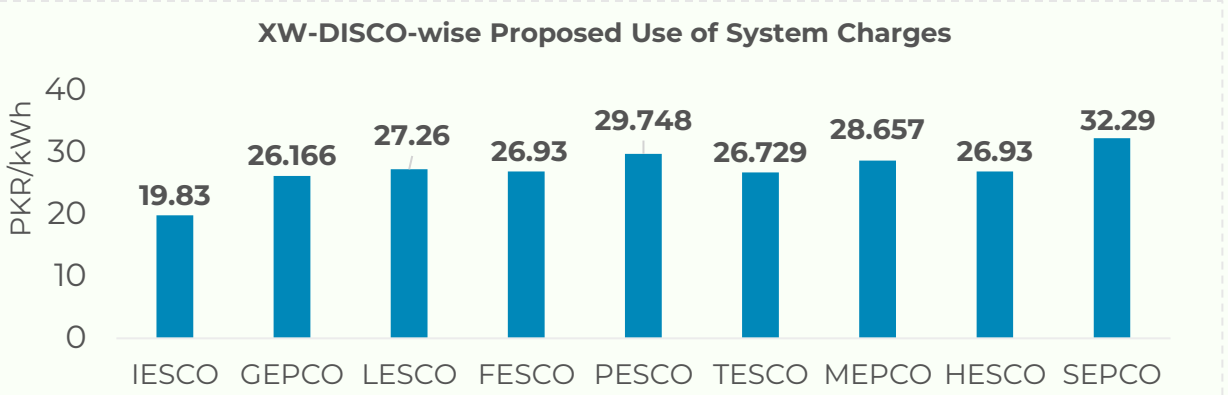


Figure 1

NEPRA's Open Access Regulations 2023

In 2022, NEPRA promulgated the **NEPRA Open Access (Interconnection and Wheeling of Electric Power) Regulations.** As per these regulations, the XW-DISCOs were directed to prepare and submit petitions for the determination of UoSC within 90 days of the notification along with a statement that set out the basis for UoSCs' calculation.

However, multiple hearings on the matter of UoSC were postponed following the hearing in November 2023 when XW-DISCOs proposed their petitions.

The proposed Use of System Charge (UoSC) by XW-DISCOs averaged around Rs. 26 per kWh, with over 80% of this amount attributed to stranded costs and cross-subsidies. The government maintained that these costs should be recovered through the system charge; however, industrial representatives strongly opposed this view, arguing that such costs have no connection to wheeling and would make the resulting electricity tariffs uncompetitive.

**Figure 1 has been developed using the average UoSC of the B4 consumer category of all XW-DISCOs*

***Figure 2 represents the UoSC breakup of IESCO's B4 consumer category*

Component-wise UoSC PKR/kWh

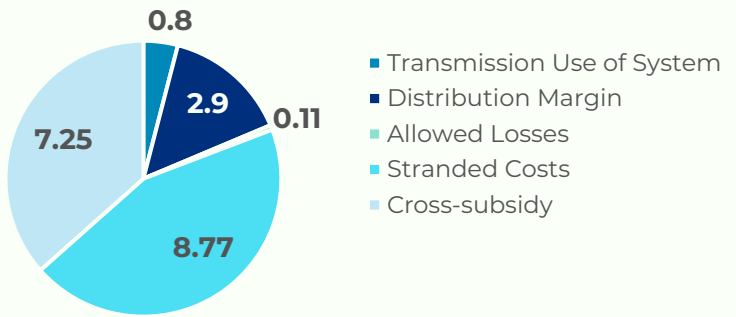
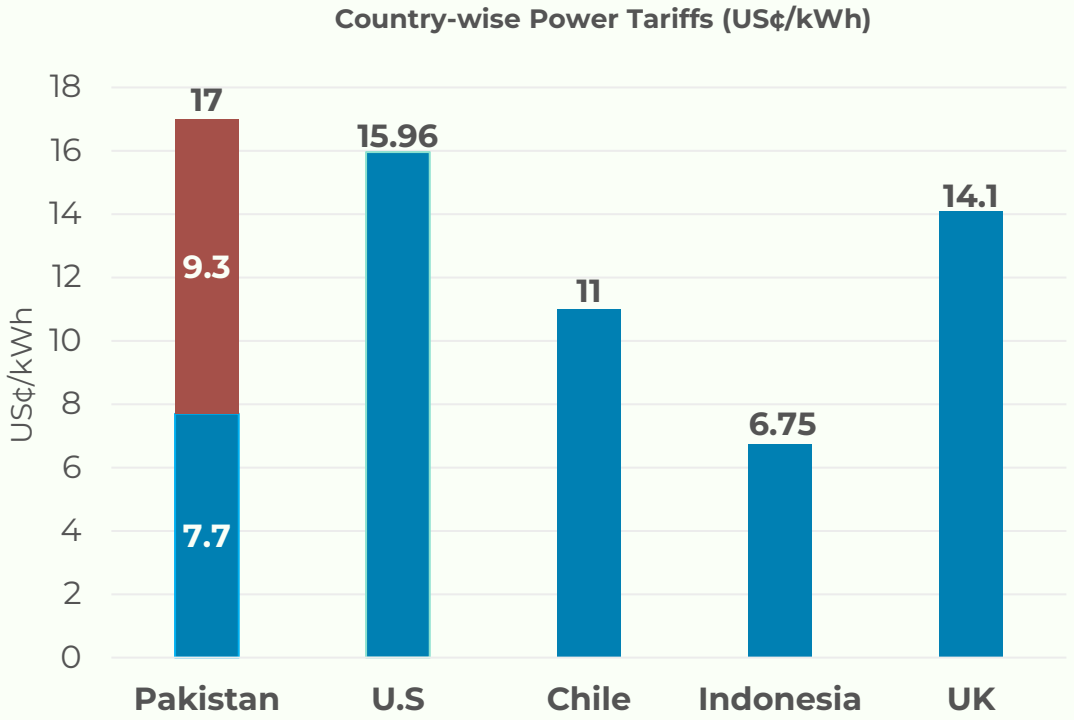


Figure 2

Data Source: NEPRA & Renewables First calculations

Proposed UoSC was deemed unrealistic and uncompetitive by the industrial sector, stalling the launch of a competitive market in Pakistan and threatening spillover to other sectors

Comparison of power tariff of other economies



Data Source 1: APTMA calculations; petrolprices.com data
Data Source 2: Energybot; tariff rates for every state in the USA
Data Source 3: Statista; average market price of electricity in Chile -May 2024
Data Source 4: Statista; Average electricity selling price by PLN for industries Indonesia 2023

High power tariffs crowd out the export sector

- As per an analysis made by the All-Pakistan Textile Mills Association (APTMA), the threshold value of power tariffs above which export sector is crowded out is approximated at 12.5 cents/kWh.
- The proposed UoSC exacerbates the overall power tariff to 17US¢/kWh which not only erode Pakistan's industrial competitiveness in the global market but deter investments in the power sector.

Reduce export earnings will lead to other repercussions and spill-over

- A high UoSC risks reducing industrial power consumption, leading to lower exports, higher debt, job losses, and broader economic decline. It also increases capacity payment burdens on residential and agricultural consumers. To mitigate this, industries have repeatedly proposed a UoSC of 1–1.5 US¢/kWh (PKR 2.80–4.20).

The Govt's current approaches are limited to socializing or subsidizing the stranded costs

- In July of 2025, the Cabinet Committee on Energy (CCoE) approved a wheeling charge of PKR 12.55/kWh for an initial 800 MW of market quantum, to be allocated for competitive bilateral trade.
- While this approach is conducive to initial market uplift, long term rationalization frameworks are needed which seek to recover stranded costs from within the industrial sector, avoiding unnecessary and unfair burden on the non-industrial consumer.

Phased Recovery of Stranded Costs: A Ten-Year Plan for Pakistan's Competitive Electricity Market

A phased and gradual recovery of stranded costs is essential to ensuring that UoSCs remain both attractive for market participants and equitable for all consumers

Model Development

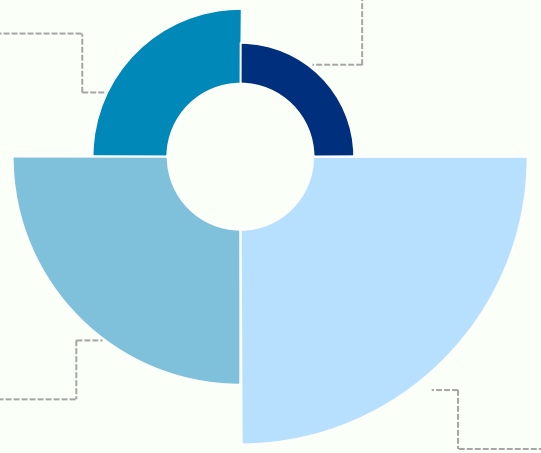
The model for stranded cost recovery is built using dynamic market sizing based on annual growth rates ranging from 10% to 30%.

To project stranded cost revenue required over the next 10 years, a Compound Annual Growth Rate (CAGR) was used based on historical trends. FY2022 & 2023 was excluded from the calculation due to abnormal economic conditions, including an unprecedented depreciation of more than 50% of the PKR against the US dollar. Instead, the CAGR is calculated from FY2024 to FY2026 (P), yielding a more representative growth rate of 0.8%

Horizon & Scale

The model takes a period of 10 years into account: 2026 to 2035.
To ensure flexibility and relevance, results are generated for three market sizes: 2 GW, 5 GW, and 10 GW and three growth rates: 10%, 20% and 30%.

**As per NEPRA, the initial market size assumed for CTBCM during the preparation of UoSC petitions was 2 GW.*



Scenarios

Four distinct recovery scenarios are evaluated:

1. simple recovery,
2. growth-based recovery,
3. backloaded recovery*,
4. backloaded recovery with reduced stranded cost

** In case of backloaded recovery, an interest charge at an average rate of 10% has been added to the parked stranded costs*

Data & Costing Method

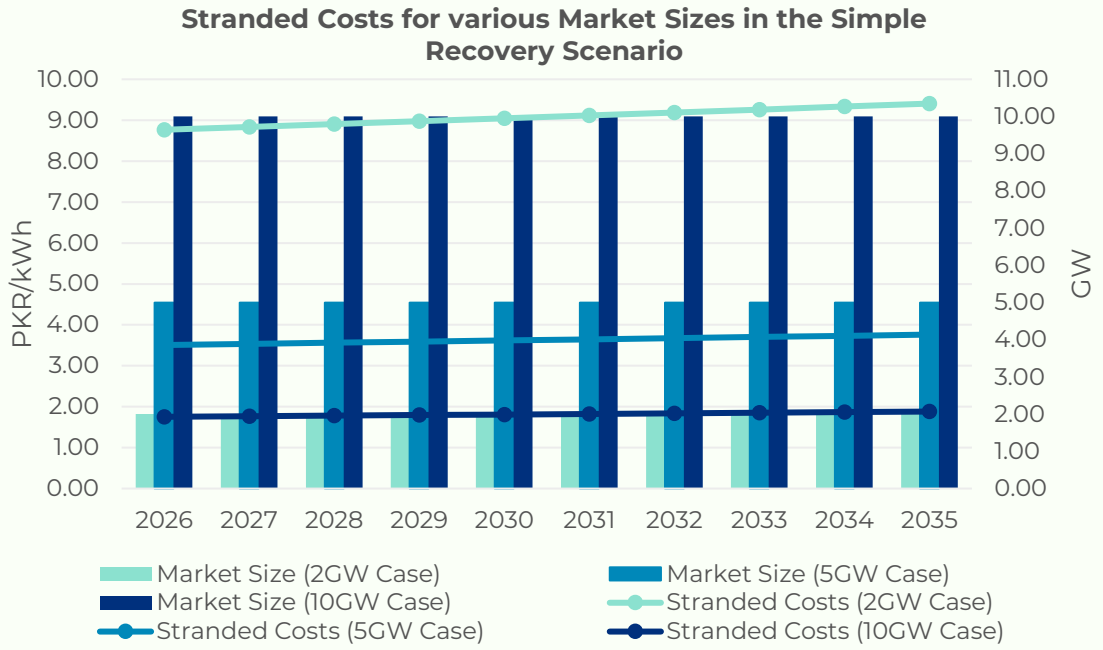
Data from the B4 consumer category of IESCO has been taken as representative, which has stranded costs of PKR 8.77/kWh and a load factor of 0.5.

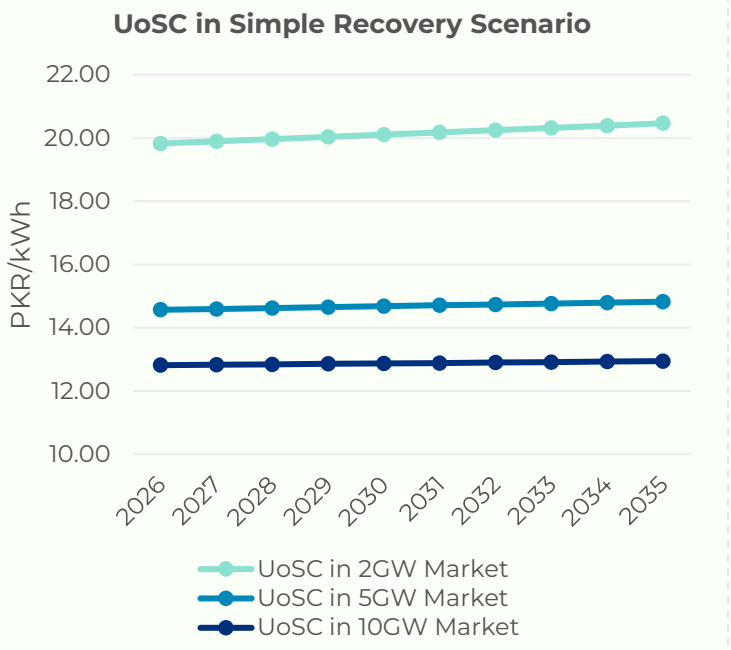
While DISCOs submitted costing proposals based on Maximum Demand Indicators (MDI), energy usage, and a hybrid approach, this model calculates charges in terms of per kWh energy usage only. This serves a representative purpose and can easily be extended to other costing methods.

Data Source: NEPRA, XW-DISCOs Petitions for UoSC Determination, Power Purchase Price Documents, & Renewables First calculations

Scenario 1: Simple recovery results in a fixed per-unit stranded cost over time resulting in excess burden for initial participants

Fixed market sizes are considered throughout the period for 2GW, 5GW, and 10GW cases leading to constant stranded costs in all cases



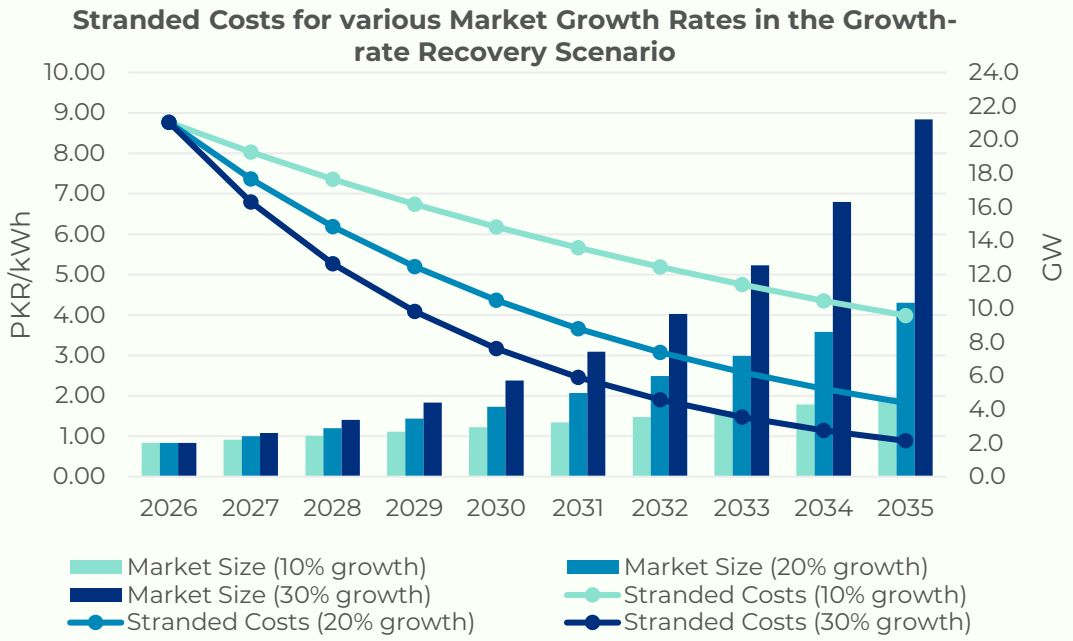


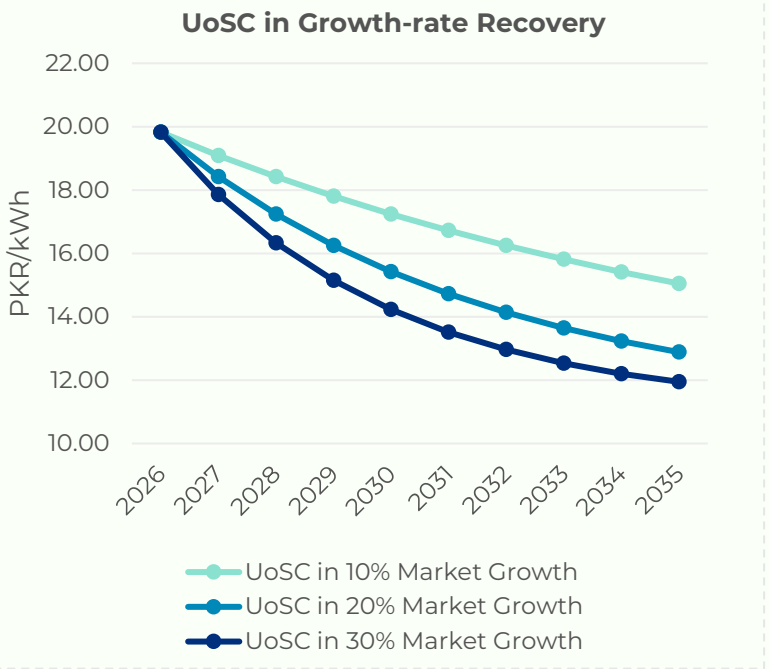
Comments

- The ten-year stranded cost revenue is uniformly distributed over the period with recovery set to 10% each year, ensuring 100% cost recovery by 2035.
- This method of stranded cost recovery gives high per-unit stranded costs over the period.
- Although an ideal case, this approach is **not viable** as it is uncompetitive and discourages market participants' entry.

Scenario 2: Growth-based recovery gradually lowers the per-unit stranded cost as the market expands but still discourages early entrants

Market growth rate of 10%, 20%, and 30% per annum is assumed while the total stranded cost is uniformly allocated over the years leading to higher per unit charge in the initial years



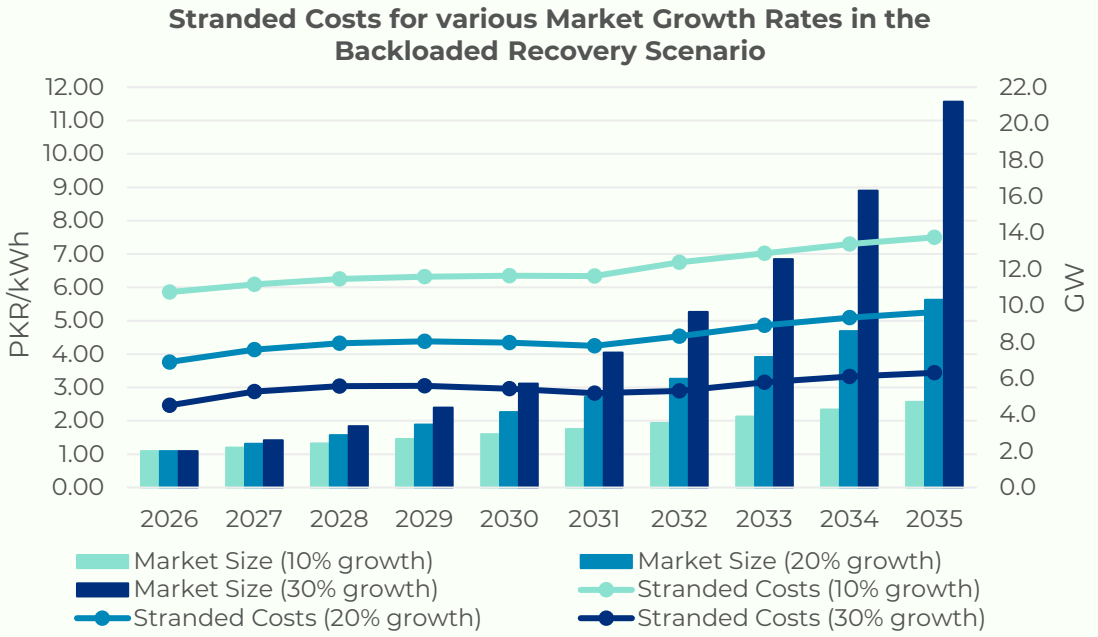


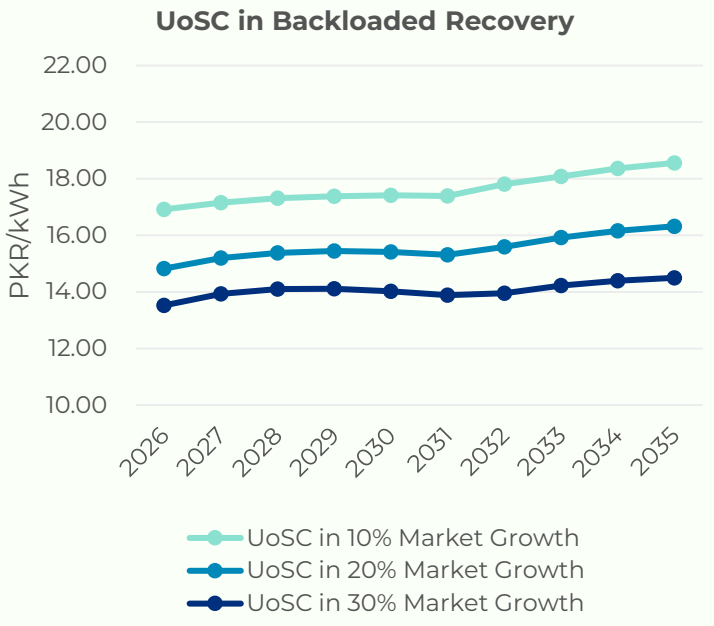
Comments

- Similar to the previous case, the ten-year stranded cost revenue is uniformly distributed over the period with 10% each year.
- This method of stranded cost recovery guarantees lower per-unit stranded costs in the final years thereby giving a somewhat positive market outlook.
- However, the higher per-unit stranded costs in the initial years will overburden the early market participants and thus **discourage entrants** and **jeopardize market sustainability.**

Scenario 3: Backloaded recovery ensures a lower per-unit stranded cost in the initial years and promotes a sustainable market

This case uses the same market growth assumptions as scenario 3, however, total stranded cost is now non-uniformly spread over the 10-year period—resulting in lower per unit charges



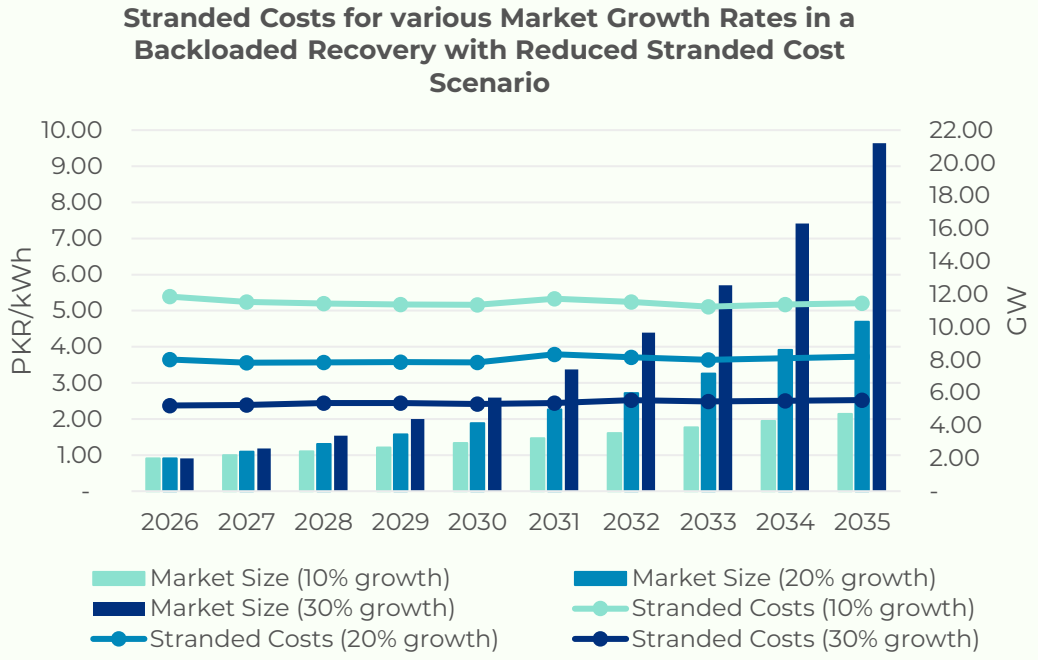


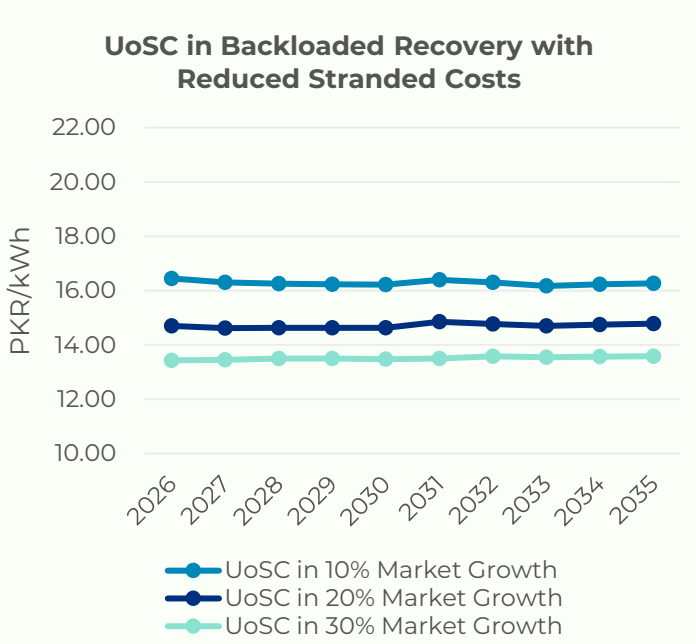
Comments

- In this scenario, the ten-year stranded cost is non-uniformly distributed over the period ensuring 100% cost recovery by the tenth year.
- This method of stranded cost recovery ensures lower per-unit stranded costs in the initial years allowing the market to grow before absorbing higher costs.
- This case not only gives a **realistic market outlook** but also **encourages market participants** to enter into the CTBCM regime.
- However, the increase of per unit charge is still fairly high which is due to the assumption that allocated stranded costs will remain the same over the coming years.

Scenario 4: Backloaded recovery with reduced stranded cost guarantees the lowest per-unit stranded costs and ensures market sustainability

This case uses the same market growth assumptions as before but assumes that stranded costs can be realistically reduced to a 50% value over a period of 10 years. As a result, there is a lower rate of increase in per unit charges over the years

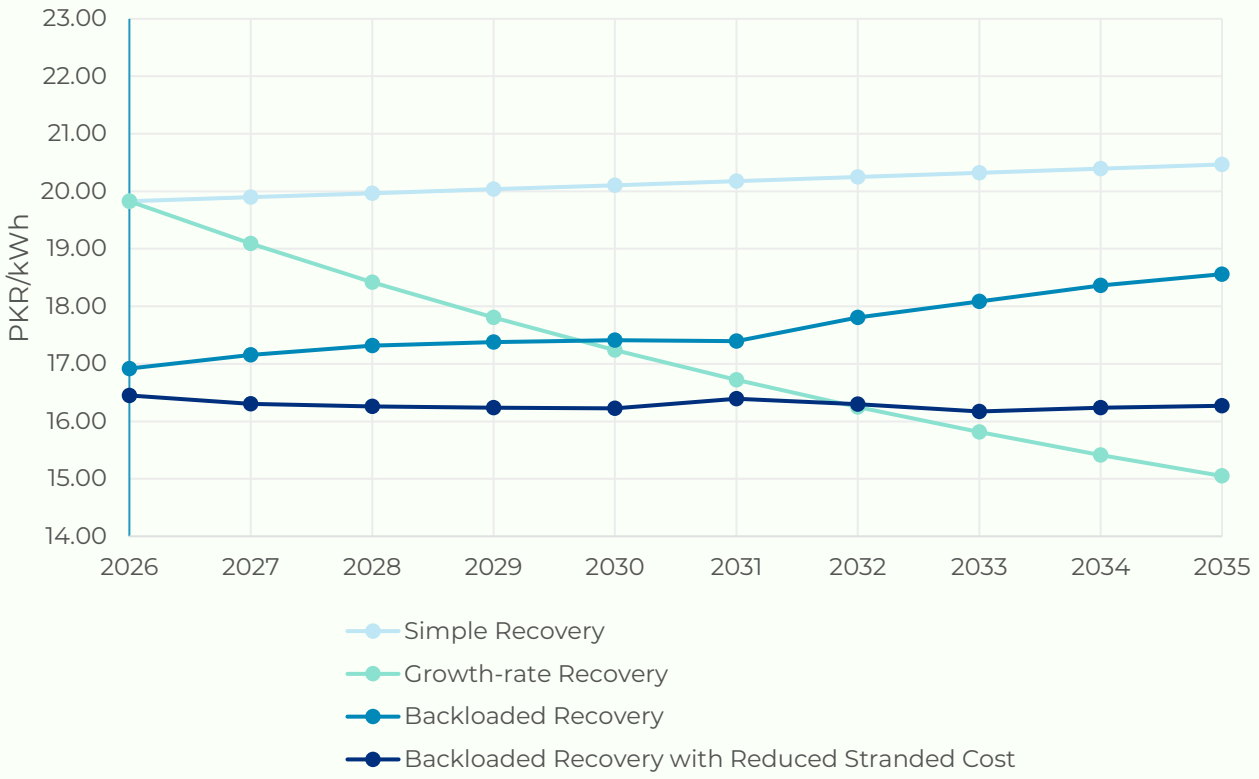




Comments

- The ten-year stranded cost is non-linearly distributed over the period such that it reduces to 50% by the last year..
- This approach results in a lower per unit stranded cost over the years, **facilitating early market participants** as well as **encouraging continued market growth**.
- It is to be noted that reduction in stranded costs over time is not an unrealistic assumption as many of the legacy contracts are expected to expire. Additionally, with improved planning further increases in these costs can be avoided.
- This approach offers a more financially accurate and transparent recovery path, helping policymakers and investors plan for long-term sustainability with realistic cost projections.

Backloaded recovery with reduced stranded costs emerges as the most favorable option, as it ensures ease of market entry while continuing to encourage participation over time.



Backloaded Recovery with Reduced Stranded Costs: Benefits

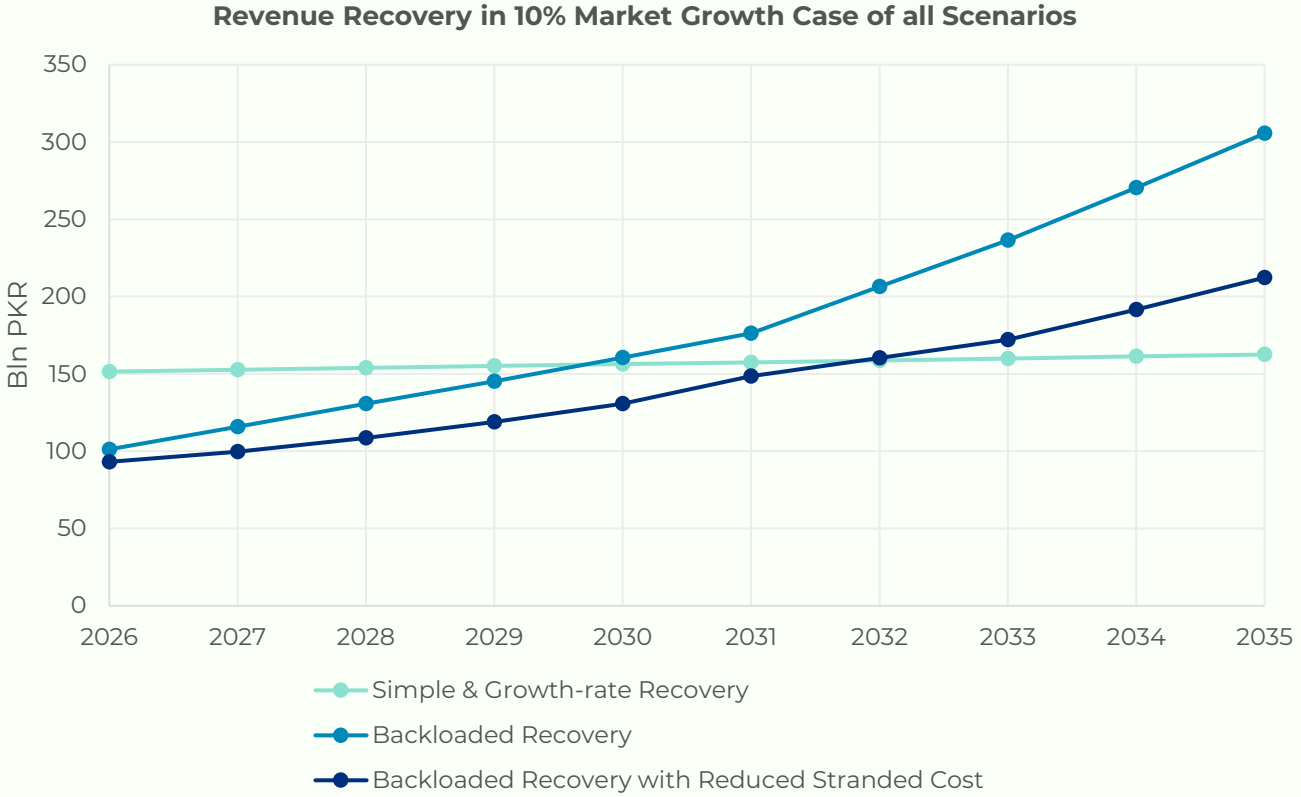
01 Realistic

02 Reduces UoSC while recovering costs

03 Supports free and fair competition and quick launch of competitive market

04 Wins investor confidence & reduces government liabilities

Scenario 4 and 5 offer a more financially sustainable approach by recovering less total stranded cost than scenario 3, leading to noticeably lower per-unit charges across all market growth rates



- In Scenario 3, the total stranded cost is recovered over 10 years by varying annual recovery percentages—6.28% in 2026, 6.90% in 2027, and so on—keeping the per-unit charge relatively stable throughout and ensuring 100% revenue recovery by the 10th year.
- Scenario 4 follows the same recovery structure but assumes the stranded cost declines to 50% by the 10th year, reducing the overall 10-year stranded cost. This scenario presents a more sustainable recovery path—lowering the financial burden while aligning with expected cost reductions over time.

SET OF RECOMMENDATIONS

In light of the discussions and analyses presented in this whitepaper, the following set of recommendations is proposed to bridge identified gaps and guide effective policy and implementation

Comprehensive Policy Framework for Stranded Cost Recovery	A clear policy framework should be established, outlining a roadmap and for the complete recovery of stranded costs associated with existing assets. This framework should also identify actionable strategies to gradually reduce these costs over time, aligning with the objectives of financial viability and market liberalization.
Time-Bound Stranded Cost Recovery	We endorse the recovery of stranded costs from consumers participating in the competitive regime. However, this recovery should be confined to a clearly defined timeframe—such as 3, 5, or 10 years—to provide certainty and encourage market participation.
Provision for Balancing Mechanism	To maintain fairness among all stakeholders, the balancing mechanism should be provided to competitive market consumers at the average basket price (or lower than marginal price) during the transitional period in proportion to the amount of stranded costs being recovered from them. This approach would ensure that ordinary consumers are not disproportionately burdened and at the same time competitive market consumers paying for stranded costs are not unjustly treated.
Seasonal Discounted Open Access Charges	During periods of low stress on system or reduced sales (e.g., specific seasons or off-peak months), a discounted open access charge should be introduced. This would encourage market participation and enhance utilization of idle transmission and distribution capacity.
Hybrid Bulk Power Procurement	Hybrid bulk power procurement — consumers procuring electricity from both the Supplier of Last Resort (SoLR) and competitive suppliers—should not be permitted. Consumers opting into the competitive market should commit exclusively to competitive suppliers, with the SoLR providing balancing services at average basket price only during the designated transitional period, and at marginal price afterwards. This approach prevents market distortions and ensures a level playing field for all participants.

SET OF RECOMMENDATIONS

Realistic Market Demand Assumptions for Open Access Growth	Assumptions about competitive market participants must reflect practical demand evolution. While 2 GW is expected from existing grid consumers, projections for 5 GW and 10 GW often assume either continued grid use or entirely new demand. In reality, however, market growth will largely stem from shifts in consumption driven by emerging demand segments such as electric vehicle (EV) adoption, new industrial developments, and consumers transitioning from captive generation.
Bridging the Stranded Cost Recovery Gap in Early Years	In backloaded recovery scenarios, the full revenue is not realized in the initial years—posing a fiscal challenge for the government. To address this gap, the government should explore interim financing options, such as loans from financial institutions.
Prioritize Stranded Cost Reduction	In the scenario that the market grows to 5 GW and 10 GW by the 10th year—as projected in the 10% and 20% annual growth cases respectively—the stranded cost in Scenario 3 falls to 5.51 PKR/kWh and 3.40 PKR/kWh, respectively. In this case, the government should consider it critical to proactively reduce the total stranded cost, as demonstrated in Scenario 4 and 5, which further lowers the stranded cost to 4.13 PKR/kWh and 2.53 PKR/kWh. However, if the market grows beyond 20 GW by the 10th year, as in the 30% growth case, the cost reduction measure may be less critical—though this remains an optimistic and uncertain assumption.
Backloaded Recovery offers a Sustainable Approach	Any framework for stranded cost recovery proposed by the Independent System & Market Operator (ISMO) pertaining to the 87# Amendment of National Electricity Plan will mark a welcome step toward the operationalization of CTBCM. While we appreciate this move towards opening the market, we propose that the backloaded recovery approach presented in this whitepaper offers a more sustainable solution to the issue of stranded costs.

Renewables First (RF) is a think tank for energy and environment. Our work addresses critical energy and natural resource issues with the aim to make energy and climate transitions just and inclusive.

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