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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.
- These proposed charges were rejected wholesale by the industrial community, who deemed them unattractive and unfeasible for business.
- Representatives from industry have repeatedly 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 for businesses and export-oriented sector.

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

- Notably, more than 80% of the proposed UoSC by XW-DISCOs consists of stranded costs and cross-subsidies, which are not part of the actual cost of transmission or distribution. Experts have 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.
- Therefore, a well-planned approach is needed to keep the UoSC attractive, while simultaneously ensuring 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 current approach) results in fixed per-unit stranded costs that heavily burden early market participants, growth-based backloaded recovery can lead to much lower and more uniform tariff 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

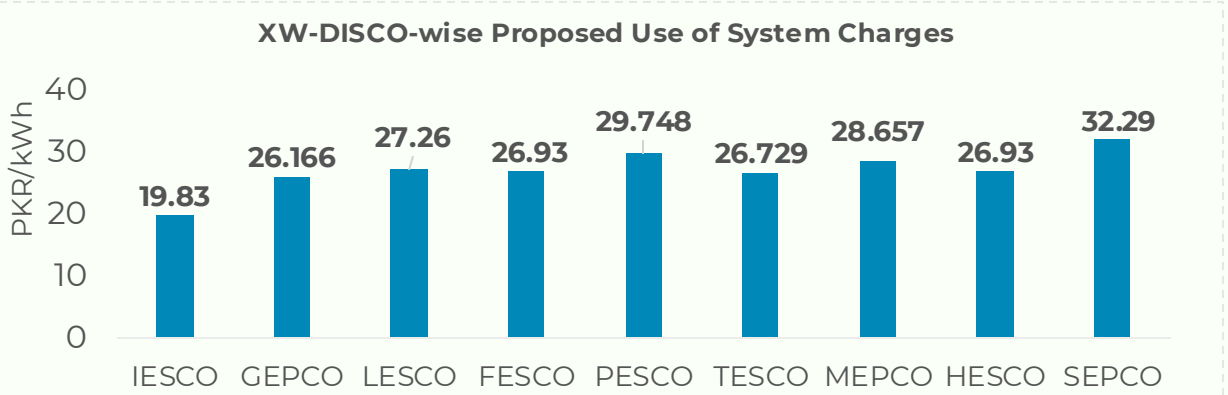


Figure 1

NEPRA's Open Access Regulations 2023

NEPRA in its efforts to advance CTBCM launched a notification in 2022 promulgating the **NEPRA Open Access (Interconnection and Wheeling of Electric Power) Regulations, 2022.** 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.

Although a rationale was provided in the petitions, industrial consumers found the justification unconvincing particularly because over 80% of the proposed UoSC was made up of stranded costs and cross-subsidies.

Opposition from the industries

As a result, the proposed UoSCs faced strong opposition from the industrial sector leading NEPRA to withhold their approval.

**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

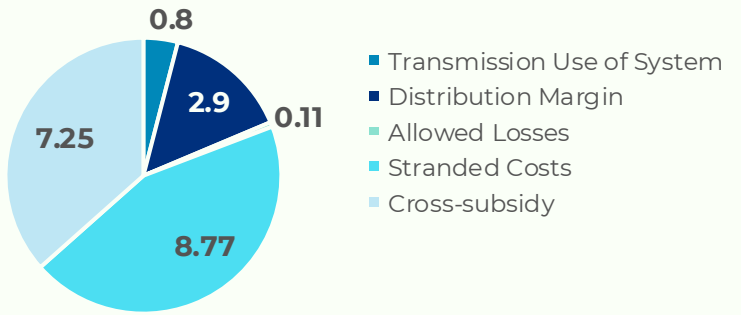
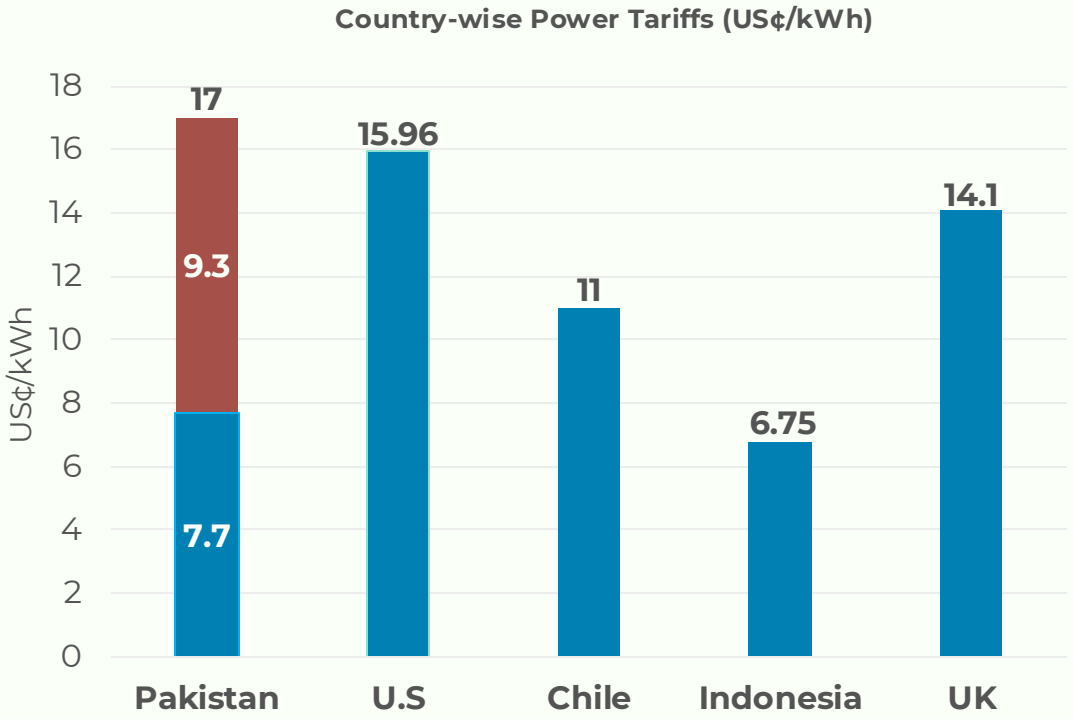


Figure 2

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

Comparison of power tariff of other economies



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 the industry 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).

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

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

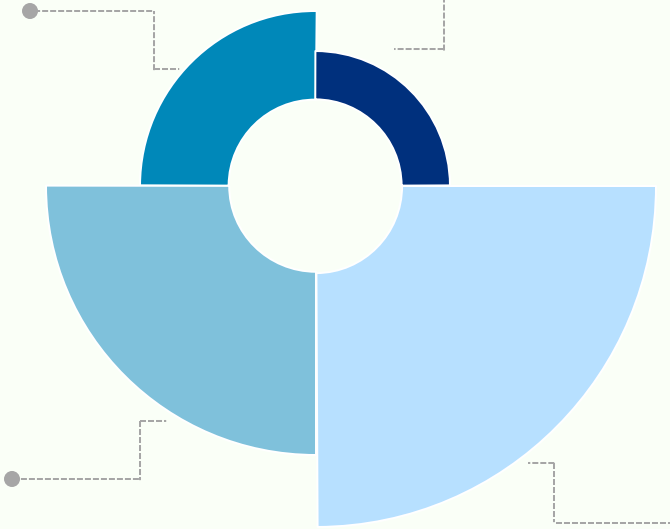
Model Development

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

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 is 2 GW.*



Scenarios

Four distinct recovery scenarios are evaluated:

- simple recovery,
- growth-based recovery,
- backloaded recovery,
- backloaded recovery with cost reduction

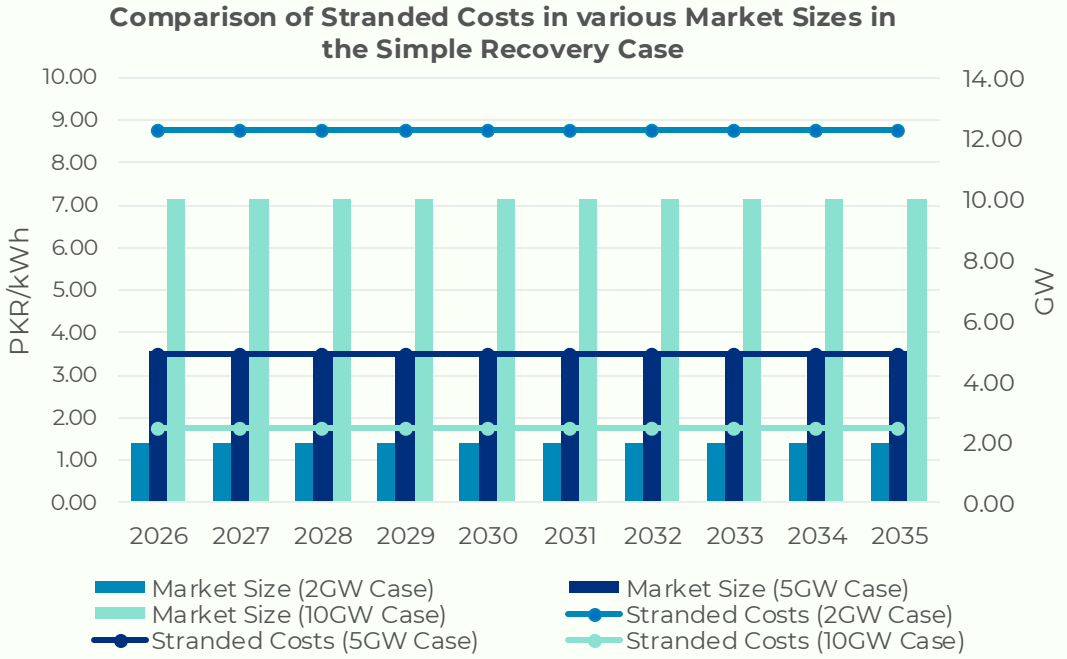
Data & Costing

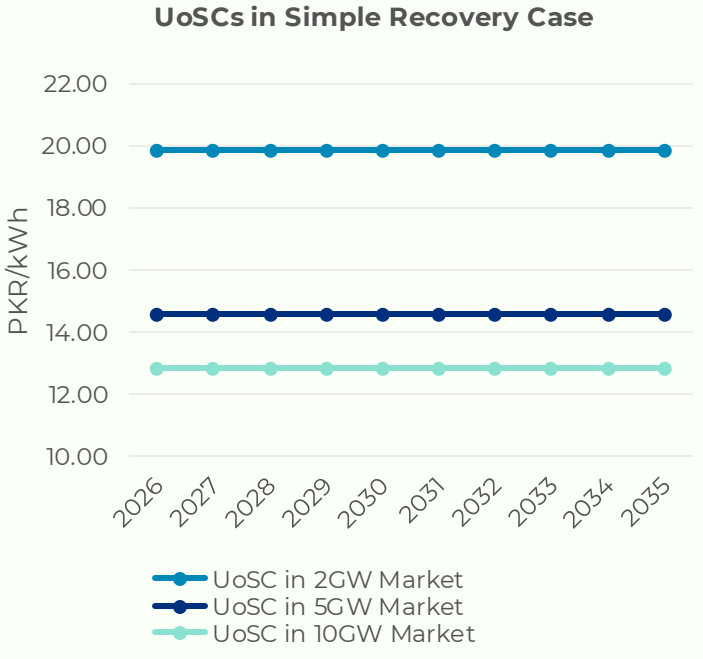
Data from the B4 consumer category of IESCO has been taken as representative, which has stranded costs of PKR 8.77/kWh and a load factor of 0.5.

While DISCOs have 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.

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



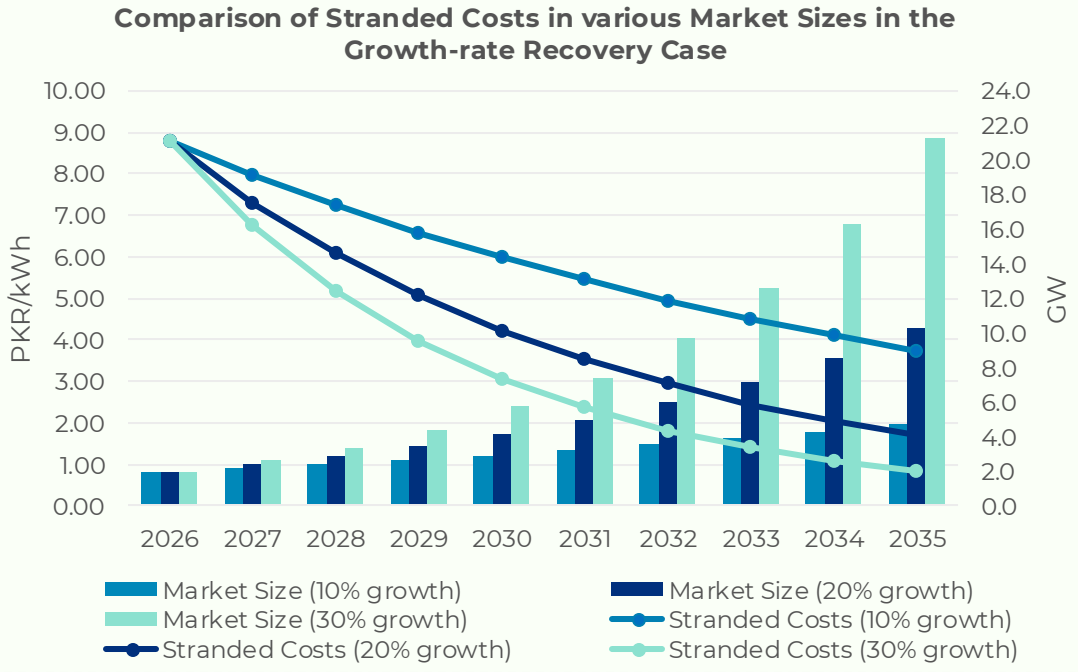


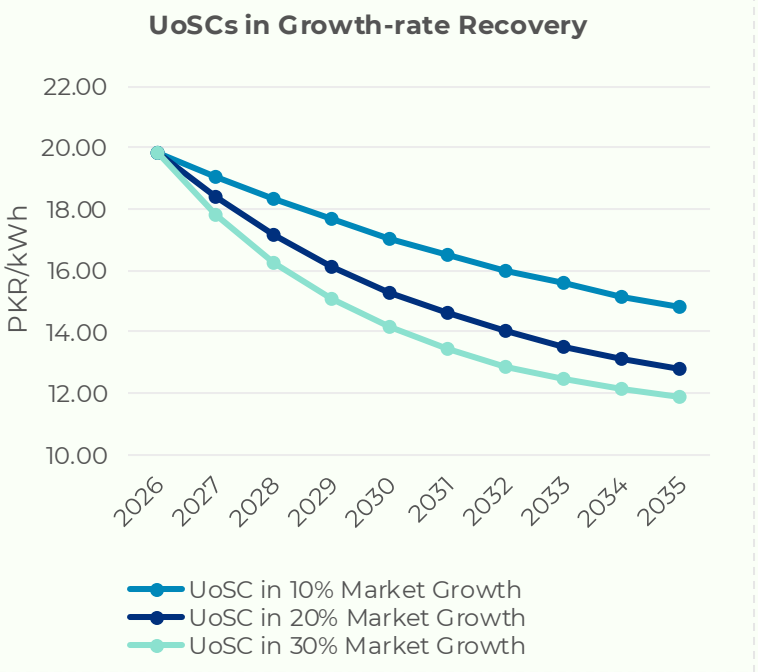
Comments

- The ten-year stranded cost revenue is uniformly distributed over the period with 10% each year — ensuring 100% cost recovery by the tenth year.
- 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 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



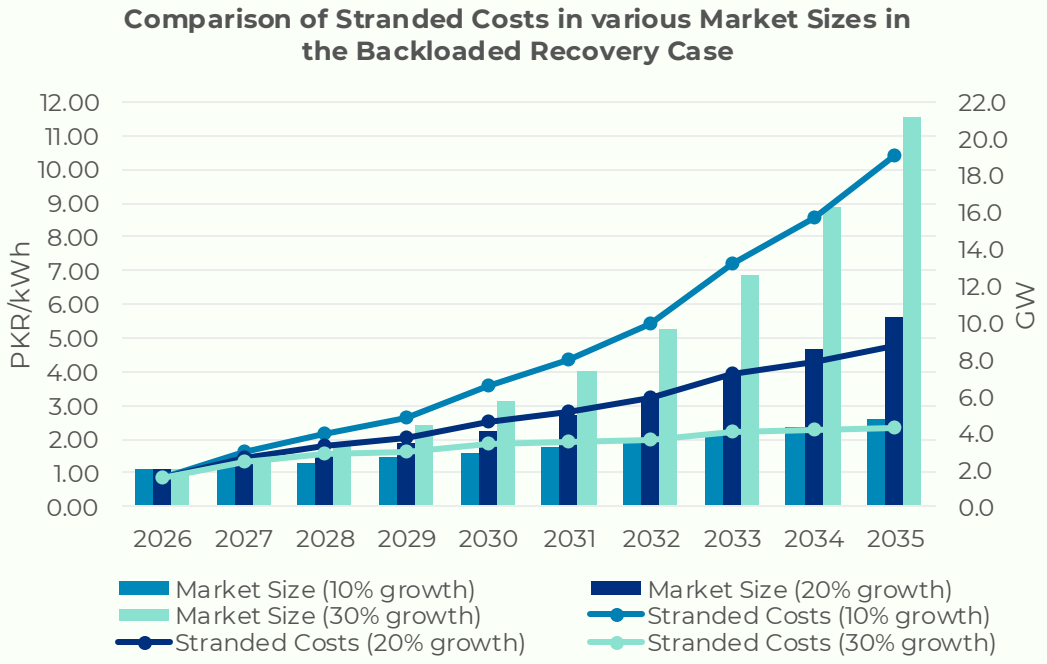


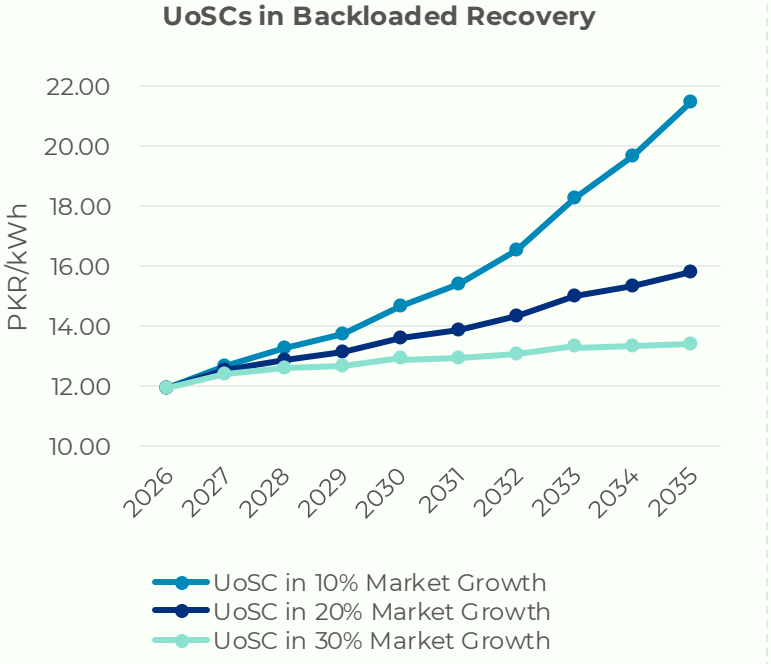
Comments

- 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



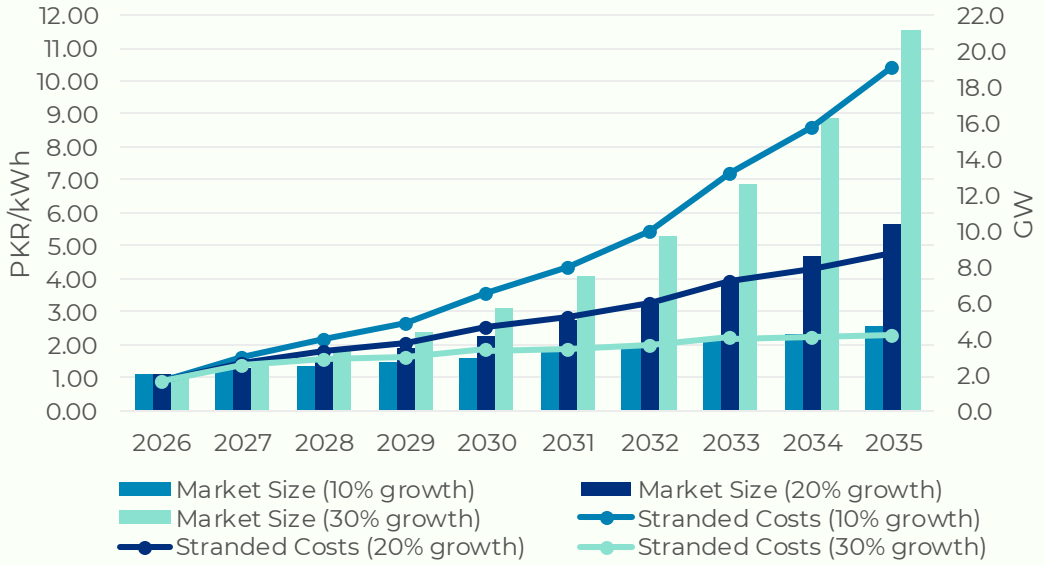


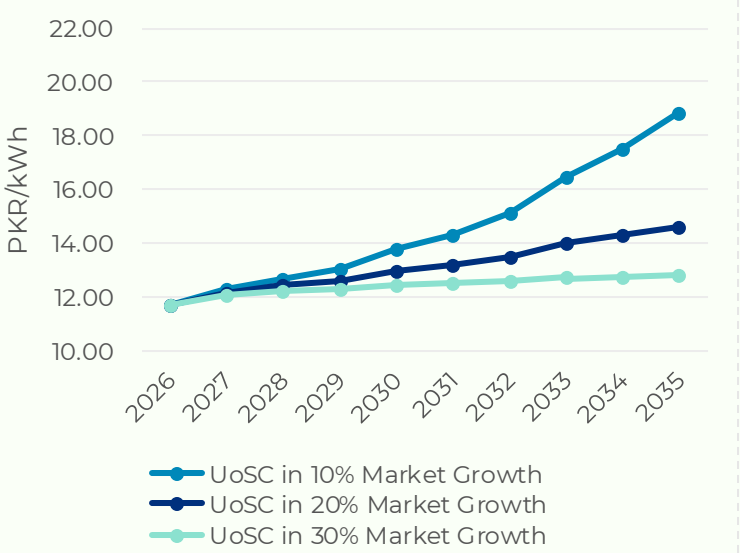
Comments

- The ten-year stranded cost revenue 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

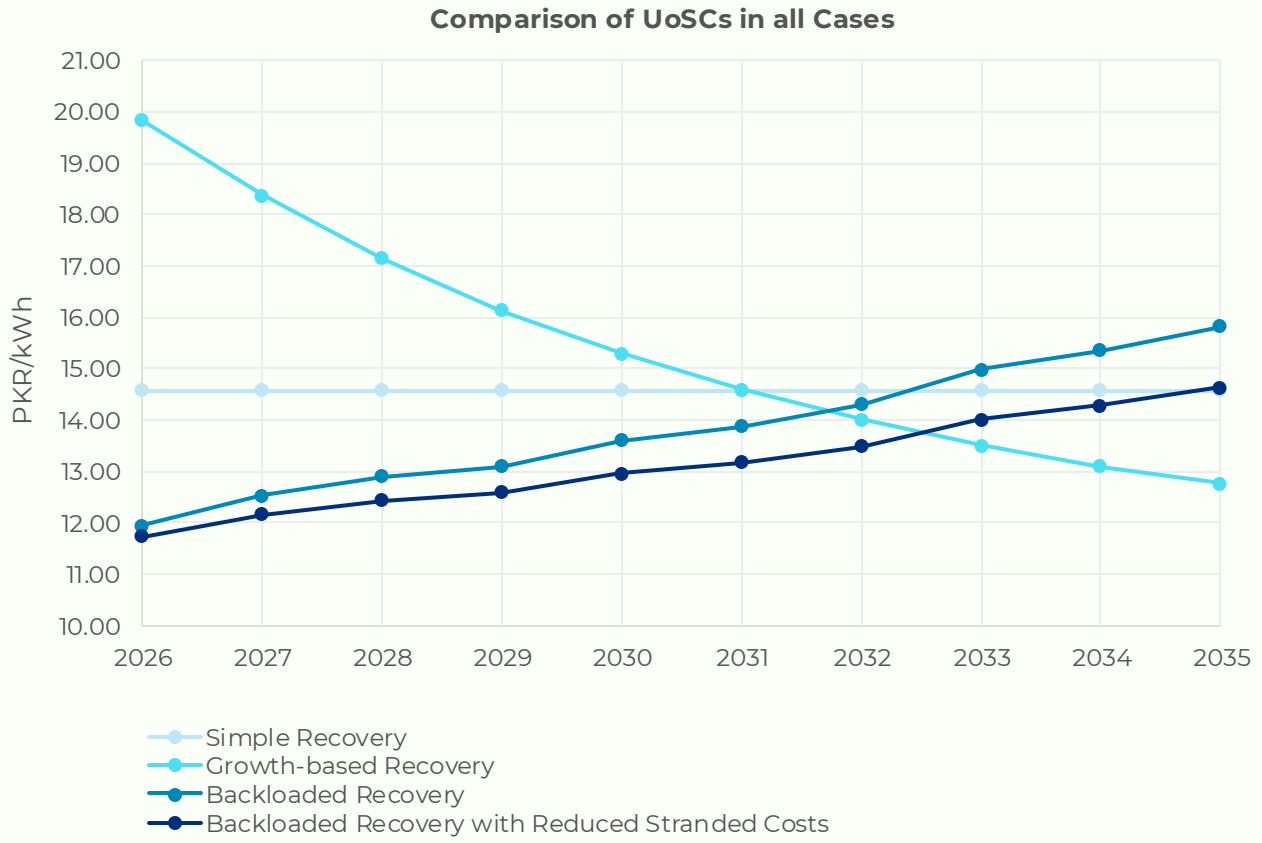




Comments

- The ten-year stranded cost revenue is linearly distributed over the period such that it reduces to 50% by the last year.
- As a result, per unit stranded costs increments are **comparatively less steep** over the period.
- This approach results in a lower per unit use of system charge as well as a less steep increase in its value over the years, **facilitating early market participants** as well as **encouraging continued market growth**.
- Reduction in stranded costs over time is not an unrealistic assumption as many of the legacy contracts are expected to expire and with improved planning further increases in these costs can be avoided

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

Realistic 01

Reduces UoSC while recovering costs 02

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

Wins investor confidence & reduces government liabilities 04

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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