



How DERs Can Enhance Load Flexibility at the Edge of MENA's Grid

By Electric Power Engineers

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As national utilities and grid operators across the Middle East and North Africa (MENA) face rapidly growing electricity demand; driven by population growth, industrial expansion, and accelerating electrification, they're seeking smarter, more cost-effective ways to maintain reliability while managing costs.

The pressure to avoid or defer expensive infrastructure investments is real, and it's intensifying.



Increasingly, utilities are turning to demand-side management as the best option for maintaining reliability and affordability. Their customers' adoption of distributed energy resources (DERs), such as rooftop solar, battery energy storage systems (BESS), and smart devices like thermostats and water heaters, has handed utilities a golden opportunity at the grid's edge to meet the challenge of rising electricity demand.

However, they need a plan to optimize these customer-owned, behind-the-meter DERs and flexible loads together to unlock their full value.

Vehicle electrification offers the perfect example at the grid's edge. As electric vehicle (EV) adoption rises, utilities have seen an increasing number of requests to connect public EV charging infrastructure. Because charging station developers want to maximize usage and revenue, they plan to install chargers in high-traffic, high-population areas. However, EV charging has a high peak load, and many ideal locations for charging stations already face electric grid constraints. Requests to connect new charging stations to the grid often result in long interconnection waits, costly grid upgrade fees, or outright rejection.

In this scenario, there is an opportunity for charging infrastructure developers and electric utilities to optimize DER-flexible load to manage grid congestion and address the increase in energy demand, leading to a win-win outcome.

With the addition of DERs, such as solar and a BESS, to a public charging infrastructure project, developers can bring their projects online while helping utilities avoid or defer grid upgrades. By using the BESS to shift EV charging strategies with the integration of solar and storage, this approach transforms EVs from an unpredictable load for utilities into controllable assets.

By optimizing onsite solar, BESS, and EV charging together, utilities and project developers maximize load flexibility and financial value.

In some service territories, many incentives and programs are already in place to create the financial value customers need to offer their energy resources as grid assets. Elsewhere, utilities can collaborate with national utility authorities, regulators, and policymakers to establish the framework for implementing necessary programs. Where competitive market mechanisms are still developing, state-led procurement and sovereign energy mandates increasingly provide the policy foundation for these frameworks. **Some of the most common value-creating opportunities utilities provide to incentivize the use of customer DERs and loads as grid assets are:**

- Demand response programs
- Energy market participation to allow customers to capture energy arbitrage opportunities
- Participation in capacity auctions
- Payments to customers for the provision of ancillary grid services, emergency services, and other services

DER and Flexible Load Optimization in Action

In New England, one state in the U.S. is in the process of overhauling many of its travel plazas, and one of the key initiatives is to install DC fast-charging stations at plazas. **Electric Power Engineers (EPE) partnered with the state to identify locations that would deliver the highest use and most revenue for the EV chargers.**



As part of the analysis, EPE found that the busier a travel plaza was, the less available grid headroom it had; a constraint that shaped the entire siting and optimization strategy. The model identified strategies that aligned EV charging load profiles with grid capacity constraints, helping avoid costly infrastructure upgrades. The results showed a clear path to solve grid constraints and preserve financial upside for project developers. The idea of a win-win scenario proved to be a reality. This dynamic where the highest-demand locations face the tightest grid constraints; is equally relevant across the MENA region as EV charging corridors scale along highways and in urban centers.

In a western state in the U.S., EPE conducted a resource optimization study to support the deployment of public EV charging infrastructure without triggering costly grid upgrades.

Recognizing the local utility's hesitation to upgrade substations and transformers in the near term, the EPE team evaluated how a strategically sized BESS could address EV charging demand while mitigating grid constraints. The analysis identified the optimal BESS capacity and control strategy to help defer costly network upgrades while keeping the project economically viable for the developer. The same

BESS-led deferral logic applies directly to MENA deployments, where solar PV and BESS hybrid configurations are the dominant technology pairing and substation upgrade timelines are similarly constrained.

Unlocking the DER-Flexible Load Optimization Value Requires Careful Planning

In the case of DERs and flexible loads, utilities and project developers often don't account for the value that on-site energy optimization offers them because they don't know that the value exists. Utilities can stay ahead by partnering with trusted experts who can evaluate site-specific load growth, assess local grid capacity and constraints, and optimize DER system capacities and designs. Making that up-front investment unlocks revenue and cost-saving opportunities that account for the financial and operational realities of local grid infrastructure.

In the MENA region, where many projects operate under long-duration power purchase agreements — typically spanning 20 to 25 years — this up-front optimization work directly shapes the financial performance of the asset over its entire life.

Analysis unlocks value, and utilities evaluating new large load requests should understand the value they could harness from DERs, and flexible loads optimized together to solve grid challenges.

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