How will the evolution of technology transform the future of energy?

Benchmarking distributed energy resource management systems implementation among global utilities

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The DERMS industry

A distributed energy resource management system (DERMS) is a portfolio of technologies used to manage and optimize distributed energy resources (DERs) such as solar photovoltaic and battery storage systems. In 2024 EY teams performed in-depth benchmarking across 12 different global utilities to provide insights into the future of DERMS. Several key DERMS themes emerged that we're excited to share.

Grid DERMS	Used to monitor and manage a wide range of DERs across a utility's transmission and/or distribution system, typically integrated with, or an extension of, the advanced distribution management system (ADMS)
Edge DERMS	An evolution of demand response management systems (DRMS), the edge DERMS enables demand-side management practitioners to scale flexibility and customer programs
Specialized DERMS	Tailored for specific use cases such as microgrid management, flexible interconnection management, transmission and distribution coordination, locational voltage control and electric vehicle charge management

Key business value of DERMS

A key theme of successful DERMS solutions is their ability to foster the interconnection of more DERs and then leverage those DERs to address specific grid constraints through direct control or flexibility services. The DERMS enhance reliability and resiliency through DER programs.

Monitoring: Ability to monitor DER behavior at scale, in real-time, for situational awareness and more granular insight than is available through supervisory control and data acquisition (SCADA) or ADMS alone
Optimization: Maximizing DER performance and output to drive their value to the system while improving reliability and maintaining grid stability on the distribution and transmission system
Forecasting: Predicting DER generation, consumption and flexible capacity to better plan and manage grid operations; fine-tune performance of downstream systems and programs
Coordination: Facilitate interaction between DERs and traditional grid resources to balance intermittency, reduce renewable curtailment and maximize efficiency of the system to put downward pressure on rates and achieve decarbonization goals

Key findings and considerations for DERMS

- **DERMS solutions are quickly emerging from nascency** and rapidly being developed. However, most US utilities incorrectly believe they are further behind than an apples-to-apples comparison with their peers would indicate.
- **Regulatory filings show us** DERMS business cases are still all over the board and require significant time and effort for cost-benefit analysis, and extensive collaboration with public utilities commission (PUC) staff.
- **A network model-based DERMS is significantly more complex** than a non-network-based model DERMS. This caliber of system has taken a foothold in Australia, but has not been implemented en masse in other regions.
- **Flexible interconnections** are a winning use case for most utilities. There is an emerging "crawl, walk, run" model for these solutions and many utilities may be able to leverage DERMS to leapfrog the crawl stage and go straight into walking.
- **An ADMS is not required for DERMS.** However, utilities often must manage multiyear parallel programs which can result in additional technical complexities, overlapping steering committee resources and diverse vendor ecosystems.
- **Favorable federal and state policies** enabling DER use and grid modernization can help utilities secure significant funding to implement DERMS.
- **Emerging data regulation,** like the California Consumer Privacy Act (CCPA) and New York's Integrated Energy Data Resource (IEDR) efforts, should be viewed as a navigational beacon rather than obscure regulation. Many utilities have underestimated the importance of DER data for DERMS and some are even defining their Phase 0 DERMS projects as primarily DER data projects.
- **Utilities are creating information technology (IT) and operational technology (OT) portfolios** that streamline leadership oversight and drive broader, multifunctional strategic goals through the implementation of IT and OT projects such as DERMS.
- **The selection of a technology provider** is rarely a one-size-fits-all decision. Across the globe, utilities are evaluating different providers for DERMS and sometimes landing on a partnership with an existing trusted non-DERMS vendor to develop their own to meet their needs.

DERMS maturity model

Utilities worldwide are at varying maturity stages in adopting DERMS. We conducted a scan of 12 utilities with grid DERMS initiatives in their roadmap to create a maturity model with levels* defined using insights from market benchmarking, DERMS analysis and contributions from EY resources.

***As advancements are made in DERMS implementation, the maturity model leveling may shift.**

Key for benchmarked utilities

Number of customers (in millions)

- **Range 1:** 0.86-2.40
- **Range 2:** 2.41-3.60
- **Range 3:** 3.61-10.70
- **Range 4:** 10.70-20.00

Revenue range (in millions)

- **Range 1:** $980-$3,370
- **Range 2:** $8,200-$8,300
- **Range 3:** $15,000-$22,000
- **Range 4:** $25,200-$29,000

★ **Non-US utility**

BASIC

Minimal progress on initial DER integration plans, possible ADMS implementation

DEVELOPING

Actively executing DERMS with monitoring, ongoing ADMS project and short-term network model-based DERMS plan

MATURE

Executing DERMS and ADMS, integrating geospatial information system (GIS), enabling transmission and distribution services based on local conditions

LEADING

Fully functional DERMS, ADMS and GIS, demonstrating scaled flexible interconnections and innovative approaches

Regulatory drivers for DER adoption

Regulatory and policy support is a key driver for DERMS implementation, with varying approaches being pursued across the US. Highlights include:

- **Colorado:** Utility distributed system plans (DSP) guide IT and OT investments; SB 218 requires utilities to propose virtual power plant (VPP) programs
- **Maryland:** HB 1256 and SB 959 (DRIVE Act) are leading to new programs and tariffs for compensating DER owners for distribution services
- **Massachusetts:** The Clean Energy and Climate Plan (CECP) sets decarbonization targets that facilitate grid modernization plans (GMPs), and eventually electric sector modernization plans (ESMPs), which rely on robust DERMS investment
- **New York:** The Climate Leadership and Community Protection Act (CLCPA) establishes clean energy targets and evolves beyond the Reforming the Energy Vision (REV) initiative to spur new Distributed System Implementation Plan (DSIP) frameworks which include investments like DERMS
- **Illinois:** Utility multi-year integrated grid plans (MYIGP) spurred by the 2021 Climate and Equitable Jobs Act (CEJA) are facilitating DERMS investment

Governance approaches among DERs programs

The integration of DERMS requires tight coupling with enterprise OT systems like the GIS and ADMS, but also requires new business processes that enable the optimization of new energy sources and grid-edge intelligence. As governance structures evolve to support these initiatives, they reflect the diverse operational components essential for managing a decentralized energy landscape.

As part of our study, we identified three potential approaches to DERMS governance typically considered and implemented by utilities. They are:

1. **Merging to technology-focused portfolios**
2. **Creating new and separate organizations for DERMS and similar or related OT programs**
3. **Maintaining previously installed governance**

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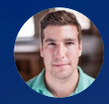

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