Global Energy Settlements

Embracing Automation for Modernization and Precision

Settlements, the intricate financial reconciliations that underpin the energy sector, are undergoing a transformative shift as utilities adapt to new regulatory landscapes and gain access to better data through advanced metering infrastructure (AMI). In this white paper, we explore how these changes are reshaping the settlement process in the United States, and how utilities around the globe are replacing outdated legacy systems.

Simply stated, the settlement process is the financial reconciliation of electricity supply and demand — how much was generated; how much was used; and who owes money to whom. If there is just one generating power plant and one transmission and distribution (T&D) utility, it is a relatively simple process. The combination of deregulated electricity markets, distributed generation and distributed energy resources (DERs) adds complexity to the settlements landscape.

In the U.S., numerous utilities operate in areas which require them to act as metering authorities, tracking both electricity generation and consumption within their respective regions and reporting those statistics to market operators and participants for financial settlements. As these utilities deploy AMI — or prepare to — the availability of interval data for every customer, metering authorities collecting and reporting settlement data with greater accuracy, the use case for a new, data-driven settlement solution becomes compelling. With the right functionality in their meter data management systems (MDMS), they can automate labor-intensive reporting processes and replace legacy settlement systems.

REGULATORY PRESSURE ON SETTLEMENTS

Regulators around the globe are beginning to require more granular reporting of settlements data. Australia mandated five-minute reporting to its wholesale electricity market in 2021, and the United Kingdom will require 30-minute reporting for retail settlements beginning in October 2025. The Federal Energy Regulatory Commission (FERC) in the U.S. already requires five-minute reporting for wholesale electricity.

THE LEGACY (AND BURDEN) OF HOMEGROWN SYSTEMS

Utilities in the U.S. began developing systems to manage market settlements with the emergence of deregulated markets in the 1990s. Settlements were essential for coordinating transactions among multiple market participants, and the middlemen metering authorities were obligated to measure and report how much electricity generators produced and how much end users consumed.

Metering authorities historically relied on Supervisory Control and Data Acquisition (SCADA) meters to measure energy flow at "settlement points" along and between transmission and distribution networks. To measure consumption, utilities generally used one approach for large commercial and industrial (C&I) customers and another for residential. For C&I consumption, they deployed interval meters that were expensive but justified by the high electricity demand of C&I customers. The process was so laborious, a utility would call the C&I customer directly to validate any unusual consumption.

For many years, the cost of installing interval meters for every residential and small-business customer was prohibitive. Instead, utilities installed interval meters for a sampling of these customers and used that data to estimate hourly and daily consumption of all other customers grouped in similar rate classes. In a large utility, thousands or even millions of customers were thus assumed to behave similarly to the few hundred in the sample.

"Metering authorities are required to aggregate and report their individual customer estimates to market operators and third-party participants (generators, retail utilities, etc.) at multiple points in time — typically the day after consumption, 30 days after consumption and a final "re-settlement" after 90 days."

The reporting timelines are staggered to give immediate feedback to market participants and then allow time for metering authorities to validate their estimates and eventually replace them with actual meter reads.

Because there were no productized settlement solutions available when markets were first deregulated, utilities had no choice but to develop, manage and maintain manual homegrown systems for tracking generation, estimating consumption, aggregating totals, uploading meter reads, transmitting reports, and the numerous daily tasks necessary to coordinate the use of so much data, pulled from multiple systems. Many of these inefficient legacy systems are still in use today and require teams of highly specialized analysts as well as contractors to maintain and manage.

SYSTEM CONSOLIDATION: A TECHNOLOGICAL LEAP IN SETTLEMENT MANAGEMENT

These challenges have helped convince utilities to transition to a consolidated system, which leverages the functionality of a robust, comprehensive meter data management (MDM) to do the heavy lifting required for settlements.

By using a scalable MDM, utilities can leverage its robust computational abilities, which automates the settlements process, freeing up staff to cross-train on holistic management of the settlement process, or other operational priorities.

This was the case for Australian utilities in 2021, when faced with the challenge of moving to five-minute settlements through a national mandate. Itron Enterprise Edition™ Meter Data Management (IEE systems globally, was an ideal choice for creating a five-minute settlement solution. IEE MDM's platform for calculating, validating and reporting settlements was designed to collect, store and manage granular AMI data for millions of interval meters around the world.

Itron worked with a group of Australian utilities to design the solution, which can quickly process terabytes of data to generate settlement reports or exchange data between relevant operational systems, including billing, customer information systems (CIS) or forecasting. Now, 90% of Australia's utilities are using IEE Settlements to meet the five-minute mandate for wholesale electricity settlements.

Similarly, utilities in the U.K. are adopting IEE Settlements ahead of an October 2025 deadline. The U.K. has mandated market-wide half-hourly settlements (MHHS*) for the country's retail electricity markets. The transition will involve moving from the current practice of using estimated consumption profiles to using actual 30-minute consumption data recorded by interval meters, a requirement that home-grown, legacy systems could not accomplish on their own.

Benefits of System Consolidation under MDMS

- **Reduce** project and operational risk with a market-proven, commercially available, high-scale platform.
- **Eliminate** redundant costs for business process operations, application hosting, user training and expertise, software and system interface management, and vendor relationships.
- **Automate** manual processes for routine data transfers and standardize error-prone updates to settlement-point modeling.
- **Simplify** the operational steps for delivering settlements to market operators.
- **Utilize** existing in-house support for MDMS and employ cross-staffing approaches.
- **Prepare** for a smooth transition to interval-based settlements (wholesale and/or retail).

*Source: "Electricity Settlement Reform" *(Office of Gas and Electricity Markets—OFGEM)*

IEE SETTLEMENTS: A CLOSER LOOK

IEE Settlements can automate both analytics and timely communications required for reporting to any operator or participant in any electricity market around the globe. IEE's powerful analytics engine validates and organizes interval data from each meter. Settlement reports are generated and formatted via the module's rules manager before automatic transmission.

To help utilities manage the growing complexity of reporting, IEE Settlements allows for the simple addition of DER aggregations as settlement points. These can be tracked and organized by participating meters in that aggregation. This will be validated against data from revenue-grade meters and SCADA meters for accuracy.

For exception management, IEE Settlements automatically updates with replaced meter reads for re-settlement, and validation rules can be set to flag unresolved discrepancies before the data is transmitted to the market. Other features include:

- Automatic reporting to multiple market operators, if necessary
- Customized analytics and reporting
- Auditable records of settlement reports
- Enhanced security

IEE has more than 100 utility customers worldwide, with several of the largest utility MDMS installations in the industry. Itron's long-term commitment to IEE and our customers is demonstrated through our solutions' ability to evolve and scale according to our customers' changing needs.

AN INTERMEDIATE STEP TO INTERVAL-BASED SETTLEMENTS

As more and more utilities move to AMI, accurate interval data can replace rate-class estimates as the basis for both wholesale and retail settlements. However, while the U.S. is the global leader in smart-meter adoption with 77% market penetration** at the end of 2023, it's unclear how many of those meters are capable of reporting residential consumption data in intervals of less than 60 minutes.

Where interval data is unavailable, IEE Settlements uses a patented "backcasting" model that builds on Itron's demand-forecasting tools that are already used by 70% of the grid operators in North America**. For demand forecasting, Itron uses machine-learning algorithms to predict future electricity demand based on past consumption patterns and forward-looking weather forecasts. Backcasting makes use of the same algorithms in reverse, replacing weather forecasts with the actual weather conditions that were observed to calculate even more accurate estimates of how much electricity was consumed at a particular meter over the previous days and hours.

SETTLING IN THE CLOUD

Utilities around the globe are embracing the benefits of meter data management in public cloud computing environments. Instead of investing heavily in data centers and IT maintenance, they are offloading the upfront costs and ongoing responsibilities to experienced vendors. In doing so, they can easily scale up or down and pay only for the computing resources they consume.

IEE MDM is highly efficient as a cloud-based application, and benefits from Itron's dedicated management of system resources and development of innovations. New modules and capabilities — like IEE Settlements are simple to deploy in the cloud for use across multiple regions. Utilities can focus on how to use their meter data to the greatest effect, rather than the unending IT maintenance it requires. In addition, sharing settlement data with market operators and participants is simple to do from the cloud, using secure APIs. All Itron managed hosting models are audited by a 3rd party annually for SOC 2 Type 2 and ISO 27001 compliances.

**Source: "A Billion Steps Forward: The Surge of Smart Meters Around the Globe" *(E+E Leader,* November 2024)

Backcasting is a viable solution for utilities that have meters incapable of reporting the necessary intervals. IEE Settlements can accurately backcast reports at whatever granularity market rules require. Additionally, it can automatically validate and replace estimates with actual consumption data whenever there is a delay in meter data availability to the MDMS. If these utilities deploy next-generation smart meters, IEE

Settlements can seamlessly integrate the more granular interval data and continue reporting with less reliance on backcasting calculations. However, the backcasting capability remains in standby for validation and back-up purposes.

CONCLUSION

With the ongoing evolution of big data and increasing complexity of power grids, the global trend is towards more granular transactions and regulatory reporting. At the same time, budget and labor constraints require utilities to seek solutions for greater automation, efficiency, accuracy and traceability.

The business case for updating to a modern settlements process is clear. Through investments in AMI, many utilities already have — or soon will have — access to comprehensive interval data. MDMS are the foundation for integrating the data and using it to deliver business and operational value to utilities. MDMS can take over the complex work of calculating and reporting settlements, while freeing utilities from the burdens of legacy systems that have reached the end of their usefulness.

To learn more about IEE MDM or the IEE Settlements module, and the migration path to utilizing interval data, contact Itron.

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