# Build smart metering solutions with IBM Informix TimeSeries



IBM

A smarter planet requires smarter energy solutions—solutions that capitalize on the power of information to help utility companies transform the grid, empower consumers, ensure a cleaner energy supply utility network, improve generation performance and transform customer operations. Smart meters are one of the cornerstones of smarter energy solutions, delivering benefits throughout the entire value chain, from utility suppliers and operators to consumers.

Smart meters change how utility companies collect data, which opens new possibilities for using that data. Historically, utility meter data has been collected manually just once per month, primarily to produce a monthly bill. Smart meters can automatically record energy usage every 60, 30, 15 or even 5 minutes. Data is then used in two-way communications between the meter and enterprise systems running time-of-use billing, load forecasting, outage management and other applications. Utility companies can capitalize on smart meter data to optimize energy purchases, resolve service issues quickly and improve power reliability while also helping customers reduce consumption and cut costs.

Smart meter solutions offer important advantages, but utility companies and solution providers need effective ways to handle massive volumes of time series data—the information continuously produced by millions of smart meters and loaded at regular intervals. Many of the database solutions available today are unable to load this time series data fast enough or store data efficiently enough to cost-effectively accommodate the data and meet performance requirements.

To realize the full potential of smart meters, utility companies and their partners need a data management solution designed to reduce data load times, decrease storage capacity needs and improve query performance for time series data.
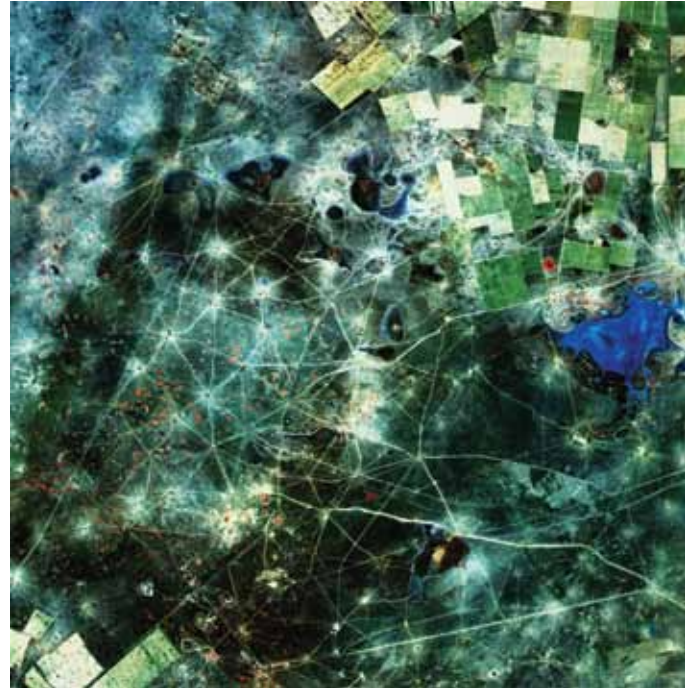


## Confronting the data deluge

Smart meter solutions can create substantial data management challenges for utility companies and their partners. By collecting data every 15 minutes, a smart meter generates close to 3,000 meter readings per month, and approximately 36 billion readings per million smart meters per year.[1] According to one forecast, smart meter shipments will see a worldwide compound annual growth rate of 13 percent between 2010 and 2015, with a total of 460.9 million smart meters shipped during that forecast period.[2] In Texas, one electric delivery company alone plans to implement smart meters for 3 million homes and businesses by 2012. The volume of data a company must manage will grow rapidly as it deploys more smart meters across its service areas.

Utility companies need to load the time series data generated by these millions of smart meters as quickly as it is produced. Loading data rapidly is essential for meeting service-level agreements and providing customers with access to the real-time consumption information that can help them alter usage patterns.

Utilities then need efficient ways to store and query those large data volumes. Some government regulations can require utility companies to provide access to extensive historical data so that customers can analyze and adjust their consumption. Other regulations may require utilities to use historical smart meter data to improve their own efficiency so they can achieve governmental goals for reducing energy use and curbing emissions. Failure to comply with these regulations could result in fines and severely damage the reputation of the utility.

Some organizations might attempt to accommodate the rising volume of smart meter data by expanding their IT hardware infrastructure, adding servers and increasing storage capacity. But expanding the infrastructure requires additional IT budget for buying and operating more hardware. Adding hardware also increases the complexity of the infrastructure, which can amplify risks. If IT groups fail to implement sufficient capacity planning or data protection strategies, their businesses could face unexpected expenditures, liabilities and losses.

Selecting the wrong data management solution, meanwhile, could limit scalability. Several solutions on the market today use relational data management techniques to handle time series data. While these solutions might be adequate on a small scale, they are poorly equipped to handle the volume and velocity of data generated by the millions of smart meters that utility companies will deploy in the years to come. To address today's and tomorrow's data management challenges, utility companies and their partners need a better approach to time series data.

## Capitalizing on the unique value of IBM Informix TimeSeries

Unlike other data management solutions, IBM® Informix® has the native ability to handle time series data, offering utilities an efficient, effective and scalable solution. With Informix TimeSeries, organizations can reduce data load times, decrease the capacity needed for data storage and improve query performance. Informix is also part of the IBM Solution Architecture for Energy and Utilities (SAFE) framework, a software platform that enables data and business process integration for solutions throughout the energy value chain, and contributes to the "Informed Decision Making" capability of the SAFE framework.

### Reducing load times

Informix TimeSeries includes a loader designed specifically for smart meter data. It can load large volumes of meter data in a fraction of the time of other solutions by loading data in parallel. The generic high-speed loaders of other solutions do not provide the same parallelism capabilities and require custom hand-coding to achieve decent results. Without parallel loading, load times become even slower as more data is added. Because loading data accounts for a large percentage of the total maintenance window, utility companies without parallel data-loading capabilities may find it more difficult to meet service-level agreements as data volumes grow.

### Decreasing storage capacity needs

Other solutions force-fit data into standard relational database organizational schemes, which can increase the total data size and require additional indexes. By contrast, Informix TimeSeries compacts data and automatically clusters data by meter ID and time, so there is no need to create an index for those fields. Getting rid of those indexes not only reduces data storage but also enables companies to dramatically reduce the amount of resources consumed by other overheads, such as database logging and archiving.

## Improving query performance

The performance challenges caused by inefficient data organization and greater reliance on disk-based storage are compounded as data volumes grow. By storing data in a compacted format, Informix TimeSeries can keep more data in memory. As a result, that data can be retrieved much more quickly than data stored on disk, helping to improve query performance.

### Help accelerate load times and accommodate growth

U.K. energy consultant Hildebrand demonstrated that Informix TimeSeries software can deliver rapid load times even when working with large-scale data volumes. "We simulated three million homes sending readings once a minute, and we were able to capture nearly 50,000 readings per second using only a single server with two quad-core Intel® processors," says Clive Eisen, chief technology officer at Hildebrand. "Suddenly, energy monitoring for three million homes or more became a practical proposition."

## Achieving the benefits of smart meter solutions

The unique capabilities of Informix TimeSeries can help utility companies address key business challenges associated with smart meter solutions. For example, short load times and fast query performance enable utility companies to adhere to service-level agreements and meet customer expectations for real-time data access. Intelligent, compacted data storage can help utility companies comply with government regulations for long-term data retention while enhancing the accuracy of reporting by facilitating the analysis of large data volumes.

Informix TimeSeries also provides massive scalability. While other solutions produce bottlenecks as data volumes grow, the solution's intelligent time series data management features can help utility companies efficiently load, store and query the massive volumes of data produced by millions of smart meters. And unlike traditional database solutions, it does not require complicated data partitioning strategies or database administration such as the maintenance of table-level statistics. Consequently, utility companies can realize significant savings in management time and costs.

In addition to these benefits, Informix TimeSeries is backed by extensive services and support from IBM—one of the largest and most well-respected IT companies in the world and an organization with deep expertise in energy and utilities and other industries.

### Dramatic performance and storage benefits

One electric utility company found that Informix TimeSeries was the answer for addressing the performance and storage requirements of the company's smart meter solutions. Existing systems, which had proved adequate in the past, were not scaling up to the massive amounts of data generated by the company's smart metering prototype. The utility company looked at several competing technologies before deciding to embark on a rigorous proof of concept using Informix TimeSeries. What they saw was impressive: they were able to reduce storage requirements by two-thirds and speed the query performance up to 60 times compared to their existing solution.

## Gaining flexible deployment options

Utility companies can deploy Informix TimeSeries alongside existing database software, using it exclusively for time series meter data, including summarizing the smart meter data and sending it to billing systems, customer-facing applications, warehouse applications and other environments. Or utility companies can implement the time series data management capabilities as part of a comprehensive Informix database environment that handles everything from time series data to customer records and billing. Choosing the right database solution at design time can help reduce risks and avoid the costs involved with making a change later.

For solution providers, IBM offers a solid foundation for building a smart meter solution, enabling them to capitalize on strong integration between a wide range of IBM software solutions. For example, they can incorporate Informix TimeSeries with IBM InfoSphere® Streams software for sending and receiving real-time event data, InfoSphere DataStage® software for extract, transform and load (ETL) processes, IBM InfoSphere Optim™ Integrated Data Management software for archiving data and IBM Cognos® software for dashboard and analytics functionality. Because Informix TimeSeries is an open development environment, solution providers can develop and deploy their own analytics functions to operate directly on the data stored in the database, eliminating the need to extract it and perform additional processing in the application layer.

### Help cut storage requirements by 55 percent

U.K. consultancy and system technology provider AMT-SYBEX needed a way to extend its existing Data Transfer Solution (DTS) to load, validate and store smart meter data in external systems. Working with IBM Research, the company developed and tested a new solution that incorporates Informix TimeSeries software. During a proof of concept, the team simulated a system that received and processed data from 10 million smart meters. The solution processed more than 200,000 transactions per second, completing the total job within 96 minutes on a single eight-processor server. Loading was achieved in just 55 minutes—the additional time was used to stage data before loading and to check data accuracy after loading.

"The way that the data is structured with Informix TimeSeries means that you can process, validate, analyze and manipulate all the readings from a single meter in a very efficient manner," says Gordon Brown, DTS product owner at AMT-SYBEX. "It's dramatically faster than a relational data model, and it also cuts storage requirements by approximately 55 percent."

## Realizing the full potential of smart metering

As utility companies continue to deploy smart meter solutions to more households and businesses, they will need intelligent, efficient ways to handle the large volumes of data produced continuously by millions of smart meters. Informix TimeSeries delivers a smarter software solution for addressing the unique requirements of time series data. Building on this native ability to handle time series data can help utility companies and their customers realize the full potential of smart metering.

## For more information

To learn more about Informix TimeSeries, contact your IBM representative or IBM Business Partner, or visit **ibm.com**/software/data/informix

For more about how IBM can help with smart meter solutions, visit **ibm.com**/energy

1 Heimann, Klaus. *SAP Insider*. Volume 10, Issue 3, July 2009. "SAP for Utilities: Leading the Charge for Long-Term Energy Efficiency." http://sapinsider.wispubs.com/article.cfm?id=4542

2 IDC. "Perspective: The New Meter to Cash—Faster than Ever." March 2011.

Please Recycle