

Electricity Market Settlements

Conceptual Design Overview.

Profiled Pass Thru Bill

While "Pass Thru Bill" is an industry standard term, in use at MISO and PJM, Pass Thru Billing has generally involved little or no calculation, with these items appearing as direct line items on the bill. In the case of MISO the Pass thru records who the money is due to once collected, so that MISO members can place line items on the MISO bill if they so wish.

Wise Technology Management's design extends this basic capability to provide a generic interface capability of contract, margin calls, and more complex quantity and rate pass thru items, needed to support settlements in a range of markets.

Key to this design is the Profile capability. This profile capability provides a user defined means to record quantity, price, total, or other billing factor on an interval by interval basis as part of the pass thru billing. This improvement allows an ISO to dispense with multiple miscellaneous interfaces and channel these varying data feeds via the Pass Thru Bill capability.

One application of this capability proposed by WTM is a means for RTO's to allow exposure reducing trades, in line with the CCRO Credit Management white paper recommendations, and NEMMCO's revised credit policy where a reallocation capability is provided as a credit transfer mechanism.

Developed under a Federal Government Research and Development Grant, this design allows an ISO to consolidate interfaces into settlements and to allow pass thru billing to be used where various interval level inputs were required to support the pass thru charge.

Settlement Date Control

Settlement date control is designed to automate the settlement scheduling process particularly where revised meter and other data can be submitted and

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require prior trading days to be resettled. This is a key issues as ISO's face increasing demands to resettle trade days based on the latest data available.

This function was first designed with NEMMCO, the Australian Market Operator, to automate settlement reruns in market where trade days may be recalculated multiple times over a year, and the operator needs to track arrival of new data on a trade day basis.

The key technical problem is tracking all data received by trade date in an efficient manner. A solution was developed for this problem in conjunction with Mark Gurry and Associates, who had previously developed an Oracle replication tool called Replica to support real time replication of market and settlement data to market participants on a table or group of data base tables basis, called suites.

The developed solution ensures optimal performance in updating a central tracking table of all trade dates, with rapid response, to queries on what data has changed, and what the impact is in terms of whether the trade date needs to be rerun.

WTM's settlement date control design allows the data that needs to be tracked for a trade date to be user defined for configurability, utilizing similar concepts to the Replica software developed by Mark Gurry and Associates for NEMMCO, and provides triggers for automating the scheduling of rerun jobs. Development of capabilities for more frequent, incremental settlement of market data, is critical to allow RTO's to adopt accelerated settlement timeframes and daily cycles, similar to NEMMCO and Nordpool. Settlement Date Control is essential for allowing more rapid turnaround and scheduling without significant resource implications.

This function is essential to support automated scheduling of settlement reruns.

Simultaneous Charge Calculation

Improving the performance of settlements systems is critical to the successful implementation of accelerated and more frequent settlements, and market designs such as LMP, which can dramatically increase the volume of data settlements needs to be able to process on a daily basis.

Traditionally systems have processed charges on an interval by interval, record by record basis. The normal approach of using parallel processing by customer to improve performance has not been possible as ISO settlements are market wide. Later systems have achieved gains by reading all the data for a day at one time, performing all calculations in memory and then bulk writing results at the end. Some of the latest systems further improve



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performance by calculating specific charges in parallel, to reduce overall calculation times.

Wise Technology Management's design for reducing settlement processing supports further parallelization of the solution by grouping similar charges together in the one charge group for calculation purposes. This approach has been tested and applied with a number of ISO settlements resulting in a 200 – 400% performance gain depending on the nature of settlement charges.

Ancillary services are a good example where multiple charges could be calculated at once. To apply the design the specific charges would be calculated as a set allowing inputs such as price simply to have a charge type flag against them and calculating the group as a single problem.

Generic (Universal) Settlement Output

Each electricity market has their own specific format for publication of settlement data. In the US for example, each market has their own format due to differences in market rules and the history of their markets, with a number of the markets evolving from power pools.

This means that a participant wanting to participate in different markets needs to develop a unique settlement interface and verification process for each market.

Improved access to settlement data and adoption of a common approach to settlements data publication is critical to the further development of electricity markets, and the likely future convergence of RTO and Clearing House settlements.

WTM has designed a solution to the problem of multiple formats and varying rules by designing outputs that set out bill determinants and calculation results in one set of outputs, with a matching set of calculation rules for the bill determinants in a second output. This means RTO's can follow a consistent format for bill determinant outputs, and allow specific market differences to be captured in the separate settlement rules output.

Outputting settlement results in a bill determinant format such as that adopted by MISO also has the advantage of reducing data volumes that are published, compared with approaches such as ERCOT. The key to automating validation is that these outputs must contain all the bill determinant inputs (but only once per output set) as well as the calculated results for each charge.

Market participant shadow settlement systems need to be able to process the bill determinant inputs and apply the relevant configuration rules matching that determinant (on a charge by charge basis) to verify the calculated outputs per charge, and if required to calculate the charge with participant

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supplied data. Provided the designed format is followed by all RTO's, shadow settlements will work without further development across markets.

In addition to this the participant is able to review bill determinant and equations together via the web or upload to a spreadsheet that used both outputs, provided the RTO outputs data via the web.

The last challenge is to provide a means for the participant to verify recalculation results. WTM's design provides prior or settled to date results for all determinants and charges that have changed so that the participant can determine the reason for a change and also they can easily reviewed the total settled to date on a specific charge for a trade date.

Participant outputs must be versioned to support this recalculation process, preferably on a trade date basis as supported by NEMMCO, the Australian electricity market operator.