



PJM Market Participant Solutions







In Focus.

PJM Market Participant Solutions

- **Front Office Tools**

Optimize, Bid, Analyze, Pre-Settle, Automate

- **Deal Management**

Includes e-Tag Agent Integration

- **Back Office Tools**

Settle, Shadow, Dispute, Build Settlement Reports

- **Data Warehouse**

- **On-Site Hardware or Hosted Systems**

PJM Market Participant Solutions

Power Costs, Inc. (PCI) is the leading provider of Market Operating Solutions for the PJM Market, working with clients such as Dominion, FirstEnergy, AEP, GenOn, and others. Companies value their partnerships with PCI for many reasons, including:

- Market experience
- Financial strength
- Fair pricing
- Applications stability, performance and upgrades
- Solutions compatible with other vendors' systems

By taking application components and integrating them, PCI creates customized solutions that meet PJM customer needs.

PJM solutions include:

- Portfolio Optimization and Analytics
- ISO Bid-to-Bill Automation
- Deal Management
- P&L Analysis

PCI also offers the latest Business Intelligence (BI) tools as well as automation and data warehousing technologies to quickly manage, visualize, and analyze large volumes of market data.

Hosted Solutions

PCI is proud to offer a hosted solution alternative for small PJM market participants. The PCI suite is available via a monthly lease, which helps you reduce costs on hardware, third-party software, and implementation.

Optimized Market Performance | Minimal IT Impact

Additionally, since PCI maintains the hosted system as well as updates and patches, your internal IT department's support time and maintenance costs are dramatically reduced.

Market Leadership

More than 50% of the generating capacity in the U.S. is scheduled and optimized using PCI software solutions. Our client base includes more than half of the leading Fortune 500 GenCos which are currently using PCI applications to reduce their operational costs and maximize profits.



SOLUTION

Bid-To-Bill Automation

Market Participants in PJM use the PCI GSMS suite to automate their PJM bid-to-bill workflow and maximize their market benefits. The PCI suite can be used to create and submit unit offers and demand bids, manage internal and external bilateral transactions, download PJM awards and prices, and validate PJM settlement. The PCI modular service-oriented architecture provides the flexibility to quickly respond to varying PJM market conditions and easily interface with other systems and data sources.

PCI solution can be used to manage the entire PJM bid-to-bill workflow

- **Enhanced ISO communications and data exchange** using scheduled and manual tasks. Evaluate, formulate and submit bids and offers, download key market data (e.g., messages, results, dispatch instructions), set up alerts on the execution of key tasks, monitor run logs and maintain a clear auditable history of XML transfers.
- **Create and submit optimized bids and trades.** Automate creation of Day-Ahead and Real-Time bids and offers using reusable bidding templates tailored to specific resources and products:
 - Generation
 - Demand (Includes Demand Response)
 - External Bilateral Transactions (Imports and Exports)
 - Virtuals (Incremental Offers and Decremental Bids)
 - Internal Bilateral Transactions
- **Receive market awards, messages, and dispatch instructions.** Validate DA awards using bids, prices, and market rules.
- **Independent shadow calculations and pre-settlement results** can be used to estimate settlement charges prior to the availability of the PJM Settlement. Instead of waiting for PJM settlement reports, the Pre-Settlement module can be used to estimate settlement charges and provides early feedback to the front office. Users can compare PJM MSRS versus shadow settlement results to quickly identify settlement discrepancies, and easily submit and track settlement disputes.

Bid Packages

PCI supports reusable bid packages, which allow users to automatically create 3-part energy offers (Cost, Price, and Price with Parameter Limits). For example, bid packages can be submitted from a previous day using saved templates that update all positions for the current operating data.

Bid packages apply “strategies” to assets to determine how generation or load should be offered into the market. Users can make an inventory of strategies for each bid/offer type so that generation and load can be offered into the market in one of several different ways, depending on the desired bidding goals and market conditions. Each strategy can generate the appropriate type of bid or offer per product and market instrument by applying a pricing formula to the latest available asset data, including a resource’s operating cost, dispatch limits and operating parameters.

Other advanced capabilities of PCI’s bid-to-bill solution include:

- Post Analysis
- Deal Management
- Outage Management
- Gas Management
- P&L Analysis



SOLUTION

Portfolio Optimization & Analytics

Today, PCI optimizes roughly 50% of the US generation capacity using PCI GenTrader, which encompasses a broad array of robust analytics and optimization logic — all within a single integrated application. Studies can be run over timeframes ranging from the next few minutes out to 30 years. A detailed asset model supports traditional steam powered, pumped storage hydro, and multi-stage combined cycle generation assets and factors in power market prices, fuel prices and/or forward obligations (such as load). PCI is able to provide optimal unit commitment and resource scheduling to either maximize profits or minimize costs.

PJM market participants can use the PCI suite to:

- Develop resource plans
- Run weekly unit commitment for OD + 1 to OD + 7 to optimize resource plans beyond the PJM time horizon
- Forecast fuel burn
- Produce hourly unit schedules and P&L

Features

- Advanced algorithm for robust unit commitment optimization from next hour to 30 years
- Multi-tier fuel constraint optimizations
- Comprehensive model representation for combined-cycle and pumped-storage units
- Simultaneous local and global emission optimization for NO_x and SO₂ as well as other emission constraints (e.g., CO₂)
- Integrated platform for deterministic and stochastic simulations
- Full co-optimization for all customer resources and obligations considering all commodities (energy, synchronized reserve, regulation, fuel, and emissions)
- Deterministic and stochastic production-costing runs, which can be used to simulate the impact of load uncertainty, forced outages, fuel-cost uncertainties on revenues, production costs, and profits and losses
- Grid computing to perform parallel processing to significantly reduce the time to run long-term multi-year studies
- Easily access market price scenarios to analyze how a portfolio's profit and loss would behave under certain market conditions

PCI's Portfolio Optimization Solution provides:

- Production cost savings of 1-3%
- Accurate forecasting of fuel burn and emissions
- Cost/benefit analysis of proposed plant upgrades
- Full integration with other IT sub-systems (e.g., SCADA / EMS, load forecasting)



As the global leader in asset optimization software for power generation and trading companies, PCI keeps your **energy in focus.**



SOLUTION

Deal Management

Today, with multiple ISOs using nodal instead of fleet-wide prices, it has become imperative to view deals as part of the overall portfolio optimization and bidding strategy. PCI's Deal Management Solution provides a powerful and user-friendly toolset for managing and automating complex front to back office requirements. Our approach is driven by the need to integrate deals and fuel procurement, as well as optimization and bidding strategies into one system.

- **Manage a wide variety of trades and instruments:** Real-Time, Day-Ahead, Swaps, Options, Option Exercise, Tolling, Credit, Interties, Bookouts, Tags, Reservations, Confirmations, Checkouts, Invoices, Reports, etc.

- **Control complete lifecycle of a deal:** Deal Capture permits quick deal entry, expanded detail and hourly entry, deal consolidation, confirmation, and invoicing.
- **NOT a “one-size-fits-all” approach:** Configurable screens, customizable workflows, and user-defined default deal entry allow users to tailor the product to meet their specific business needs.
- And more: Data security, deal transformation, BIRT report integration, and inter-operability with other PCI (as well as third-party vendor) applications.

High-Level Functionality

- **Multi-commodity deal entry** with configurable screen layouts and custom business logic to customize day-ahead and real-time deal entry forms that automate and comply with business processes and user preferences.
- **User customizable dashboards** to optimize workflows during trading periods and help support the mapping of internal and external data from multiple sources into Excel-like grids and various graphical formats for visual analysis.
- **Pre-deal analytics** to calculate optimal position changes and unit commitment schedules given open positions, asset characteristics and market conditions.
- **Comprehensive back-office support** for ISO and bilateral settlement functions for different markets that allow Settlements staff to have screens that process and reconcile estimates versus actual invoices.
- **Bidding of deals and scheduling in multiple ISOs for multiple market instruments** together with reservations and tagging outside of the ISOs.
- **Post analysis** to evaluate individual deal costs and impacts on the overall asset portfolio.



SOLUTION

Data Warehouse

Market participants have been challenged with gathering, rationalizing, linking, and maintaining large volumes of disparate operational and market data. Because data from different sources are housed in separate systems, it is very difficult for business users to gather the information that they need — when they need it — to make decisions.

Many data warehousing solutions are built from scratch and have simply been too expensive, too hard to assemble, or too complex to manage. This makes it hard to maintain a Business Intelligence (BI) infrastructure that is easy and flexible to operate.

The PCI Data Warehouse is a powerful strategic tool that will put your company at a competitive advantage. It is designed exclusively for energy companies to manage, analyze and report on generation, transmission and demand-side data from PCI and non-PCI data sources. PCI's primary objective in developing the Data Warehouse system has been to support and speed up business analytics and reporting. Some PCI Data Warehouse benefits include:

- **Out-of-the-box Implementation:** The PCI Data Warehouse comes predefined with schemas and wizards to hit the ground running.
- Streamlining and substantially increasing the speed of data mining, analysis and reporting. Because different information sets from different systems are stored together, they are easier to access.
- **Flexible deployment:** The PCI Data Warehouse can be utilized as a Reporting or Interface Database.
- Creation of new reports and BI "Analyzers" in days instead of months. Business users and IT personnel can create and test new reports far faster.
- **Stability:** The PCI Data Warehouse only stores read-only data, meaning that user interactivity will not "break" the data — helping to guarantee its stability across time.

Maximize Performance and Security

PCI uses an optional Data Mart Wizard to automatically create new data marts to speed up response times. The Data Mart Wizard can also be used to create data sub-sets for security purposes. The PCI Data Warehouse supports role-based security and can create separate data marts on-the-fly, providing more flexibility for your enterprise.

Data Quality Improvement

An integrated Business Rules Engine is used to translate data and check quality. For instance, common problems are units or contracts that may have different names in different systems and change over time. PCI allows you to map this data as it is imported into the Data Warehouse which supports simple business rules (for mapping new name changes) to advanced logic changes to ensure data consistency. Both built-in and custom rules are available.

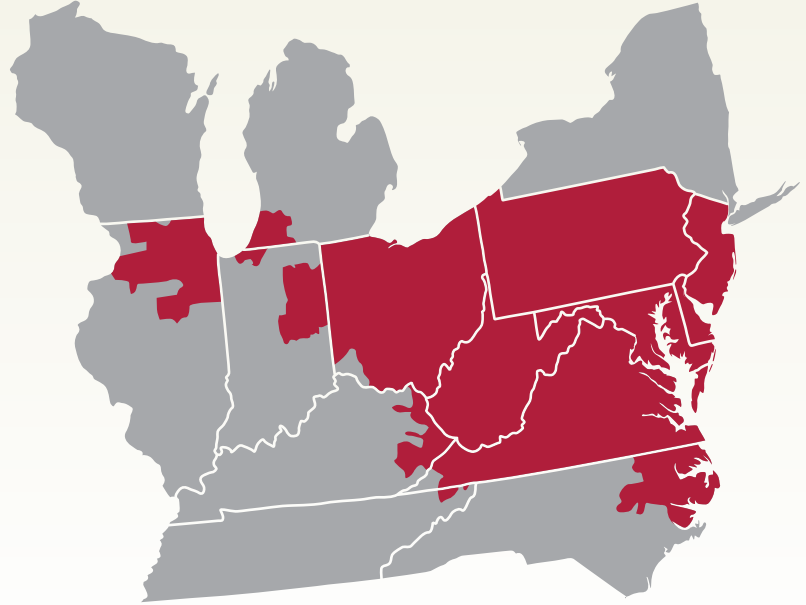
Open Integration

The PCI Data Warehouse can be deployed and linked to multiple SQL databases (e.g., Oracle, Microsoft SQL Server, MySQL) and a variety of Business Intelligence tools (e.g., Pentaho, QlikView, Cognos, BusinessObjects, Hyperion, Powerbuilder and Microsoft Excel).

The PCI Business Intelligence (BI) Analyzer Suite

In addition to providing data for interfacing, reporting or analysis, PCI has developed a number of BI Analyzers that can be deployed out-of-the-box on top of the PCI DW. The Analyzers focus on common industry analysis including the following currently available topics:

- P&L Analyzer
- Settlement Analyzer
- Position Analyzer
- Price Analyzer
- Demand Response Analyzer



**Pennsylvania, Jersey, Maryland
Power Pool (PJM)**

Power Costs, Inc. (PCI) is the premier, global provider of generation supply management and optimization software and services. We develop, deploy and support essential software tools that energy supply, marketing and trading organizations require to capitalize on their portfolio capabilities and market opportunities in order to maximize profits.

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