PG&E Energy Trading

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Putting the Power of Information in your

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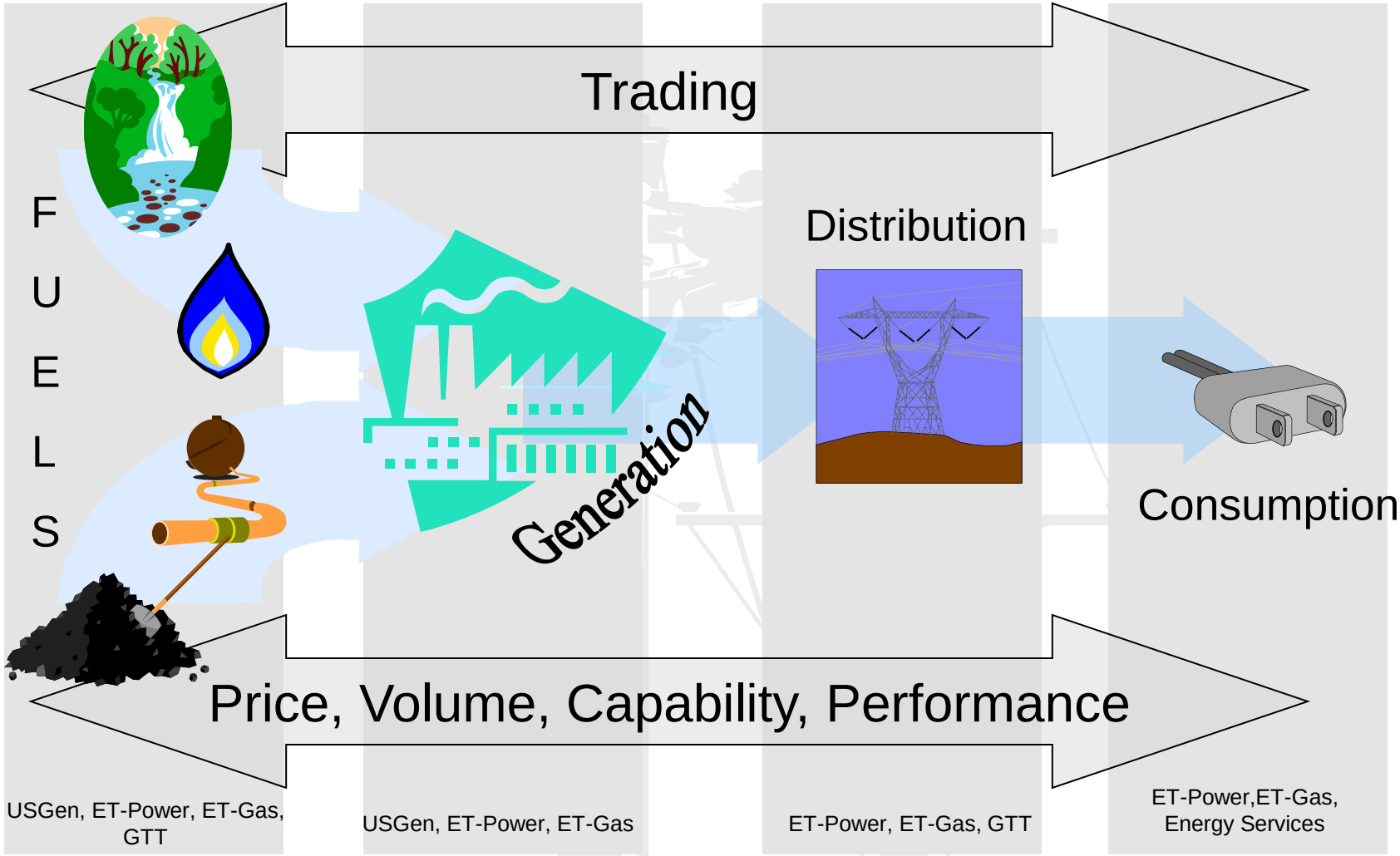
Business Themes

- Become a premiere energy trading company
- Establish major asset presence in deregulating regions
- Ability to monitor performance of a geographically disperse asset base
- Quickly integrate new assets into the decision process
- Manage the portfolio as a single entity (financial and physical)
- Establish a core base of information for decision making
- Extract maximum value from assets by optimizing performance during high value periods
- Address factors beyond our control
  - Type of DCS installed in new projects
  - Types of HW/SW systems acquired
  - External systems that are critical to our success

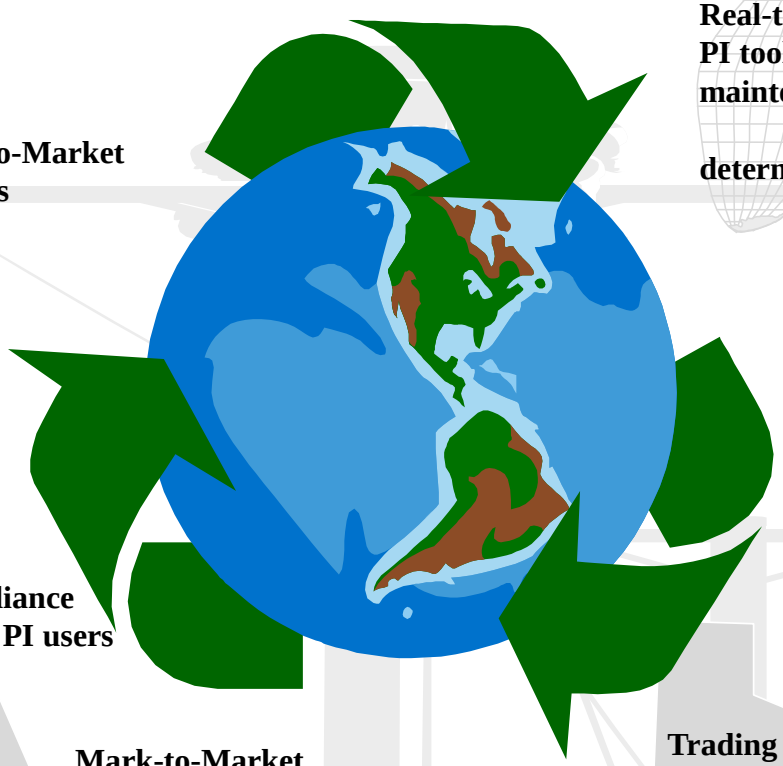
Touch Points for Information



Information Exchange Requirements

Plants:
Real-time and historical process data
PI tools used for process improvement , maintenance planning, performance monitoring and problem determination.

Real-time unit Mark-to-Market
Market Pricing Signals
Forecast weather
Price Curves
Load Forecasts



Fuel Consumption
Generator Output
Heat Rate
Emissions (NOx & SO2)
Production Forecasts

Head quarters:
Analyzes unit performance
Monitors environmental compliance
Distributes relavent data to all PI users

Mark-to-Market
Market Pricing Signals
Forecast weather
Forward Price Curves

Trading Floor:
Collects pricing information
Collects weather information
Generates forward price curves
Monitors generator production, fuel consumption, heat rates and emissions

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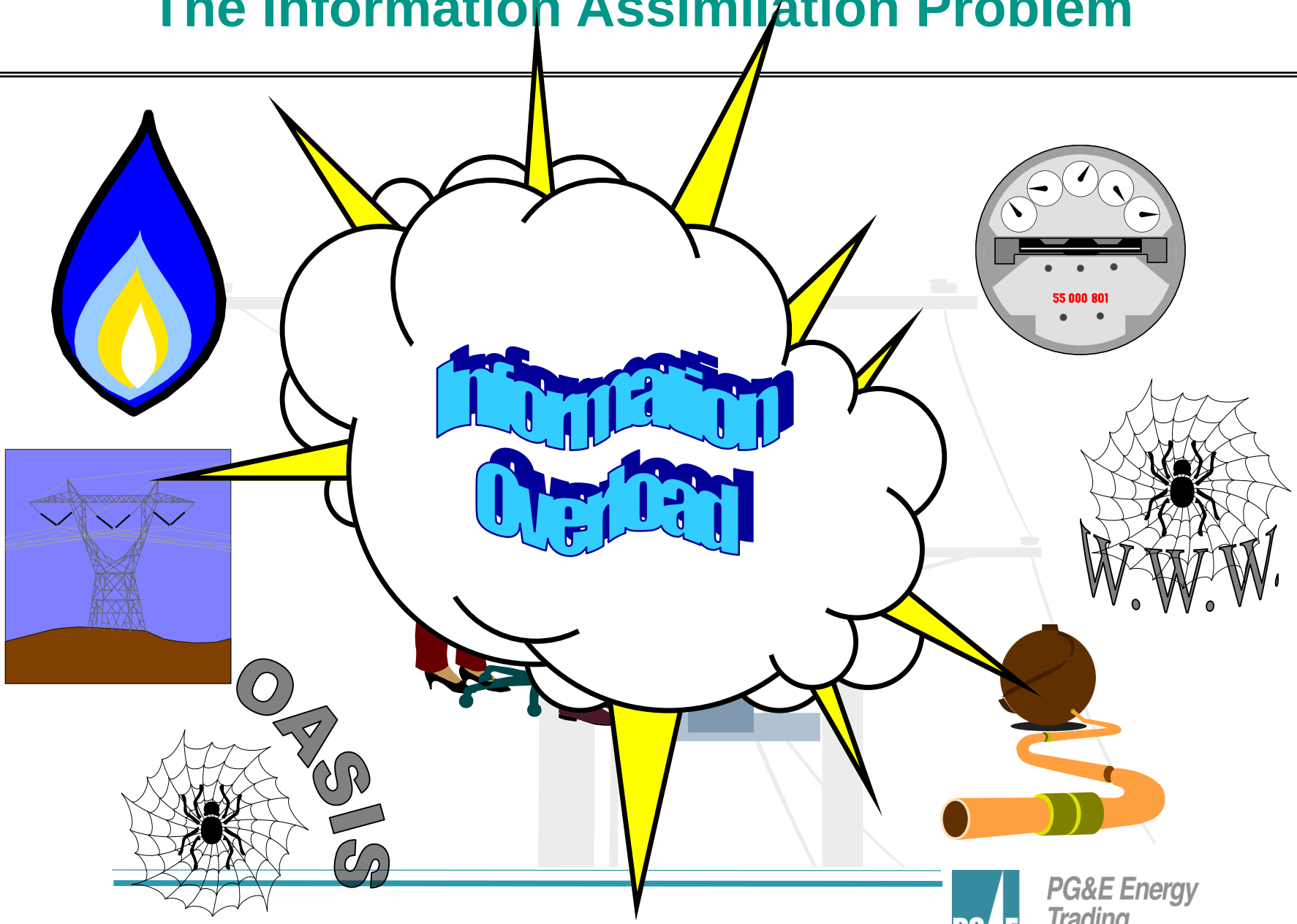
Numerous Data Sources Identified

- Power Pricing
  - Dow Jones, MegaWatt Daily, Power Markets Week
- Gas Pricing
  - IFERC, Gas Daily
- Broker Quotes
- Trader forward pricing
- 5 minute and hourly prices from Web Sources
  - PJM (hundreds of nodes), NEPOOL, CalPX prices, NY
- Weather
  - Custom Internet feeds, NCDC historicals
- Plant Production and status
- Pool settlements
  - Actual generation by unit, load by node

The Information Assimilation Problem



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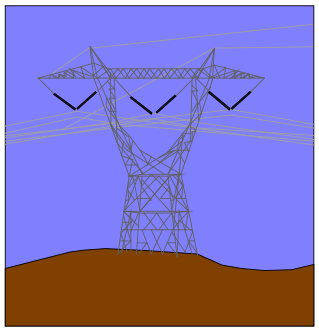
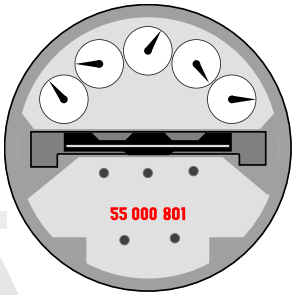
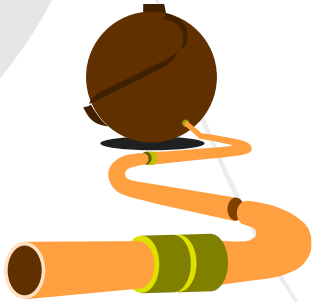
PI Supports the Business Case

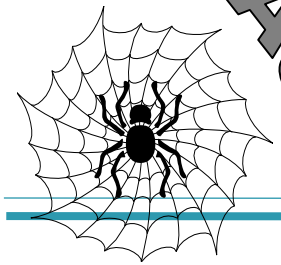
- Open Architecture supports multiple hardware and operating system environments
- Minimizes risk of acquisitions due to IT architecture
- Standard and custom analytics using familiar tools like EXCEL and Visual Basic
- APIs for custom application development
- Ability to establish standard performance measurement models across different DCSs and deploy them quickly at other locations
- Ability to integrate non-standard data such as pricing, weather and comments
- Ability to accept data from many sources, files, Web, spreadsheets

PI an Information filter and distribution tool









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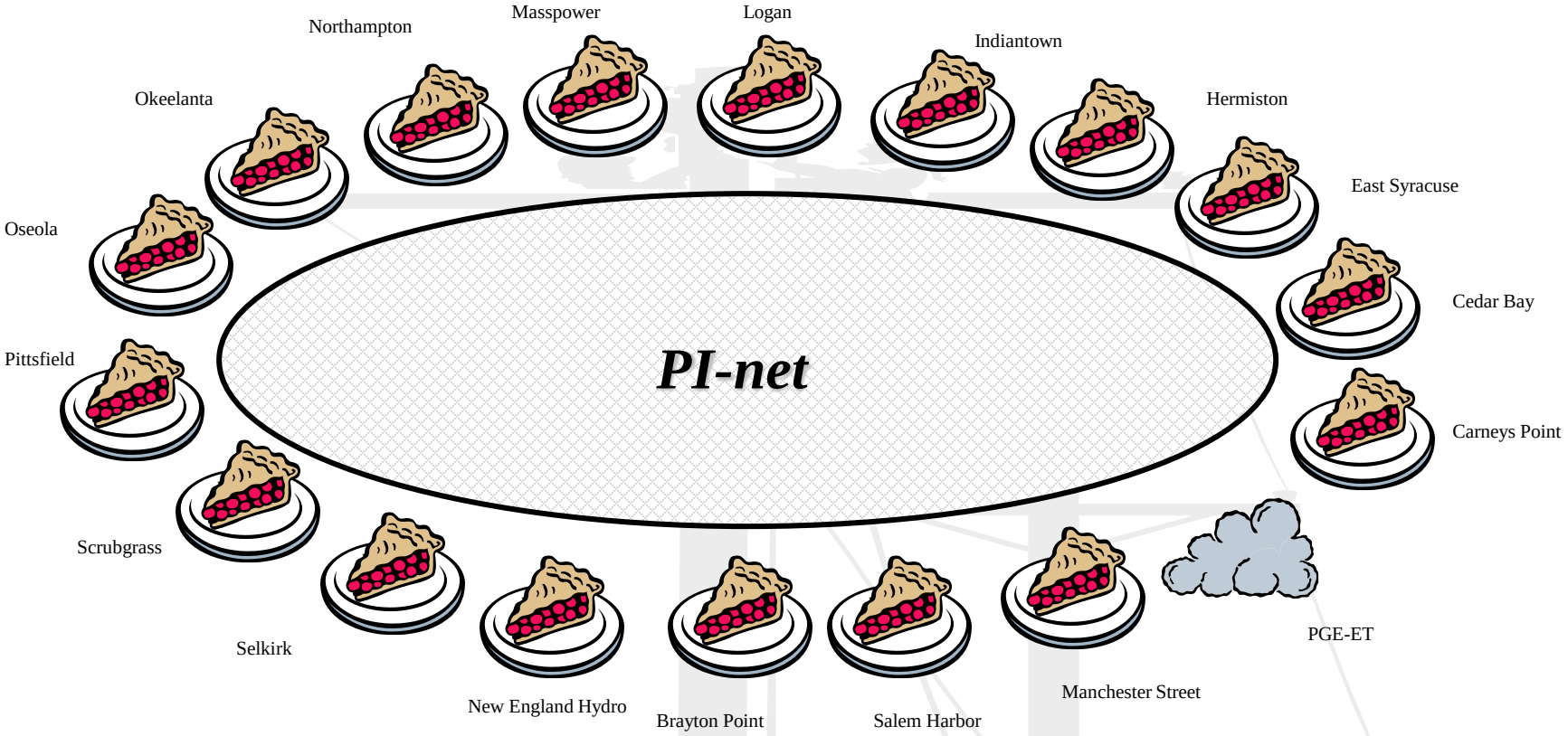
Starting to Make Sense from Chaos



Real-time access to critical information both locally and remotely throughout the PI-net improves decision making and responsiveness. Plants can maximize revenue by reacting to market price signals while Trading deploys assets to meet unforeseen load fluctuations and transmission constraints.

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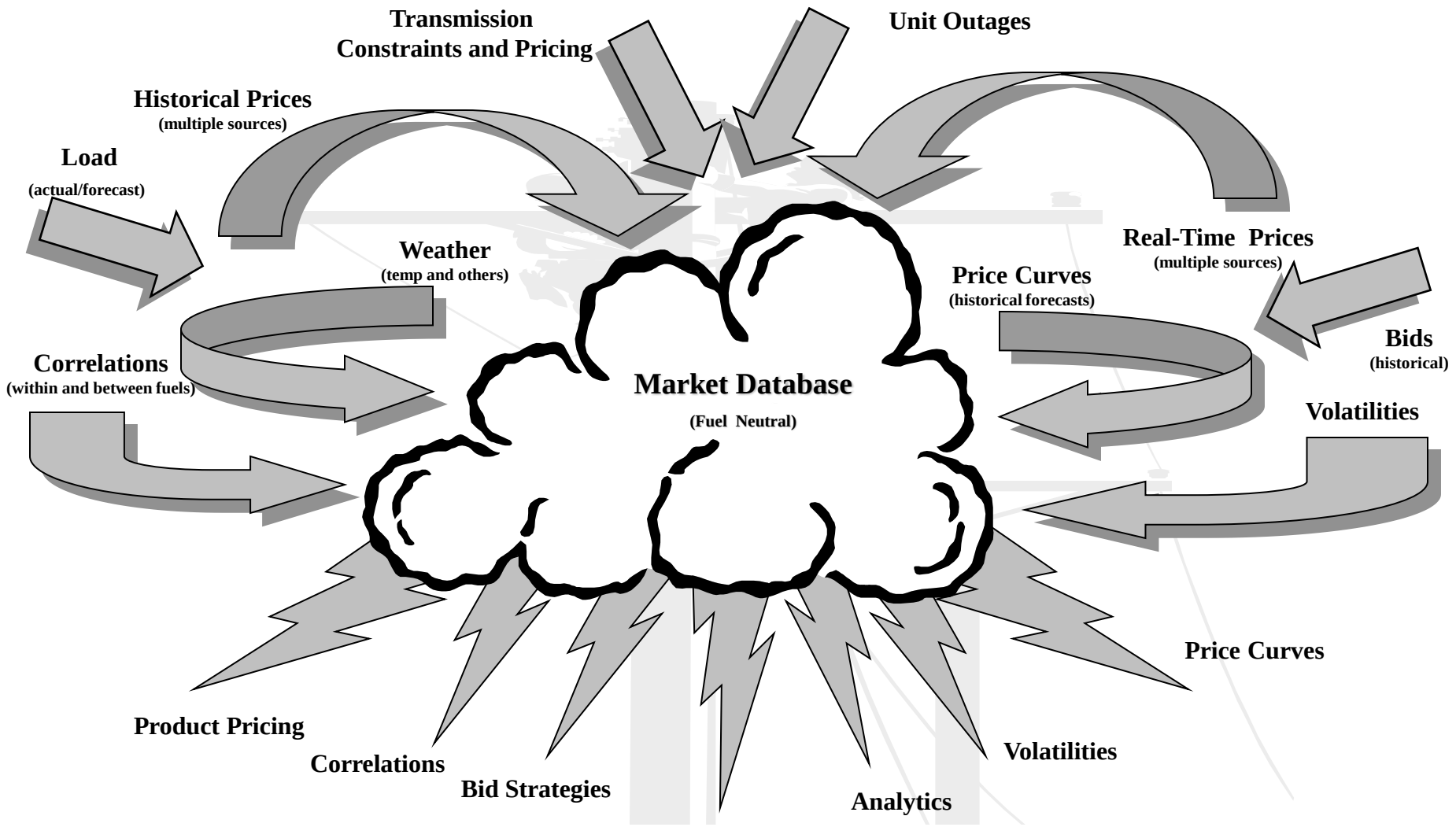
Expanding the System to Trading



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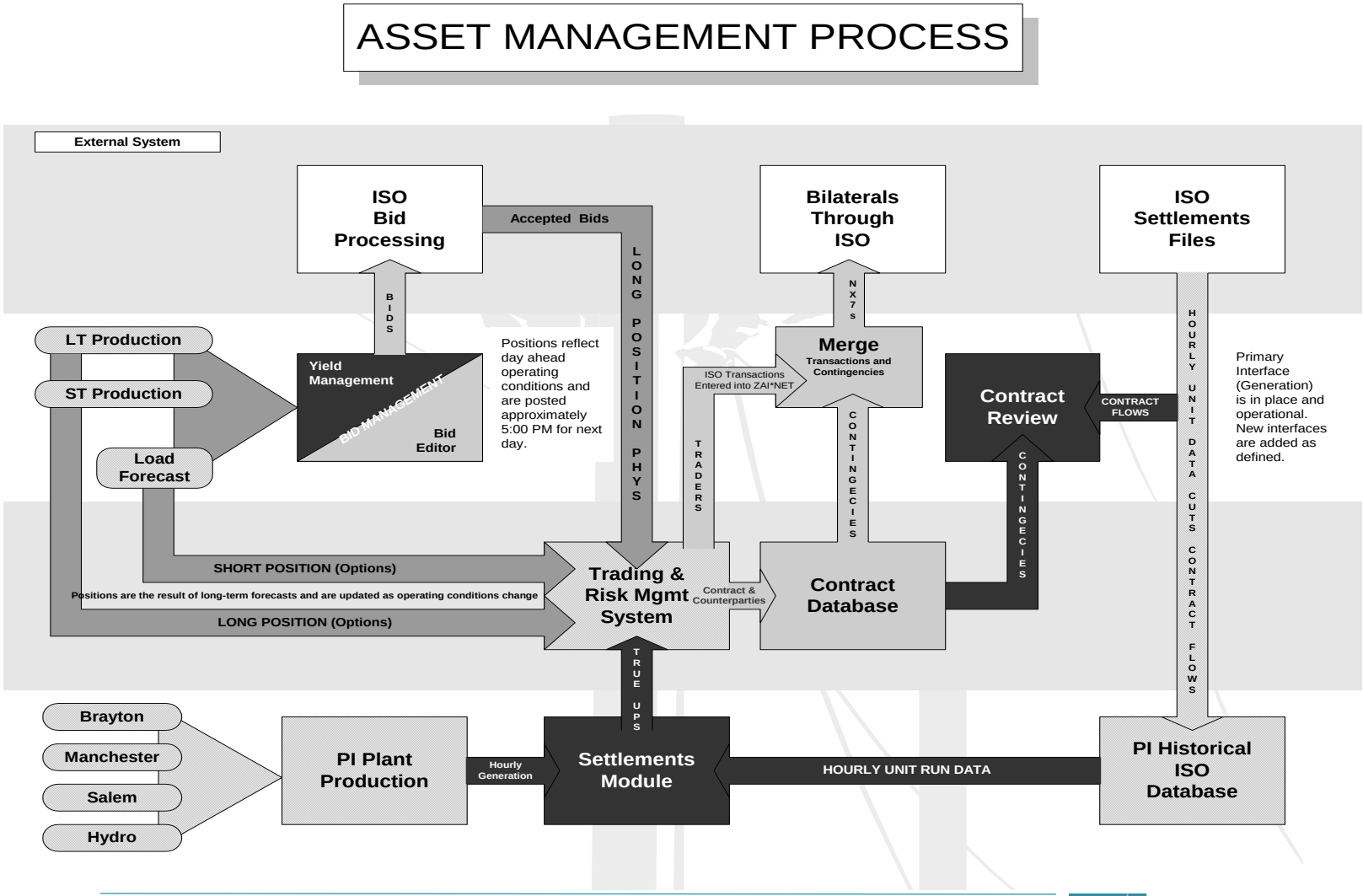
Integrating the Solutions into the Operation



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Some Examples

- 5 year daily average price showing high and low price and graph
- Historical daily prices for any period or product
- Correlate actual weather against 10 day forecasts
- Compare Dow Jones survey, Megawatt Daily, Power Markets Week, Gas Daily and IFERC indices
- Compare different product indices
- Created real-time monitors for generation output, fuel consumption and heat rate
- Centralized tracking of NoX, SO2 and other environmental constraints
- Price units in real-time against market clearing prices (MTM)
- Value historical production profile against market price and cost
- Correlate weather and prices
- Collect and balance Pool settlement data against internal production
- Collect Market Clearing and historical prices from Web/OASIS sites