

TECHNICAL PRODUCT SHEET

EtaPRO® Fuel Demand Model & Plant Accounting Settlement System

Elevate Your Plant Operations With the EtaPRO® Fuel Demand Model and Plant Accounting & Settlement System

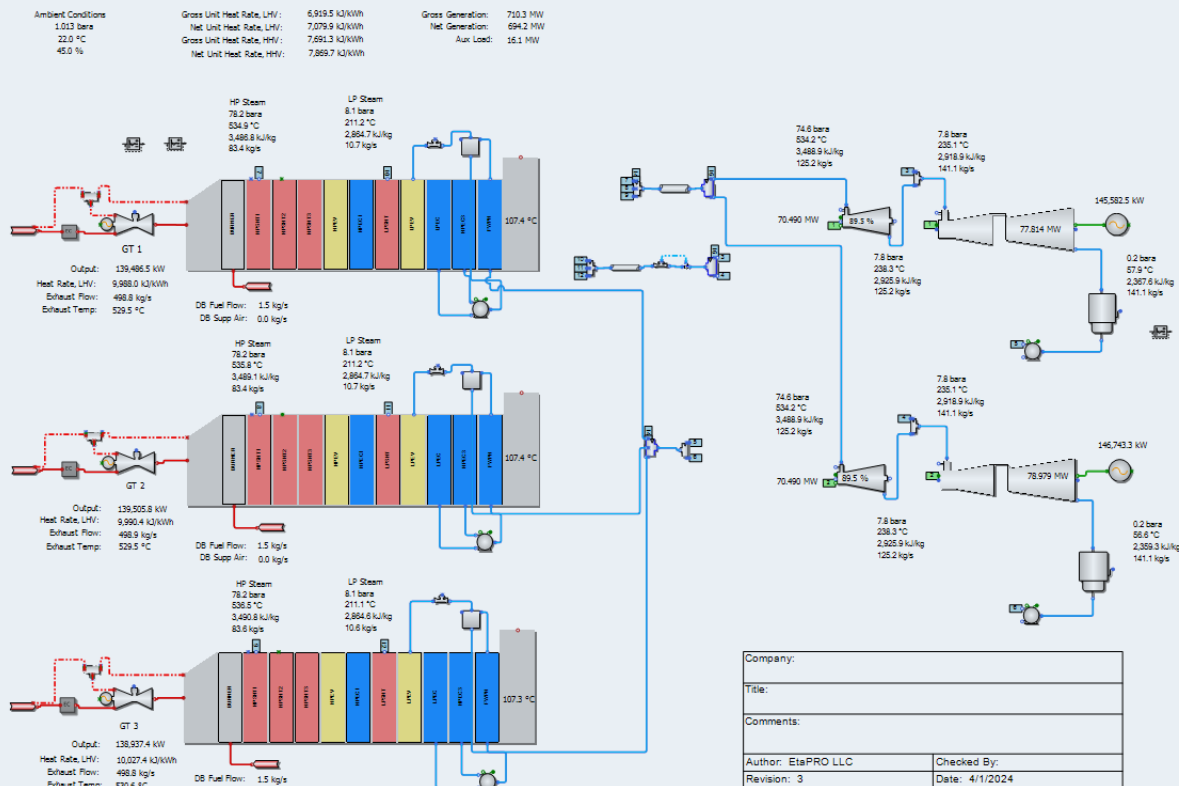
Expertly engineered and custom-tailored, this innovative solution ensures commercial contract compliance with a proven combination of economics and thermodynamics. Whether your facility produces electrical energy, water, or both, our system adapts to every contract scenario, supporting Power Purchase Agreements (PPA), Water Purchase Agreements (WPA), or combined Power & Water Purchase Agreements (PWPA). **EtaPRO® commercial solutions assure precision, transparency, and confidence in every transaction.**



EtaPRO FUEL DEMAND MODEL

The **Fuel Demand Model (FDM)** is built on EtaPRO®'s proven EtaPRO® Performance & Condition Monitoring System with its comprehensive VirtualPlant™ modeling framework. The EtaPRO® FDM VirtualPlant™ model provides a highly detailed thermodynamic mass and energy balance of your plant that aligns with contract commitments and predicts hourly contract parameters. Unlike "black box" alternatives, VirtualPlant™ FDM models include a sophisticated graphical interface that allows users to build complex plant models with a high degree of flexibility. This feature is very beneficial if the power plant is modified to improve the performance of the power plant.

The **On-line FDM** is embedded within the EtaPRO® configuration and is controlled and executed in real time by the EtaPRO® server, which collects and conditions critical inputs. The VirtualPlant™ FDM includes major components such as boilers, solar panel(s), wind turbine(s), gas turbine(s), steam turbine(s), HSRG(s), condenser(s), and pump(s). VirtualPlant™ operates as a connected system of power plant components, in which mass and energy balances around each component are satisfied according to the laws of physics. The diagram below shows the schematic of a typical combined cycle plant.



PASS Data Flow Diagram: FUEL DEMAND MODEL

The On-line FDM updates automatically in real-time based on contract requirements, typically once per minute. FDM inputs for a Combined Cycle Power Plant typically include:

- Actual Net Power output
- For the steam turbine, actual operation status (on/off)
- For each gas turbine, actual operation status (on/off)
- For each gas turbine's evaporative cooler, actual operation status (on/off)
- For each HRSG, actual operation status (on/off)
- Actual Ambient Air Temperature
- Actual Ambient Air Humidity
- Actual Barometric Pressure
- Actual Fuel Heating Value
- For each gas turbine, actual power output
- For each gas turbine, actual loading status (baseload/partload)
- For each HRSG's duct burner, actual fuel mass flow

The On-line FDM's calculated results are stored in EtaPRO®'s embedded data historian, EtaPRO® Archive. The values in the data historian are then available for the Plant Accounting & Settlement System (PASS), as well as for reporting application through EPreporter™.

Although the Projected Fuel Demand is the required output from the FDM, the FDM can also provide other calculated results such as:

- Gas turbine fuel consumption
- Gas turbine and steam turbine power output
- Auxiliary power consumption
- HRSG supplementary firing fuel consumption
- Projected fuel demand for the plant
- Net heat rate, based on HHV/LHV of the fuel
- Correction factor for net heat rate based upon the customer's Power Purchase Agreement

The **Off-line FDM** is a set of parametric studies that uses the same VirtualPlant based FDM that is used for the On-line FDM. An EPreporter™ report collects all the FDM inputs on an hourly basis (or other interval) from the EtaPRO® Archive historian for each hour of the specified Billing Period. The user can then execute the Off-line FDM for each hour of the Billing Period using hourly averages for the FDM inputs.



PLANT ACCOUNTING SETTLEMENT SYSTEM

The **Plant Accounting Settlement System (PASS)** handles financial reconciliation between the contracting parties to ensure accurate billing for energy and/or water delivered, settlement of fuel costs, ancillary services, and any associated penalties. The PASS calculates all terms required by the PPA/WPA to generate an invoice based on measured inputs.

Typically, there are three types of input data required for an invoice:

1. PPA/WPA Fixed Values
2. User Manual Inputs / Declarations
3. Online Plant Readings

The **PPA Fixed Values** are configured in separate PASS worksheets within the PASS Calculations and Invoice Generation file. Fixed values from the PPA are tabulated and formatted such that they are readily validated against the PPA.

These fixed values typically include terms such as:

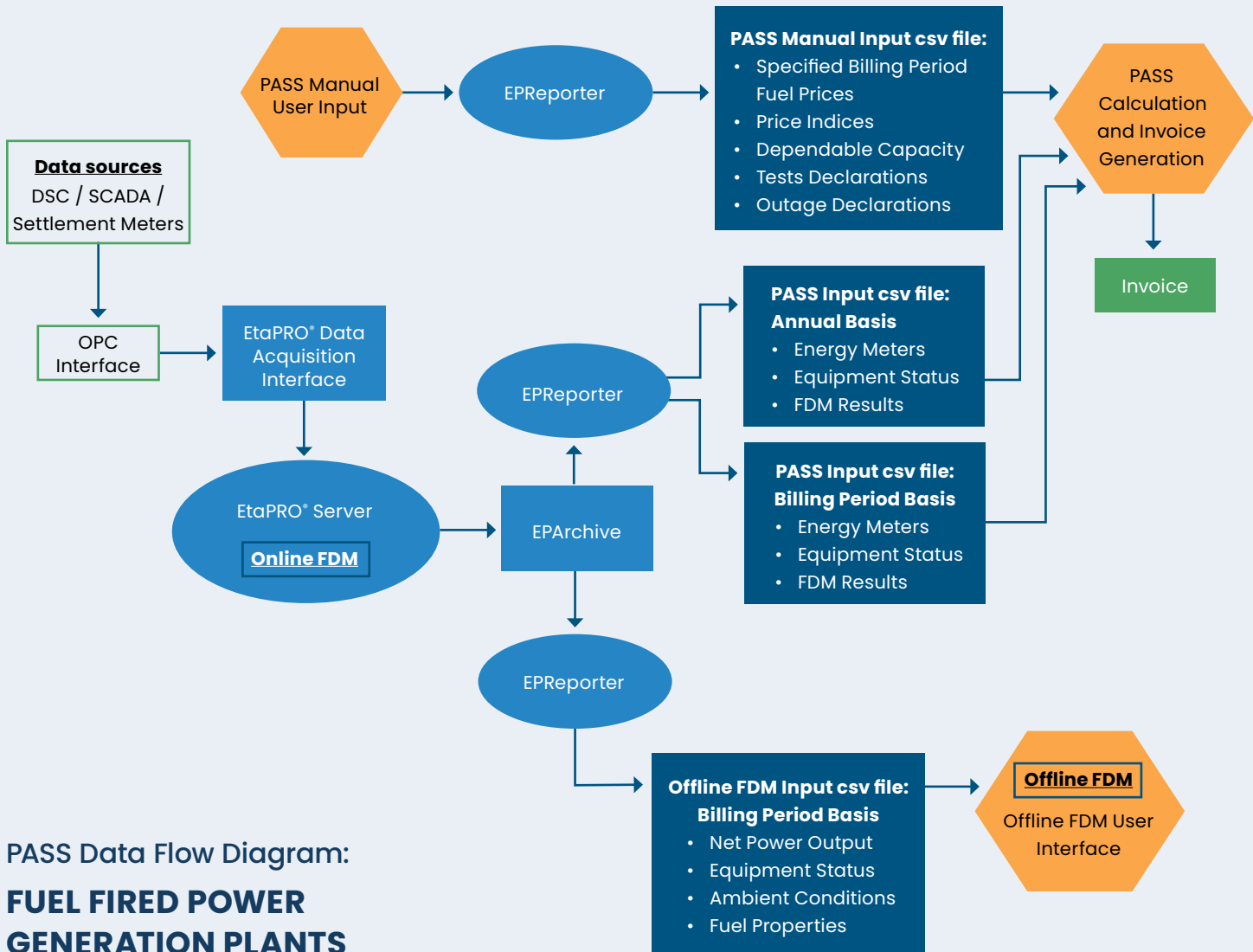
- Capital Cost Recovery Charge Rates
- Fixed and Variable Operation and Maintenance Charge Rates
- Electrical Energy Variable Operation and Maintenance Charge Rates
- Startup Payments / Deductions
- Period Weighting Factors
- Contracted Specific Net Heat Rate tabulated for each Contract Year
- Contract Years Start Dates
- Data Values

On-line Plant Readings are retrieved from the EtaPRO® Archive data historian for the Billing Period in each Contract Year using in data mining functions in EPreporter™ to produce On-line FDM results such as:

- Energy Settlement Meters Values at Start of each hour for each generator
- Energy Settlement Meters Maximum and Minimum Values in each hour (to check for totalizer meter resets)
- Fuel Settlement Meters Flow Rates
- Fuel Heating Values
- Ambient Conditions (Temperature, Barometric Pressure, Relative Humidity)
- Projected Fuel Demand calculated by the online Fuel Demand Model
- Actual Fuel Demand
- Data Validation



A FULLY INTEGRATED FDM & PASS SOLUTION



PASS Data Flow Diagram:
**FUEL FIRED POWER
GENERATION PLANTS**

FDM and PASS systems are highly complex, sophisticated applications demanding the highest level of technical due diligence. EtaPRO® FDM and PASS systems are fully integrated and designed based on nearly two decades of experience working with leading plant owners and operators. Unlike bespoke solutions

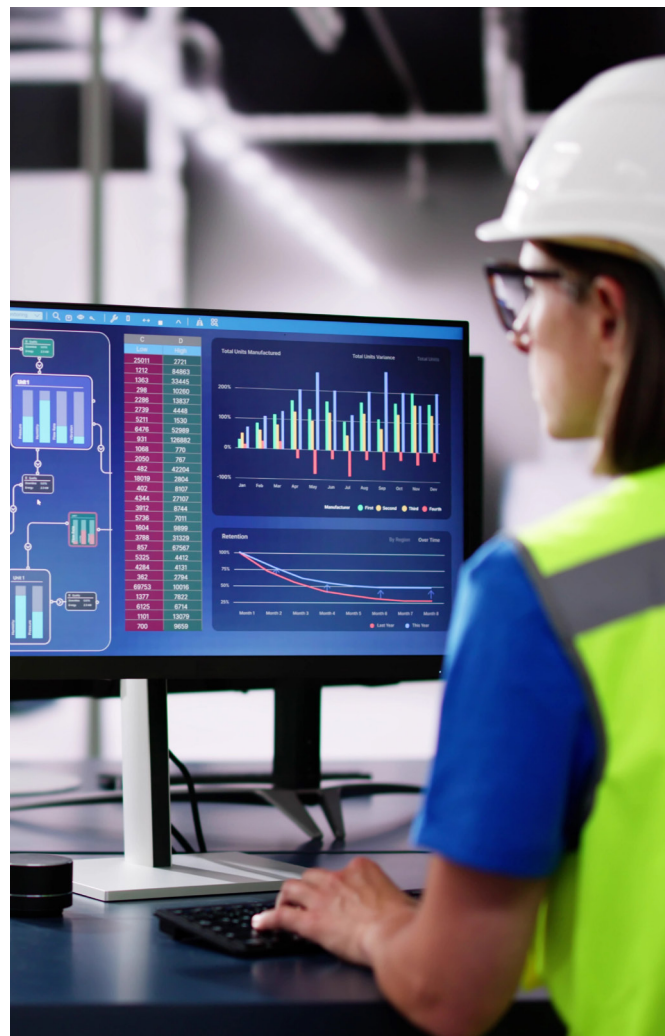
that risk becoming outdated over time, EtaPRO® offers a trusted, continuously evolving platform. It is regularly enhanced with the latest IIoT and digital innovations and backed by a dedicated team of software and industrial engineers who seamlessly integrate cutting-edge technologies.

Streamlined Annual Reconciliation with EtaPRO® PASS

Managing annual reconciliation under PPA/WPA contracts can be complex—but EtaPRO® PASS makes it simple. Instead of manual data transfers and time-consuming calculations, PASS automates the entire process. It collects and validates data across both the Billing Period and the Contract Year, ensuring accurate, compliant invoicing without the hassle.

How PASS Delivers Confidence and Efficiency:

- **Automated Accuracy:** PASS continuously validates settlement meter readings, detecting resets and accounting for calibration downtime—so your energy and water output calculations are always correct.
- **Smart Error Handling:** Built-in error trapping ensures anomalies like non-incrementing meters or offline equipment are flagged and managed.
- **Complete Data Control:** All user inputs—outage declarations, performance tests, holidays, fuel prices, exchange rates, and price indices—are securely stored for the entire contract term.
- **Simplified User Experience:** Entering outage details is quick and intuitive. Provide capacity, start and end times, outage type, and PASS does the rest—automatically applying hourly calculations, aggregating them into daily and monthly totals, and generating invoices with precision.



Transparent, Accurate PPA/WPA Charges

PASS supports every major charge type under PPA/WPA/PWPA agreements:

- **Capacity Charge:** Ensures owners are reimbursed for maintaining dependable output. PASS applies contract-specific weighting factors for outages based on timing, type, and demand periods.
- **Energy Charge:** Calculates payments for delivered electrical energy using validated settlement meter data.
- **Fuel Charge:** Handles projected fuel demand calculations via the Fuel Demand Model (FDM), applying penalties or bonuses based on actual vs. projected performance.

With EtaPRO® PASS, asset managers gain a powerful tool to simplify complex contractual requirements, reduce risk, and ensure transparency—all while saving time and effort.

Smarter Plant Management — The Combined Power of EtaPRO®'s Fuel Demand Model and Plant Accounting Settlement System

With over 15 years of proven expertise in developing advanced Fuel Demand and Plant Accounting Settlement Systems, EtaPRO® stands as a trusted leader in the industry. Our solutions are engineered to seamlessly integrate contract compliance, real-time data, and transparent invoicing—empowering plant owners and operators with unmatched precision and confidence in every transaction.

EtaPRO® delivers more than systems—it delivers certainty. From designing and implementing complex operational frameworks to monitoring performance with cutting-edge technology, we ensure your plant runs efficiently, compliantly, and profitably.

Elevate your plant performance
with EtaPRO® for smarter plant
management. Get started today!



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