EDAMS - Energy Market Operations System (EMOS)

Energy Trading

Cost Optimal Energy trading operations balancing supply and demand.

EDAMS Energy Trading covers all requirements related to the continuous optimal trading operation of an Energy producer and retailer in the Electricity Market. The module allows for (a) Regulations & Tariffs, (b) Registration of all production units as well as all market participants, and (c) Flexible PPA (Power Purchase Agreements) between all related internal and external parties.

Demand forecasting is performed in several ways, considering consumption patterns per individual connection. Production forecasting considers both environmental variables and specific park condition and behavior as well as pending production restrictions. The system communicates directly with the (MDMS) Meter Data management system to receive real time consumptions and productions,

EDAMS Energy Trading comes in two versions, depending on the type of electricity market as follows:

a) EDAMS-ETMS (Energy Transitional Market System). This model applies in markets where trading is carried out monthly, usually being transitional markets prior to opening up of the proper market.

Figure 1: EDAMS-ETMS (Energy Transitional Market System) functional diagram.

b) EDAMS-EMOS (Energy Management Operations System). This is the normal Energy Trading model applicable (at this stage) for The Forward Market and Day ahead market trading.

Figure 2: EDAMS-EMOS (Energy Management Operations System) functional diagram.

The Balancing module calculates in a cost optimal manner Over the Counter Contract requirements as well as DAM (Day Ahead Market) trading quantities. All submissions in the relevant markets are taken care of by the system.

Daily and monthly processes and reconciliations are allowed for down to the level of production of all relevant invoices between the parties involved.

EDAMS-EMOS also comes in two versions:

1) EDAMS-EMOS (producer): This version is suitable for producers that simply want to sell their production in the market and not be associated with suppliers.
2) EDAMS-EMOS (supplier): The supplier version is for electricity utilities that sell electricity to consumers and at the same time produce solar energy. The module allows the supplier to handle transactions both for itself and an on behalf of production units it manages.

At present the EDAMS-EMOS system does not trade in the Balancing Market or Ancillary Services market and thus it is not suitable for a Conventional Power generating unit.

Figure 3: Sample Dashboard from EDAMS Energy Trading software
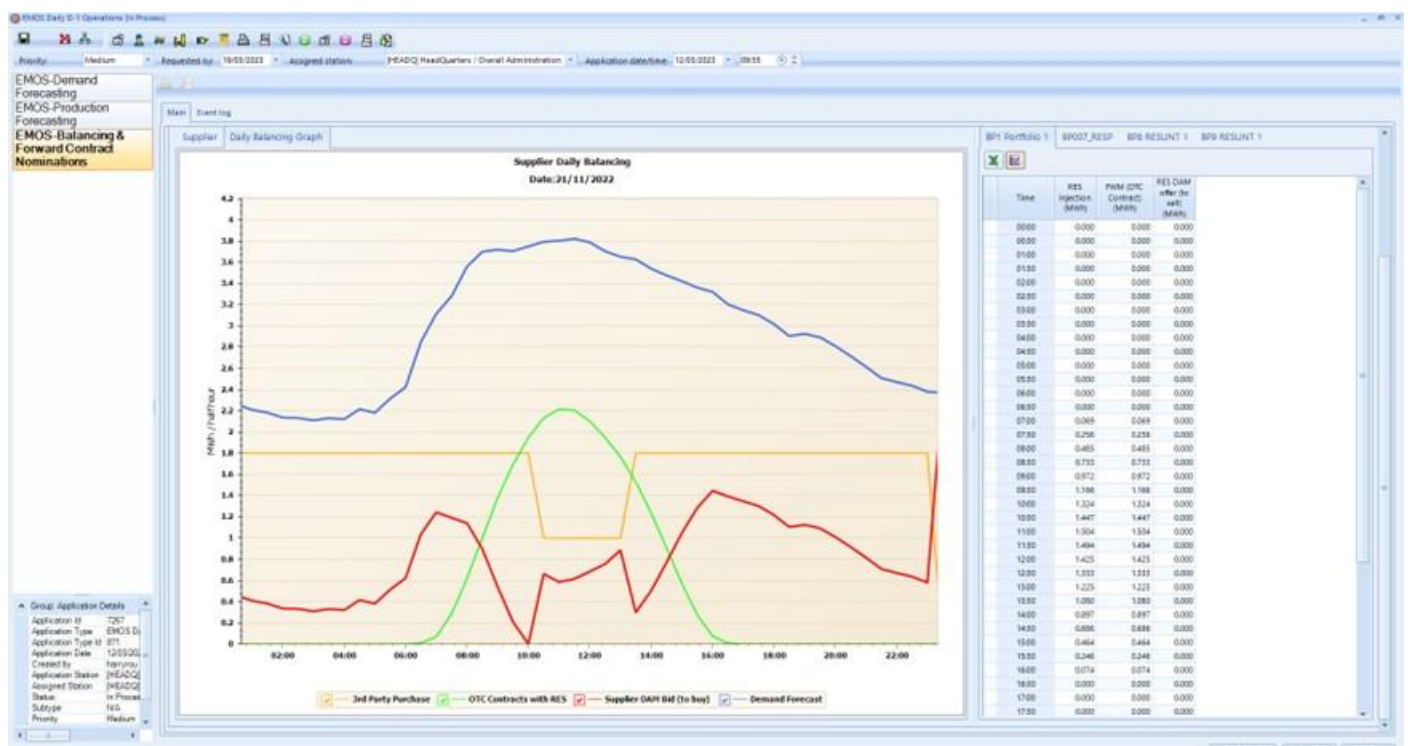
EDAMS Solar is a comprehensive MIS solution for PV Parks Owners & Electricity Market Operators

EDAMS Electricity Market Operations

EDAMS Electricity Market Operations covers all requirements related to the continuous operation of the Electricity Market, including the comparison of production with supply and performance of all required reconciliations, both energy (kWh) and monetary wise, relating to (a) market arrangements as well as (b) Supplier vs Producer contractual arrangements. Furthermore, the exchange of information with the Market Operator as dictated by the published Market Rules

EDAMS Energy Planning

The main purpose of EDAMS Energy Planning is the forecasting of production and consumption enabling: (a) Short term planning for Declaration of forecasted production and sales, (b) Medium term planning for quantifying sales requirements to meet expected production, and (c) Long-term planning for quantifying additional production requirements to satisfy a "healthy" growth in sales.

EDAMS Solar Solution

EDAMS Electricity Market Operations is part of the EDAMS Solar System an Integrated Management Information System that addresses all the business requirements of Photovoltaic Parks Owners & Operators about the production and selling of Electricity as well as the proper management of their assets.

EDAMS-Solar covers the complete spectrum of works of PV Park Owners and Operators from Park Development to Asset Management to Operations to Billing customers & Electricity Market Operation.
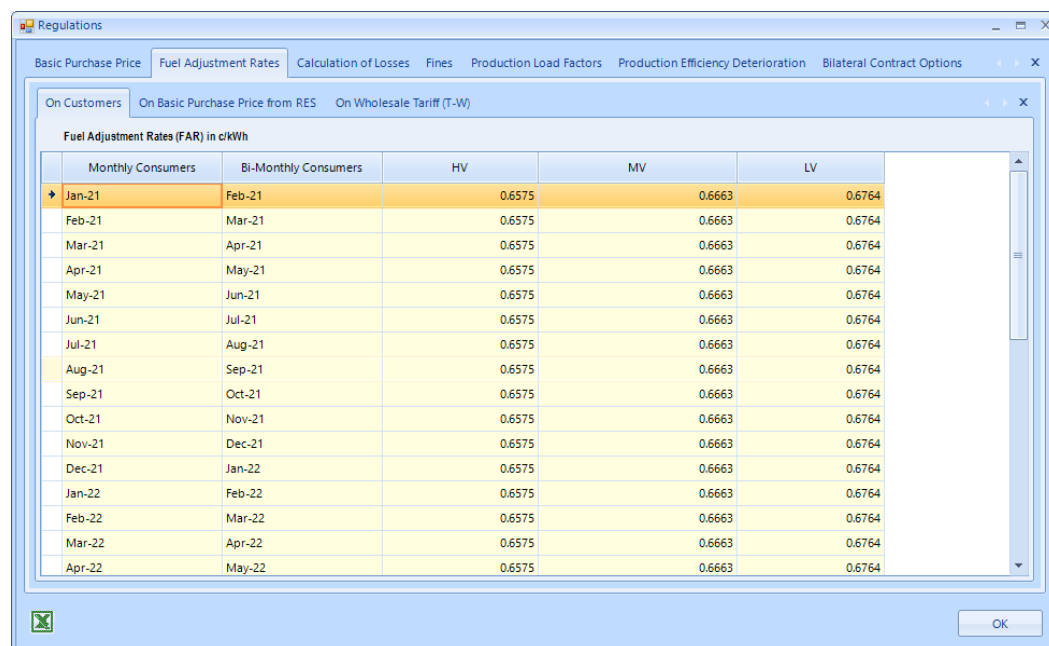
Regulations & Tariffs

Extensive Parametrization of Regulations & Tariffs

Regulations

Extensive parametrization of Regulation and settings is allowed covering: (a) Basic Purchase Prices (b) Fuel Adjustment Rates (c) Calculation of Losses (d) Fines (e) Production Load Factors (f) Efficiency Deterioration and (g) Bilateral Contracts.
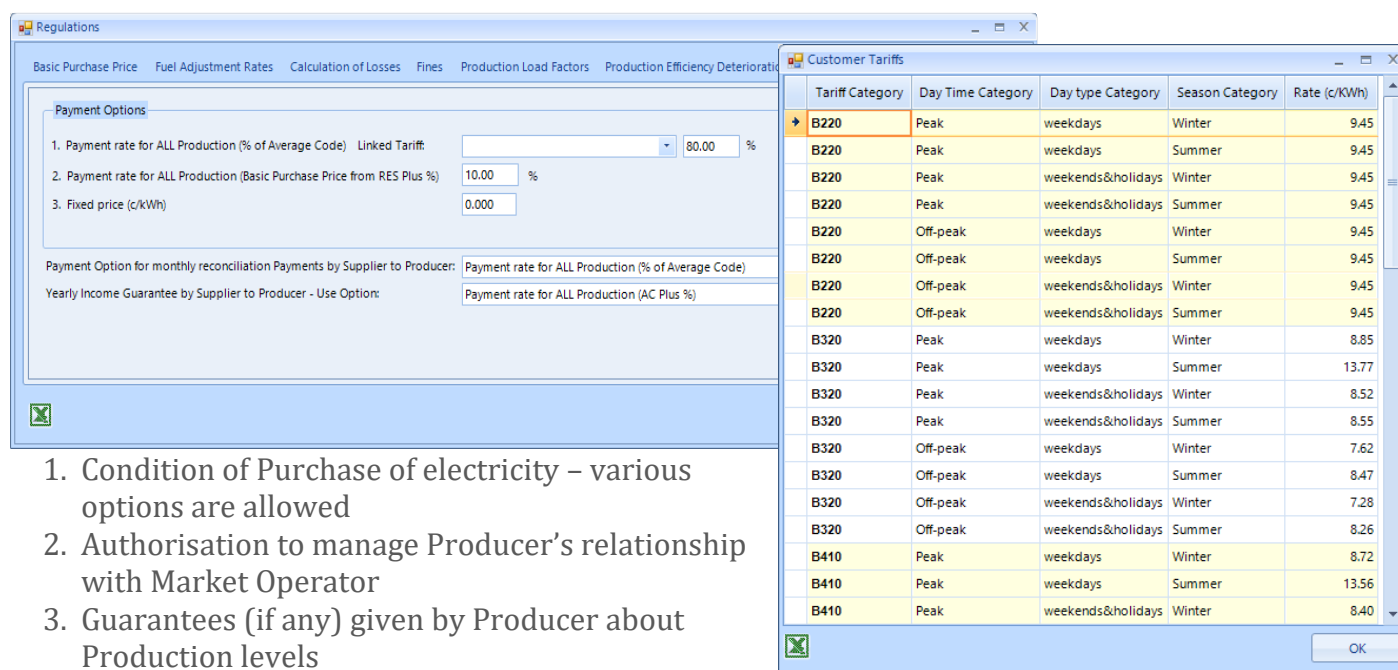

Bilateral Contracts

Bilateral Agreements are signed between the Supplier with the Producer for each Production unit specifying conditions of sale; The system allows flexibility for such conditions. A typical agreement will include:

1. Condition of Purchase of electricity – various options are allowed
2. Authorisation to manage Producer's relationship with Market Operator
3. Guarantees (if any) given by Producer about Production levels

Tariff Structures

Tariff Categories are user-definable, enabling changing of tariff structure as required. If Client uses the EDAMS Billing & CRM system, Customer tariffs categories & structures are read automatically from the EDAMS Billing & CRM system. Tariffs/ charges/ variables set by Market Operator such as: Basic Purchase Price of Solar Energy, (b) Fuel Adjustment Rates and (c) Loss Coefficients are also allowed for.
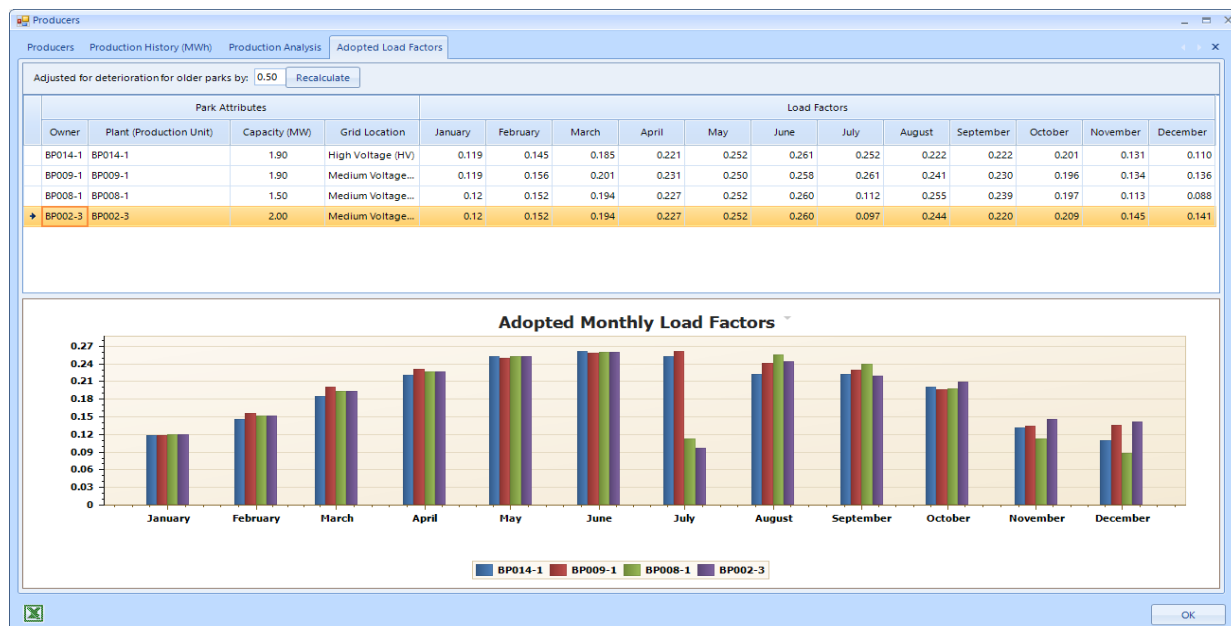
Planning – Production Analysis

Production Analysis, Forecasting & Planning

Producer Information

The system keeps Information on Production Units, such as: Owner, Plant name, Grid Location (HV/MV/LV), Capacity (MW), Connection date, earliest Connection date, Date Entering the Market and Bilateral Agreement Terms. The user can update the Planned Date Entering the Market.

Production Records Management

Historical Analysis of production records is carried out to calculate Monthly Load Factors per park.

Production Forecasting

Production/ Purchase Cost rates are forecasted and compared. Production is forecasted monthly as per Monthly Load factors adopted.

Planning - Consumption Analysis

Consumption Analysis, Forecasting & Planning

Customer Records Management

Information on Existing & Prospective Customers, including: Meter Serial Number, Customer Name, Tariff Category, Location (HV,MV,LV), Consumer Type, % Discount (on given tariffs),

Connection Status (CON/FUT) & Planned Connection date as well as Consumption historical data can be input or can be read from the EDAMS Billing % CRM system if used. The user can update the Customer Planned Connection date for Planning purposes

Consumption Forecasting

Consumption is forecasted using the Consumption rates (MWH/H) per customer connected/ to be connected and the Calendar number of hours corresponding to each Consumption rate. The forecast is finalized using Energy Balancing Optimisation.

Planning - Energy Balancing

Matching Consumption with Production

Energy Balancing Optimisation implies matching Consumption (including losses) with Production (including losses).

The system guides the user by always calculating an Overall deviation index [Sales/ Production (year ahead) ratio] for the next 12 months to be used as guideline in Customer Connection allocation.

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Energy Balancing Model — Balancing tab

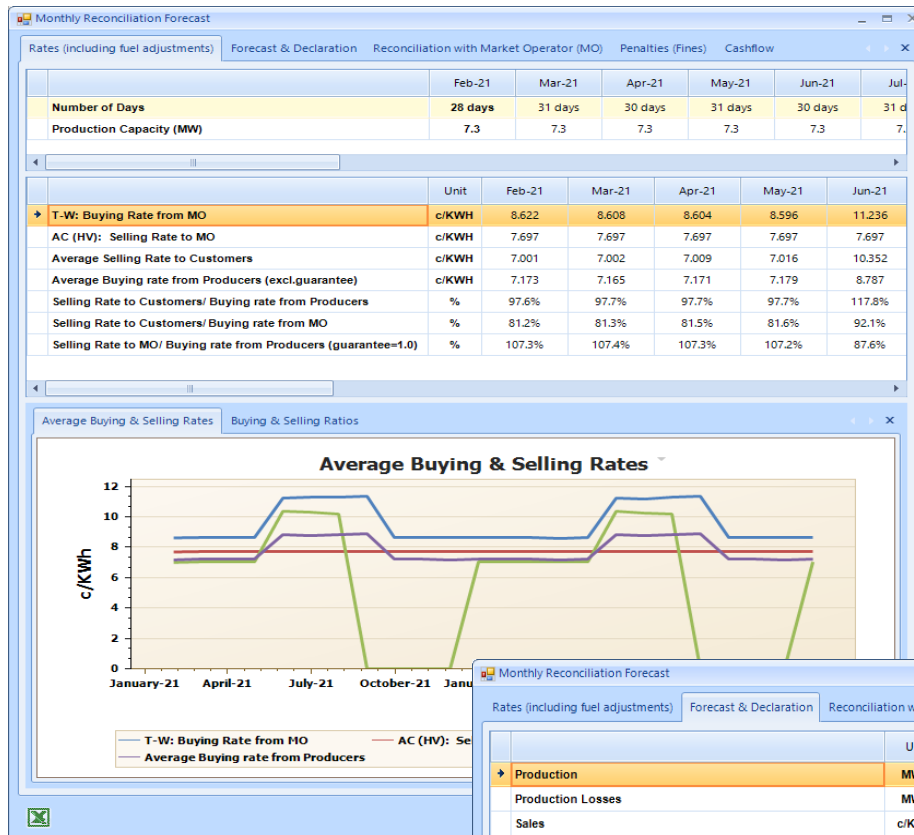|	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21
Season								
Weekdays	20 days	21 days	20 days	20 days	21 days	22 days	22 days	22 days
Weekends & Holidays	8 days	10 days	10 days	11 days	9 days	9 days	9 days	8 days

Tariff Band	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21
Peak-weekdays	140 hours	147 hours	140 hours	140 hours	294 hours	308 hours	308 hours	308 hours
Peak-weekends&holidays	56 hours	70 hours	70 hours	77 hours	126 hours	126 hours	126 hours	112 hours
Off-peak-weekdays	340 hours	357 hours	340 hours	340 hours	210 hours	220 hours	220 hours	220 hours
Off-peak-weekends&holidays	136 hours	170 hours	170 hours	187 hours	90 hours	90 hours	90 hours	80 hours

	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21
Total Sales	1,037.40	1,132.00	992.10	1,254.70	1,387.60	1,596.60	1,224.60
Existing Connectons	1,037.40	1,132.00	992.10	1,254.70	1,387.60	1,596.60	1,224.60
Proposed Connections	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sales - HV	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sales - MV	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sales - LV	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Loss Coefficient - HV	1.45%	1.45%	1.45%	1.45%	1.45%	1.45%	1.45%
Loss Coefficient - MV	2.759%	2.759%	2.759%	2.759%	2.759%	2.759%	2.759%
Loss Coefficient - LV	4.28%	4.28%	4.28%	4.28%	4.28%	4.28%	4.28%
Losses	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sales + Losses	1,037.40	1,132.00	992.10	1,254.70	1,387.60	1,596.60	1,224.60
BALANCING							
Production Increase Milestone							
Sales + Losses	1,037.40	1,132.00	992.10	1,254.70	1,387.60	1,596.60	1,224.60
Production + Losses	759.88	1,076.40	1,219.27	1,398.87	1,398.19	1,017.29	1,333.98
forward 12 month Sales	9,689.50	9,689.50	9,689.50	9,646.30	9,709.60	9,709.60	9,673.70
forward 12 month Production	12,591.17	12,591.17	12,591.17	12,591.17	12,591.17	12,591.17	12,591.17
Production-Sales (monthly)	-277.52	-55.60	227.17	144.17	10.59	-579.31	109.38
Production-Sales(year ahead)	2,901.67	2,901.67	2,901.67	2,944.87	2,881.57	2,881.57	2,917.47
Sales/ Production(monthly)	1.4%	1.1%	0.8%	0.9%	1.0%	1.6%	0.9%
Sales/ Production(year ahead)	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%

Energy Balancing Model (losses are included in sales & production)

Graph: Production - Sales (Monthly) bars; Production-Sales (Year ahead) line. Y-axis MWh/month.

Energy Balancing Model - Ratios (losses are included in sales & production)

Graph: Sales/Production (Monthly) bars; Sales/Production (Year ahead) line. Y-axis Ratios.

Planning – Performance Forecasting

Projecting Monthly Gross Profit (loss) for financial Planning purposes


Average Monthly selling and purchasing rates are compared to indicate extend of profit (or loss) in different months of trading

Detailed Monthly Reconciliation is carried out using Optimal declaration levels (to avoid fines) to determine sales excesses (requiring purchases) and production excesses (to be sold to Market Operator

The detailed Monthly Reconciliation will also indicate expected Sales, Production as well as optimal monthly declaration levels

Similar graphs/ tables are produced in monetary terms for Purchases, Sales and Gross Profits.
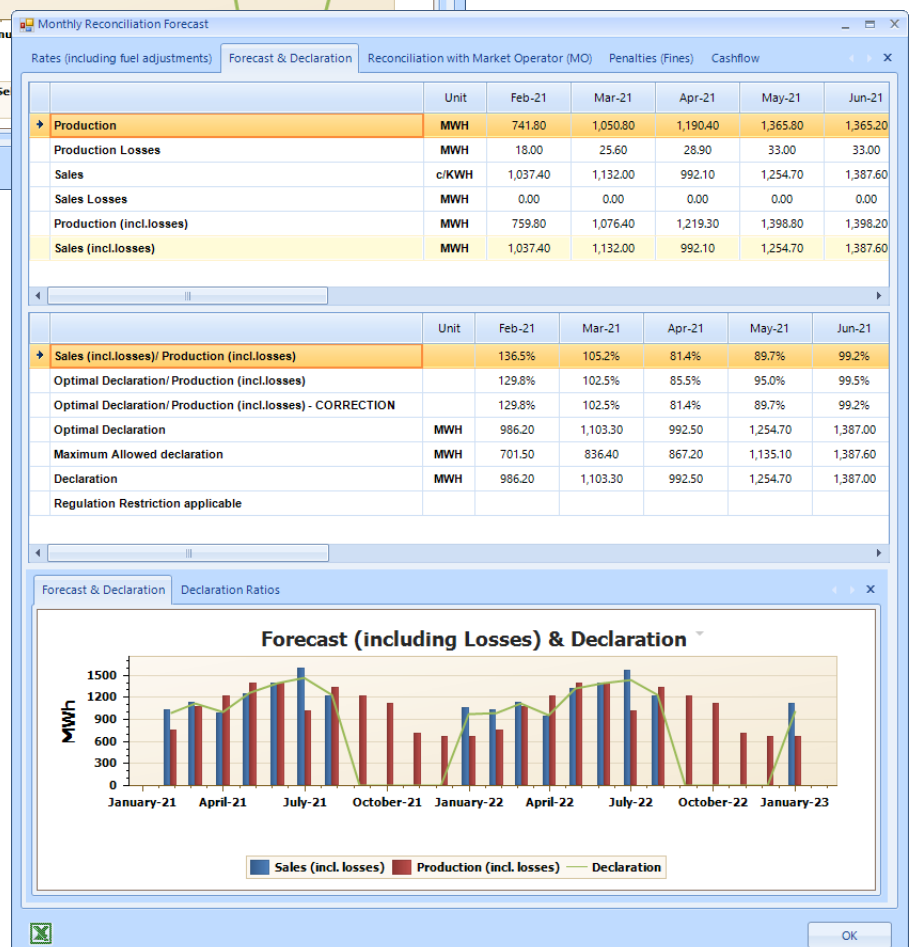
Operations - Declarations

Optimised Declaration Allocations

Declaration Level

Production (with losses) and Sales (with losses) are forecasted for the declaration period (month) in the same manner as with Planning forecasts.

The Supplier optimal overall declaration level is calculated in such a manner so as to limit the risk of getting fines. The declaration level lies between the forecasted production and sales amounts. History of forecasted amounts is kept for comparison with actual amounts.


Declaration Allocation

Each Production Unit is allocated a declaration level. This is done pro-rata their forecasted production for the month.

The user can overwrite any specific plant declaration and the rest will be adjusted accordingly.

Appropriate Declaration Forms both for projected production & Sales are produced for submission to the Market Operator.
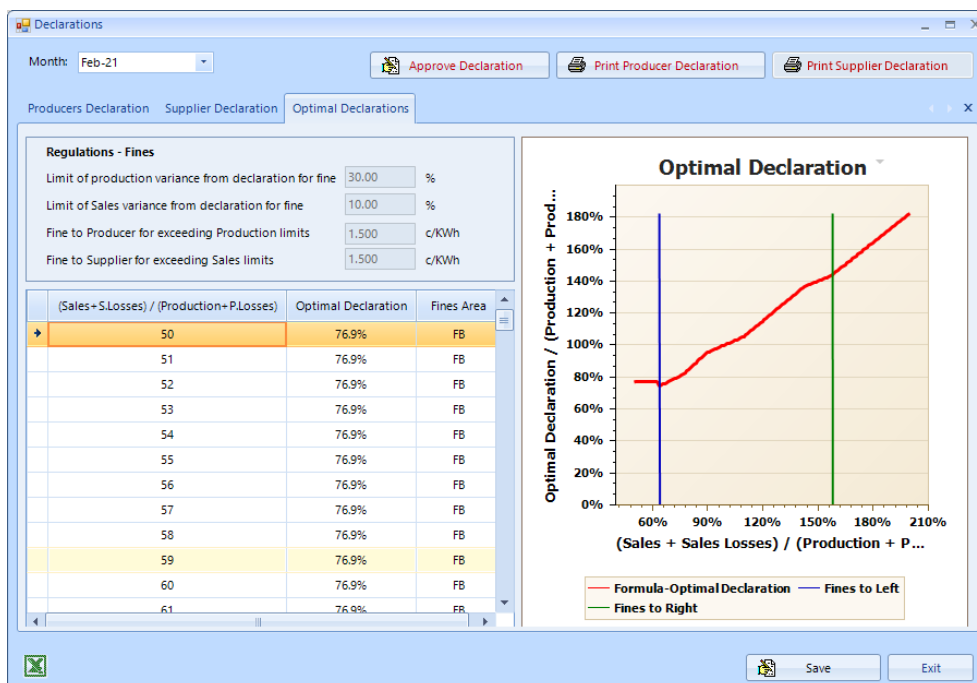
Operations - Reconciliations & Settlements

Automation of Reconciliation & Settlement Process

Reconciliation Matrix

Reconciliation Matrix per Production Unit and Overall used for producing settlement forms. Reconciliation Matrix must be approved by authorized person prior to proceeding with settlements.

Reconciliation with Market Operator

Inconsistencies with regard to Sales, Sales losses, Production & Production losses as well as settlement amounts between Market Operator and Producers as well as Market Operator and Supplier are reflected in a report to be sent to Market Operator for investigation.

Settlements

Produces Settlement forms for (a) Supplier vs Producers (b) Supplier vs Market Operator (c) Production Unit vs Market Operator and (d) a Settlement Summary.

About EDAMS Technology

EDAMS Technology is the development arm of the Hydro-Comp group of companies.

Hydro-Comp is an international Information technology and consulting company specialising in integrated management information systems (called EDAMS) and related services for Utilities, Municipalities and Government Environmental departments.

Hydro-Comp provides a unique combination of Billing & CRM, Asset Management and Operations software together with related services aimed at improving overall utility performance and efficiency.

The EDAMS Business Solutions for the Solar Energy Industry include:

- Electricity Billing and Customer Relations Management
- Solar Park Development (Licensing & Permits)
- Solar Park Asset Management (GIS/Data Management, Maintenance Management & Asset Management Planning)
- Solar Park Operations
- Electricity Market Operations (Monthly trading & Day Ahead Market)
- Solar Park Owner Portal
- PhotoVoltaic Installations (Licensing, Installation, Maintenance & CRM)
- Management Dashboards & Reports

Deployment and Services

The EDAMS Solar software is modular and scalable allowing Operators to utilize only the required modules. The EDAMS Solar software is offered as a SAAS (Software as a service), giving the option to the Customer to host the software on its premises or on Cloud. In both cases an annual fee applies, payable in advance. Cloud services are charged extra.

- The annual fee entitles the Customer to free remote support as well as free upgrades.
- An initial fee is charged to allow for data conversion, system configuration and training.
- Additional support/ consulting is charged extra based on manpower rates (if required).
- Both annual fees and initial fees vary per Customer size, with commercial software charges being a function of sales (GWH/year sales) and technical software charges being a function of Solar Park Capacity (MW). In this manner the software is affordable by Operators of all sizes.
- The number of users for the software is unlimited.

The EDAMS Solar Software modules/ packages applicable for Suppliers include:

- Billing & CRM for Energy Sector
- Customer Portal & Mobile app
- Energy Transitional Market Model (a monthly market trading model)
- Energy Market Operational system (Supplier) (a daily market trading model)
- Business Intelligence-Dashboards (Supplier)

The EDAMS Solar Software modules/ packages applicable for Producers include:

- Solar Park Asset & Maintenance Management
- Solar Park Operations
- Solar Park Control Centre
- Solar Park Control Centre (with Market interface)
- Energy Market Operational system (Producer) (a daily market trading model
- Business Intelligence-Dashboards (Producer)
- PV Park Development (Licensing) software

EDAMS GIS & EDAMS MDMS systems are supplied at no extra charge with all relevant software.

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