e·Opt Solutions

PRICEHUB

Innovative and Committed

About Us

We are a specialized software house based in Mannheim, Germany.

Energy Trading is at the core of our business, and we take pride in having delivered immense value to our customers through our Products and Services.

We aspire to provide best-in-class solutions to our Customers and work with all stakeholders involved, in developing their systems by bringing in efficient and robust tooling that is also economical in use.

We let our work speak for our skills and commitment.

Your Advantages

Out of the Box

Rapid Integration

Deep Business Insight

On-Premise or Cloud

Fixed Price Delivery

Our Flagship : The PriceHub Suite

We come from the Energy Industry, and our products and services reflect our deep understanding of the business and our grasp of technology. We have limited ourselves to the Energy Trading vertical, as we believe that we can best serve our customers by focussing on areas we know well, and where we can make a visible difference.

Traditional ETRM Systems are focused primarily on Deal Capture and Transaction Management, leaving much of the heavy lifting to be managed in Spreadsheets and other end-user computing tools. This not only increases operational risk within the enterprise, but often leads to sub-optimal processes and models. With **PRICEHUB** we attempt to tie-in some of these critical challenges.

PRICEHUB is designed as an integrated set of modules that individually complement conventional ETRM systems. Each module is designed to address a specific operational challenge.

We at e·Opt understand these challenges and have analysed them in great depth. This has led us to build solutions that have evolved over the years into robust tools that add real tangible value to our users. Our clients expect us to be in step with their own aspirations.

e·Pool	e·Curve	e·Price
e·Comply	e·Link	e·Flow
e·VaR	e·Connect	e·Limits
e·Val	e·Report	
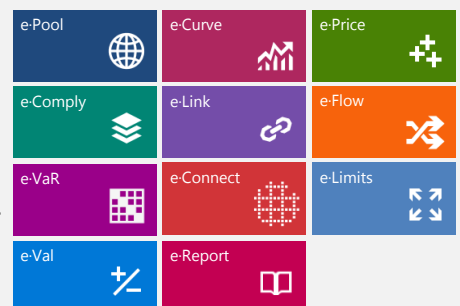
e·Pool	Market Price Data Management System
e·Curve	Forward Curves – Power, Gas, Fuels, Emissions, IR, FX
e·Price	Portfolio Risk based Energy Contract Pricing. Offer Management.
e·Comply	Regulatory Reporting and Compliance – EMIR / REMIT / MiFID II …
e·Flow	Power Scheduling for self and Third Party (as a Service)
e·Val	Mark-to-Market / Model, Valuation, Scenario Analysis
e·Report	Cross Function, Enterprise wide Reporting
e·VaR	Value at Risk, Stress Testing, Incremental VaR
e·Spot	Multi-model Spot Price Forecasting
e·Link	Straight-thru interfacing : Exchanges/Broker Platforms → ETRM
e·Connect	Intraday Optimization & Trading. Renewable /Conventional Asset Integration.

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PriceHub : The Right Support for your ETRM

PRICEHUB is a modular application suite, with each module relatively independent of the other. While they can be licensed individually, they interface seamlessly in a multi-module environment. All modules share a common framework for Reporting, Audit, Security, Communication, Access Control, etc.

As part of the Application landscape in any Trading organization, **PRICEHUB** tightly integrates with other up and downstream systems. Over the years we have built bespoke interfaces to several systems and have ready adapters for many well-known ETRM systems.

At the heart of any PriceHub module lie a few fundamental principles

- ▸ **Business Driven Functionality**. Market determines the Features Roadmap.
- ▸ Think like a User - **Optimize User Workflow**. Minimal clicks.
- ▸ Emphasis only on **Relevant and Useful** Functionality.
  No unnecessary Bells and Whistles or Feature Bloat.
- ▸ Completely **Visible** and Traceable Processes
- ▸ Logic Driven **Automation**.
- ▸ **Flexible** Configuration and Architecture.

PRICEHUB can be tightly integrated into your application landscape via APIs, WebServices, Excel Add-Ins, or even at the database level via DB Views. This ensures that all Users and Applications always see "correct" data and common Copy/Paste disasters are avoided. Third Party Vendors can efficiently integrate their solutions around data as well as logic available within **PRICEHUB**.

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e·Opt Solutions

PRICEHUB

e·Curve
Forward Curves in Control

The PriceHub Suite

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- ‣ Price Data Management
- ‣ Compliance & Regulatory Reporting
- ‣ Energy Contract Pricing & Offer Management
- ‣ Intraday Optimization & Trading
- ‣ Scheduling & Nomination
- ‣ Interfacing to Exchanges and Brokers

Your Advantages

Relevant Commodities

Pan European Markets

Flexible Modeling

Just-in-Time Curves

e·Curve : Goodbye to Curve Crisis

Forward Curves are perceived as the Crown Jewels of a Trading Organization, and rightly so. However, seldom are these tools robust and flexible enough to evolve continuously with the market and consistently reflect the market changes. While many have great intellectual logic built into them, not all are able to deliver consistently due to either weak IT framework , or the need to make ad-hoc changes from time to time. This eventually leads to one or all of the following:

- ‣ *Delayed and incorrect price curves. Risk of Incorrect Pricing and Valuation.*
- ‣ *High incidence of after-the-event rework.*
- ‣ *Periodic adjustment to models to account for end of year, quarter, etc.*
- ‣ *Personnel Risk due to limited Knowledge dissemination.*

We have recognized this and after years of research in the behaviour of the Energy Markets, introduced **e·Curve**, as a fully configurable Forward Curve engine, set up for the European Energy markets. It has been designed to meet and exceed the most stringent requirements in terms of performance, accuracy and market coverage.

One of the most critical aspects of **e·Curve** is that it is not a black-box application and users have complete freedom to calibrate the models, as per their own views of the market. Each curve can be calibrated individually and formulae can be defined to generate dependent curves.

Although the models in **e·Curve** can be used in any market, they are configured to work best in the European context.

- ‣ **Power** : DE (1h + ¼ h), UK (½ h), NL, FR, BE, AT, CH
- ‣ **Gas** : TTF, NBP, NCG, GPL, ZEE, PEG, etc.
- ‣ **Fuels** : API, BAFA, Brent, GO, HSL, HEL, FO, LSFO, etc.
- ‣ **Environment** : EUA, ERU, CER, EAA, EUAA, etc.
- ‣ **FX/IR** : EUR, USD, GBP, CNY, AUD, etc.
- ‣ **Synthetic** : Curves based on Formulae with time shifts etc.

Curves at native market granularity are generated, but can also be aggregated to higher or lower granularity. In conjunction with a e·PoolLive, a sub-module of e·Pool, **e·Curve** also enables automated generation of real-time Forward Curves. Market prices are received via Trayport feeds, or any other mechanism.

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PriceHub e·Curve : Forward Curves

e·Curve is a highly optimized Forward Curve engine, that allows just-in-time generation of Forward Curves. Using interfaces to downstream systems, curves can be directly published to downstream systems.

At the heart of the **e·Curve** modeling engine is a multi-parameter simulation algorithm, that combines historic data, user configuration and market prices, to give out Forward Curves that reflect the market as best as it is possible to do. Key features of **e·Curve** include:

- **Fast** Arbitrage-free Curve Generation. Any combination of Standard, Rolling or Quasi Products can be used to generate the Curves. Prices for illiquid tenors can be forecast based on well defined rules. Typically, building a 5 year Power curve takes about 45 s.
- Multiple Modes of Execution – **Intraday**, **EOD** or **Ad-hoc**. Back-dated Curves can also be generated to validate previously generated curves.
- Flexible **Curve Shaping**. Extent and weight of Historic Prices can be varied to get fine-grained control over the Curve shape. Impact of increasing Photovoltaics in the generation mix is also calculated and considered.
- Each curve is assigned a **Unique ID**, that links it to its source prices. All curves are archived in the database, and they can be retrieved at any time.
- **Price Envelopes** based on Volatility & Confidence Interval.

e·Curve can be fully integrated with our **e·Pool** module, so that a seamless price data process can be built - from external sources right up to downstream systems.

Forward Curves can also be consumed in Excel via PriceHub Excel Add-in, or any in other Third Party application using PriceHub WebServices or PriceHub COM and .NET APIs.

Our References

"We have found e·Opt deliver outstanding value to us. They are willing to go beyond their obligations and our experience with PriceHub has been very positive."

Christian Mehl, Head of Trading
RheinEnergie Trading GmbH, Germany

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PRICEHUB

e·Pool
Embedded Price Data

The PriceHub Suite

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- ‣ Scheduling & Nomination
- ‣ Interfacing to Exchanges and Brokers

Your Advantages

Relevant Commodities

Pan European Markets

Flexible Processing

Just-in-Time Processes

e·Pool : Enterprise wide Price Data Repository

Unfortunately for the Energy Vertical, an Industry wide common Standard Data interchange protocol has yet to emerge. Whether it is prices, volumes or contracts, every vendor publishes data in its own proprietary format. This has led to:

- ‣ *A spaghetti bowl of data formats, protocols and delivery mechanisms.*
- ‣ *Individual nomenclatures and styles that are often incompatible with each other.*
- ‣ *Different Licensing Policies and Data usage freedom.*

Consequently, without a robust and reliable Price Data Management System, an Energy Trading entity is left with a weak structure based on which critical Pricing and Risk decisions are made. What is needed is an enterprise-wide single point of truth regarding Prices. Data that is standardized, consistent, correct and most importantly, available to and used by all dependent systems.

With **e·Pool** we have such a system for the European Energy Markets. It is a comprehensive Price Data Management application that automates the process of acquiring, parsing and cleaning, normalizing and standardizing, storage, and ultimately publishing of all kinds of price related data, for a variety of energy related commodities, published by European and other Global data vendors.

e·Pool comes pre-configured with a library of more than 150 different market sources, delivering data in all kinds of formats and for every kind of commodity and instrument. New markets and instruments are continuously being added. Key highlights of **e·Pool** include:

- ‣ **Automated Processes**
- ‣ **Price Breach Notifications**
- ‣ **Standardized Price Data Repository**
- ‣ **Robust Processes. Flexible Scheduling**
- ‣ **Seamless Integration with Downstream Systems**
- ‣ **Extensive Reporting capability. Multiple Formats & Granularity.**
- ‣ **Repository for in-house Custom Price Data.**
- ‣ **Configurable Output Parameters to match receiving systems**

External Data parsing logic largely is built using configuration parameters, that allow quick reaction to external data format changes. Extendible Product definitions and naming rules.

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## PriceHub e·Pool : Natively Embed Price Data

e·Pool provides a comprehensive platform for all internal Users and Systems to work off a highly optimized Price Data Repository. In essence, it is configured to download End of Day Prices from different data vendors and based on their individual formats, process the data and validate the plausibility. This cleaned and standardized data is then pushed into downstream systems, in their respective bespoke formats, either directly or with Currency or Unit conversion.

Once prices are in, derived data like Forward Curves, Correlations, Volatility etc., are generated as part of the process. **e·Pool** can integrate fully with **e·Curve** so that a seamless price data process can be built from external sources right up to downstream systems.

e·Pool provides several options for pulling price data into Third Party applications. This is possible via PriceHub Excel Add-in, COM and .NET APIs, PriceHub WebServices, or even at the database level via DB Views. Data is fully exposed along with helper functionality for transforming data.

Key features of **e·Pool** include:

▸ **Export** Data directly into Excel/XML/CSV in multiple formats
▸ Unit and Currency **Converted** Curves. Live IR/FX quotes used.
▸ **Synthetic Prices** based on Formulae and Time shifts
▸ **Aggregate** prices to higher or lower Granularity.
▸ Complete **Overview** of the each step of the Price Process.
▸ **Publish** data to Downstream systems in bespoke formats.
▸ Configurable External and Internal ID **Mapping**.
▸ Run Processes as of **Historic** date. **Compare Prices** across commodities and tenors.
▸ **Real-time** Prices. Intraday Hi/Lo Limits, Alarms, Charting.
▸ Fine grained control over Price Limits and **Breach Notification**.
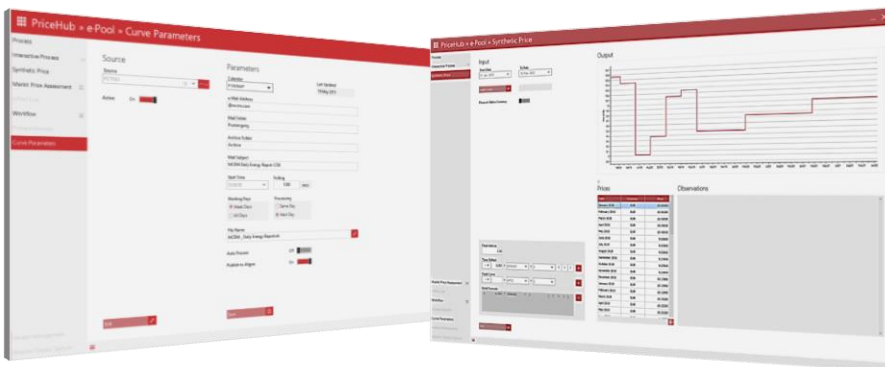
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"e·Opt distinguishes itself by offering effective and simple solutions to complex problems. They are a company that we are keen to continue working with."

Jochen Zimmermann, Head of Business IT
Enovos Luxembourg S.A., Luxembourg

enovos

e·Opt Solutions

PRICEHUB

e·Comply
Regulatory Reporting

The PriceHub Suite

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▸ Price Data Management
▸ Energy Contract Pricing & Offer Management.
▸ Intraday Optimization & Trading
▸ Scheduling & Nomination
▸ Interfacing to Exchanges and Brokers

Your Advantages

Extendible

Flexible Mapping

Automated Processing

Data Enrichment

e·Comply : Unified Compliance & Reporting

Compliance and Regulatory Reporting has emerged as a significant pain-point for Trading companies, not least due to the initial and in many cases, persistent lack of clarity. The reason being:

▸ *New Interfaces to ETRM and other Systems with Extensive Mapping functionality.*
▸ *Evolving and Incomplete Specifications, open to Interpretation.*
▸ *Constant coordination and collaboration amongst Counterparties.*
▸ *An additional Non-Remunerative Function*

As the European Regulatory environment matures from a very basic level, frequent changes and increase in requirements are expected. In view we have designed **e·Comply** with a flexible architecture that allows adding new features without large scale modifications. An extendible data model ensures that as and when new demands are made, the existing data and functionality is not compromised.

Mainstream ETRM Systems are not designed to provide all the data that the Regulators require. Hence **e·Comply** sits alongside these systems and enriches the trade data with static and derived data using logic available within **e·Comply**, before publishing it to the TR/RRM. Further, it communicates with the Repositories for a seamless and transparent reconciliation process.

Currently **e·Comply** delivers all the functionality required for EMIR and REMIT. We are committed to including all the new Regulatory obligations in **e·Comply**, as they kick in.

e·Comply features include:

▸ **Third and Fourth Party Reporting. Easy upload of external data via Excel/CSV files.**
▸ **Support for Reconciliation Failure Investigation & Correction**
▸ **Complete Process trail. All historic submission maintained and easily retrievable.**
▸ **Flexible Rule based UTI generation.**
▸ **UTI Distribution to or Consumption from Counterparties.**
▸ **Direct Interfacing to several Repositories and RRMs**
▸ **Flexible registration of Framework Agreements and corresponding Executions.**
▸ **Flexible Integration with Source Systems.**
▸ **Highly Configurable Data Enrichment and Mapping**
▸ **Automated Workflow using SFTP for Communicating with Repositories.**
▸ **Data submission via XML or CSV files. No manual transformation required.**

e·Opt Solutions

PriceHub e·Comply : Straight Through Compliance

e·Comply has been built from the perspective of an environment where there are several types of commodities and instruments traded with one or more ETRM/Ancillary systems involved. Bespoke Interfaces to these systems allow either automated or manually triggered upload of trade data into **e·Comply** . After this data is enriched in **e·Comply** it is published to the Repositories. In the next step responses from the Repositories are parsed and presented for reporting and further action, if needed.

e·Comply is rich with features that simplify the process of meeting Internal and External Compliance requirements.

- ‣ Extensive **Validation** of Source data that highlights any non-conformity.
- ‣ All Regulatory and Compliance related information within one system.
- ‣ Custom Rule or ACER/ISDA guidelines based **UTI** generation.
- ‣ User friendly interface for capturing **Framework Agreements** and **Executions**
- ‣ Flexible **Mapping**. Unit and Currency conversion
- ‣ Automatic identification and processing of **Modified** Trades
- ‣ **Portfolio Reconciliation** – Individual rules for Data Formats, Tolerance and File naming. Intuitive Trade Matching Algorithm. Detailed Mismatch Reporting.
- ‣ **Multitenant** with separate Roles for Monitoring and Administration.
- ‣ **Reporting as a Service** – Manage Reporting for Third & Fourth Party Customers.
- ‣ Multiple channels for **Data Extraction** – CSV, WebService, DB Link.
- ‣ Real-time View on Reconciliation Status and **Reporting Trail**.
- ‣ Simple **Rollback** or Modification of Reported Trades.
- ‣ **Orders to Trade** – Online retrieval from Trayport feeds or Manual input by Trader.
- ‣ **Audio** Record of all Orders Details - Motivation, Customer, Strategy, etc.
- ‣ Easy **Reporting** of Historic Transactions with complete Audit trail.
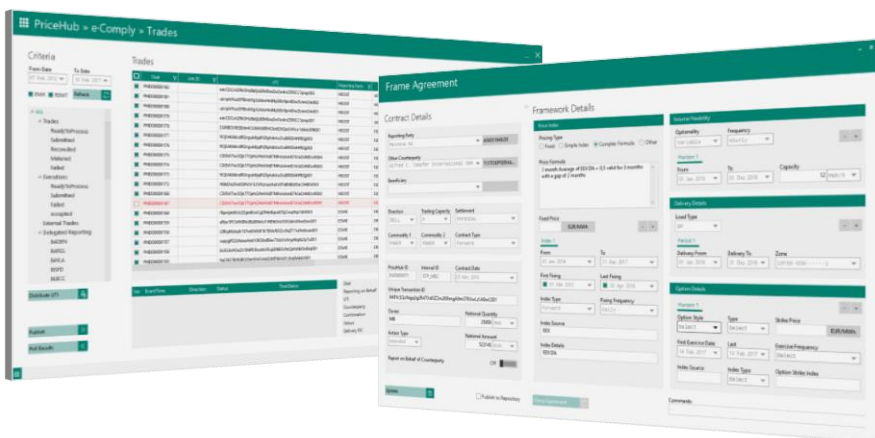
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e·Opt Solutions

PRICEHUB

e·Price
Energy Pricing & Offer Management

The PriceHub Suite

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- Price Data Management
- Compliance & Regulatory Reporting
- Intraday Optimization & Trading
- Scheduling & Nomination
- Interfacing to Exchanges and Brokers
- Risk & Valuation

Your Advantages

Risk Based Pricing

Portfolio Effect

Automated Processing

Optimal Hedge Advice

e·Price : Transparent Pricing and Offer Management

Given the nature of the market, non standard Energy contracts are the norm rather than an exception. Any organization with Generation and/or Sales assets needs to price such contracts everyday, either for internal customers or against requests from the market. However users often face the following challenges:

- *The Organized Market trades mainly in Standard Products only.*
- *Back-to-Back Hedging is not always possible. Instead hedged using Standard Products.*
- *Contracts are Individually Priced. Portfolio Effect is missing from the equation.*
- *Overall impact on Portfolio Risk remains un-quantified.*
- *Limited connection to the Customers. Offline communication via e-mails or telephone.*
- *No searchable database of historic Offers and Orders.*
- *Several manual steps involved in moving the Offer information to the ETRM system, in case of Order.*

Our experience over the years has been that a robust model based Pricing Engine is still not a common sight. Neither a systematic pricing model, nor a mechanism for managing the whole process exists. Most energy companies still use in-house Excel based tools for pricing and Offer management.

Bearing that in mind, we have developed **e·Price** which addresses these two basic issues at the fundamental level. Essentially the key features of **e·Price** that set it apart are:

- **An Incremental Risk based Pricing Model**
- **Offer Fixed, Index, Tranche, Limit Prices**
- **Order in Vertical and Horizontal Tranches**
- **Re-price and Update Offer on Market Price Changes.**
- **Flexible Load Forecasting functionality**
- **An Integrated Pricing Workflow aligned to mimic operational processes**
- **A transparent Offer Management platform.**
- **Customer Web Interface for requesting Offers and Managing Responses**
- **Detailed Hedge Advice based on Market Liquidity and lot size.**
- **Scheduled Automated Pricing**
- **Define and re-price Standard Profiles at regular intervals.**
- **Notifications by e-Mail at every important step**
- **Offers and Orders are managed in one easily searchable database.**

e·Opt Solutions

PriceHub e·Price : Unlimited Possibilities to Offer

e·Price is a complete Pricing platform that facilitates a seamless workflow between the Customer and you. It links your Portfolio data, Forward Curves and the Customer data to build a comprehensive pricing process around an easily searchable database. **e·Price** also has an integrated platform for managing Offers and Customer communication via a web portal. Here clients can upload their requests directly and also receive and confirm offers.

e·Price uses complex algorithms to evaluate the Risk Premia. The key risk element, **Price Structure Risk** is estimated by calculating the incremental VaR of your overall Portfolio by considering how well the incoming profile fits in, to form liquid standard products that can be hedged in the market. The advantage of the **Portfolio Effect** is reflected in the pricing.

- Use real time Bid or Ask **Forward Curves**, for Energy Cost calculations.
- Optimal **Volumetric** or **Financial Hedging** based on Market Liquidity and lot size.
- **Incremental VaR** used for evaluating the true impact on Overall Risk.
- **Transparent** and well defined Pricing Rules. Repeatable results.
- Portfolio Position updated at regular intervals, or ad-hoc by user.
- Configurable globally defined **Risk Parameters**.
- All data is stored centrally and available for review and **Audit**.
- If required, client's Pricing model can be integrated.
- **Web interface** – allows clients to price contracts directly.
- Integrated into your corporate website with similar Look & Feel.
- Data upload possible in multiple **formats**. No transformation required.
- Portfolio Managers observe and intervene, if required. **Limits** based hand-brake.
- Medium for offering **Value Added Services** – Advisory and Operational Indicators.

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"We are using PriceHub since more than 8 years now, and are extremely pleased with the choices we made."

Jens-Uwe Schlötel, Head of IT
Syneco Trading GmbH, Germany

syneco

e·Opt Solutions

PRICEHUB

e·Connect
Intraday Position Optimization & Trading

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Your Advantages

X Online with EPEXSPOT

⊞ Integrated Interface

⚙ Automated Processing

🖥 All Activity on one Screen

e·Connect : Transparent Pricing and Offer Management

The Intraday Market offers great opportunities to balance positions closer to real time. It has opened an opportunity for Utilities to integrate intermittent supply from Renewable sources with trading strategies, to optimize Portfolios at the lowest granularity.

However, this flexibility brings with it several challenges to the energy traders, who have to react quickly and with precision. The main challenges faced include:

▸ *Multiple sources of position update – Customers, Generation, Sales, Wind/Solar. Impossible to keep track and manage.*
▸ *Limited reaction time. Orders come in continuously via e-Mails, ftp, Voice, etc.*
▸ *Internal Matching and Optimization of Orders with multiple price/volume levels is not a trivial exercise.*
▸ *Equitable splitting of Executed trades and matching to corresponding Orders.*
▸ *Interconnected systems require feedback regarding executions and prices.*
▸ *Several manual steps involved in moving the Executions to the ETRM system.*

e·Connect has been built to intelligently automate this process and to provide a fast and consistent workflow for ¼ Hourly and 1 Hourly Intraday Trading. It connects to the EPEX Intraday Market using their M7 API and provides total control to the Trader, to submit, modify or delete Orders, get complete market information regarding prices and depth, calculate best Bid/Ask prices, etc. The trader is free to execute on either platform and **e·Connect** seamlessly reconciles every transaction. Key features of **e·Connect** include:

▸ **Interfaces to ETRM system for Open Positions**
▸ **Automatically validates and uploads Orders received via e-Mail, ftp. Quick and easy registration of Voice Orders. Validation at each step.**
▸ **Interfaces to several Third Party Generation Optimization and Forecasting systems like ProCom, emsys, etc.**
▸ **Internal Matching of Orders. Only Delta positions submitted to EPEX**
▸ **Dashboard facilitates decision making by showing all information in an intuitive way.**
▸ **Manual Override always possible.**
▸ **Complete Audit trail and look-back facility.**
▸ **Withdraw, Modify or Delete Open or Partly Executed Orders from one Dashboard.**
▸ **Drill Down feature to identify status of individual ¼ h or 1h segment.**
▸ **Positions and Orders differentiated @ Balancing Zone**
▸ **Real-time view on all Market and internal activities.**
▸ **Can be integrated with e·Flow to generate and forward real time Schedules.**

e·Opt Solutions

PriceHub e·Connect : Intraday Position Optimization & Trading

Our References

e·Connect receives Orders from multiple sources, including the internal ETRM systems, and provides the Trader with an intuitive Overview of the positions. Orders received via e-Mail and ftp are processed automatically and are assigned a merit-order based on price, volume and timestamp. The trader Optimizes all Orders internally before pushing the residual volumes to EPEX. Matching takes place within price limits assigned by the Customers and market prices.

e·Connect has a secure, fault tolerant, redundant architecture that is resilient against connectivity issues. In case of disconnections, critical data is retrieved afresh, maintaining data integrity.

- Direct upload of Trades into the **ETRM** system, either aggregated at EOD as one or two trades, or in real-time as individual trades.
- **Automates** the collation of orders from different sources including internal open positions, generation forecasts, customer requirements and optimises the execution of intraday trades. Complete market Order stack visible in one click.
- Flexibility in the order execution process. The trader can decide when to submit orders manually, or let **e·Connect** carry out **automated execution** before expiry. Visual and audio notification to support decisions.
- Can handle limited or unlimited orders, price differentiated orders
- **Dashboard** facilitates the decision making process, with clear colour coded information.
- Clear **Market visibility** with real time market prices, best Bid/Ask per segment, etc.
- Extensive validations at Order registration and Submission stage.
- **Optimization** and order aggregation logic can be customized based on an organization's needs
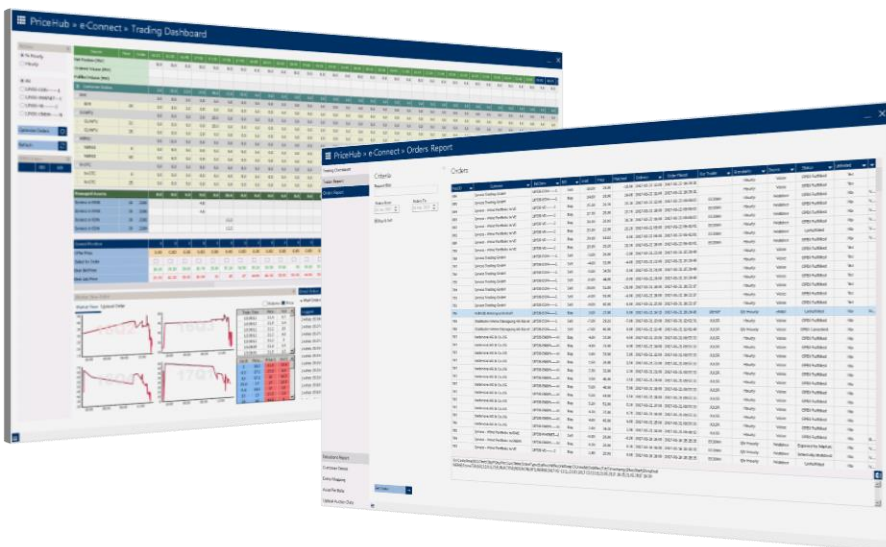
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"**e·Opt has a great understanding for our needs and has consistently delivered very professional service to us and our clients. We strongly recommend e·Opt and its people.**"

Frank Quaas,
Head of Trading and Portfolio Management
Energie Südbayern GmbH, Germany