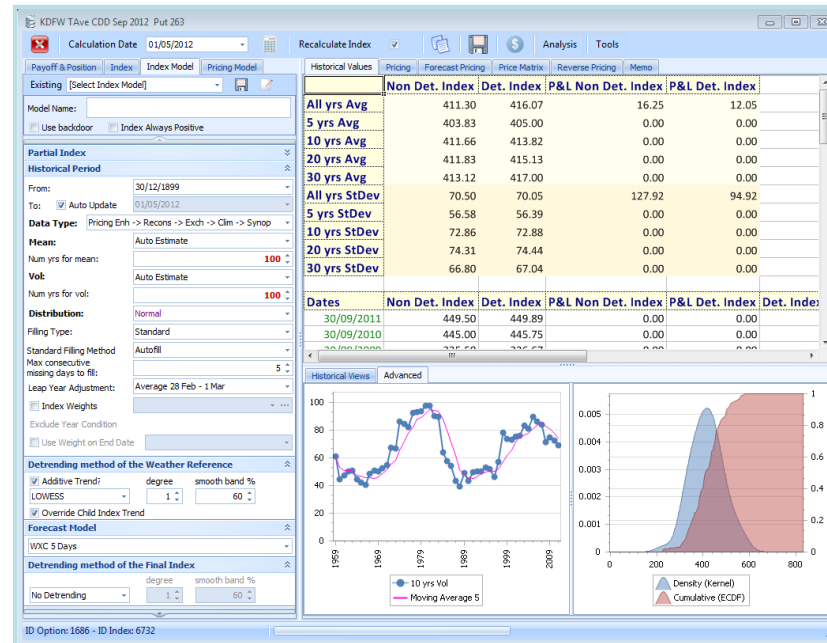# Speedwell Weather

SWS is an enterprise software application for pricing weather risk contracts, managing a portfolio of weather risk contracts and managing historical weather data and feeds.

Speedwell Weather
Speedwell Weather System

SWS

An Introduction

About SWS

SWS is an enterprise system used by traders of parametric weather-risk contracts since 2002. It provides front, middle and back office support and includes:

- ◦ SWS Oasis Desktop for pricing/portfolio management/back office
- ◦ SWS Data Manager for management of weather data and forecasts
- ◦ SWS Contracts and Invoices module (optional)
- ◦ SQL Server Database for weather data / forecasts and commodity data

SWS enables you to:

- Manage historical weather data, feeds and forecasts (including gridded data)
- Price weather risk contracts and provide analysis including gas "quantos"
- Manage portfolio risk and create risk reports
- Manage contracts, invoices, settlement...
- Help meet regulatory requirements
- *New in SWS Version 11 and 12*:
    - automation of weatherXchange Request for Proposal processing
    - seamless integration with new weatherXchange tradeable sites database
    - Optional integration with configurable Automated Pricing Service to automatically respond to weatherXchange RFPs

A multi-user, enterprise-wide solution

Traders, Risk Officers, Legal Officers, Back Office, …
Weather Derivative Pricing
Deal Booking, Confirmations and legal doc management
Portfolio P&L and Risk Measures
Data Management – ad hoc import and quality control
Correlation analysis
Weather dependency analysis
Settlement, Invoicing, EMIR, Dodd Frank Reporting
…

Online Sales Solution
We have developed end user clients and
sales web solutions fully integrated with
SWS for some clients

SWS Application Server
Continuous Data and Forecast Imports
from multiple data providers
Automatic Pricing Service for
weatherXchange RFP
Automates End of Day Tasks:
- Settlement Calculations
- Daily and Expiry VaR
- P&L reports
- Credit Risk Reports

Database Server
(MS SQL Server)

System Administrator
Set up Users
Manage Permissions
Importation of additional data e.g. gas / power data

weatherXchange
Requests For Pricing
Online Data Streaming

Integration

Data Support

Data Support

- The SWS data base supports any daily, hourly or sub hourly time series. The data does not even have to be weather related ..eg it could be commodity price data
- Any new 'weather element' can be added at a press of a button
- SWS supports multiple data types and hierarchies
- SWS supports deterministic and ensemble forecasts
- *New in SWS Version 11* : API access to tradeable weatherXchange data sets
- *New in SWS Version 11* : Direct Access to Speedwell Forecast Archive: archived forecasts can be viewed and imported into SWS.
- *New in SWS Version 11* : Gridded Data Services integration: direct access to several gridded data catalogues supported by Speedwell

Data and Forecasts

Plot Daily and Hourly Data
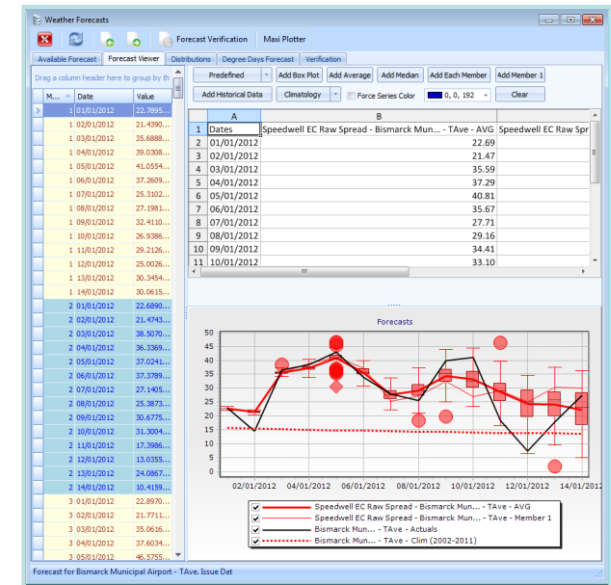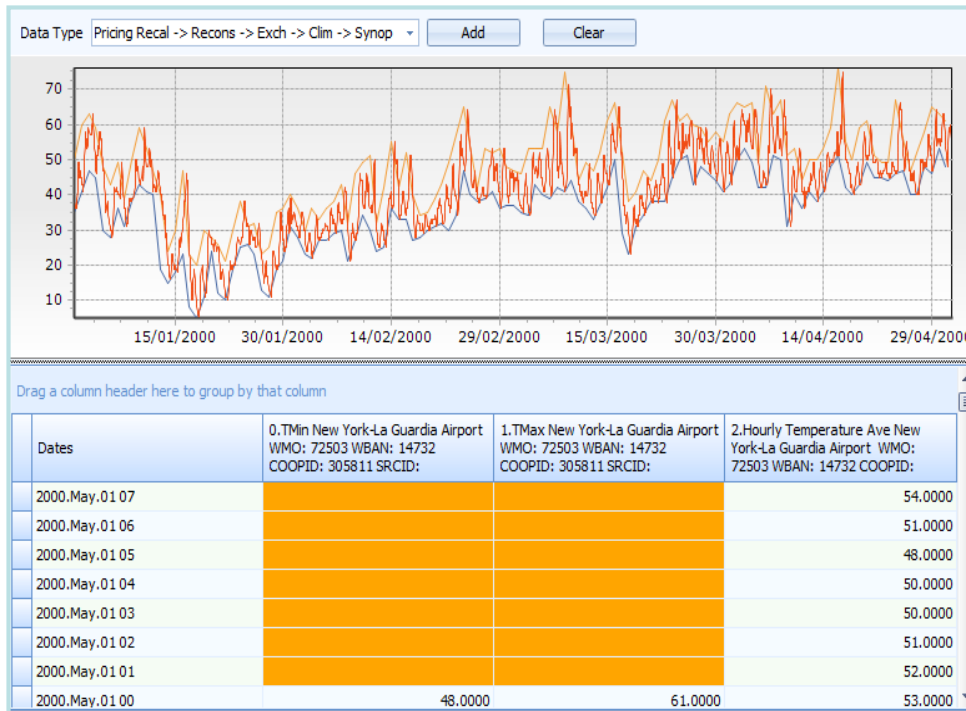
Plot and verify forecast
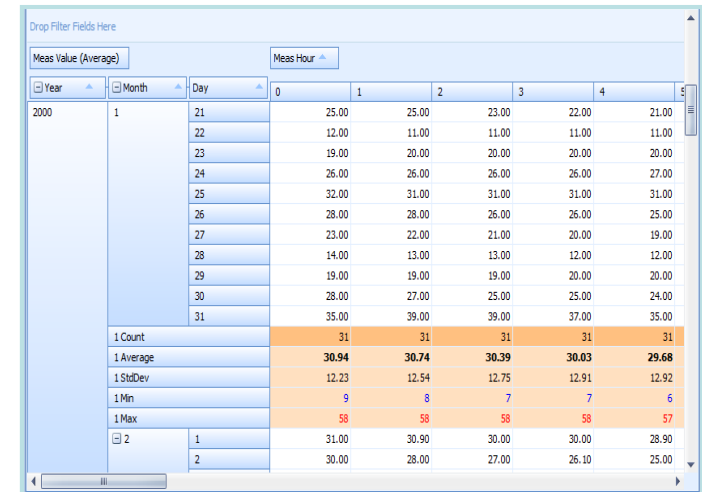
View Pivot Hourly data tables

Gridded Data Support

SWS provides direct access to several gridded data catalogues supported by Speedwell (subject to subscription). Point data is available for any latitude/longitude within a given catalogue. In addition to point data, users can apply mathematical functions over user-defined areas or standard regions. For example, this could be daily average over a given region or the maximum/minimum of all data points within a chosen area

Select gridded data source

Define the area with the cursor tool and Transform data (eg sum / max /min / average) and extract to SWS
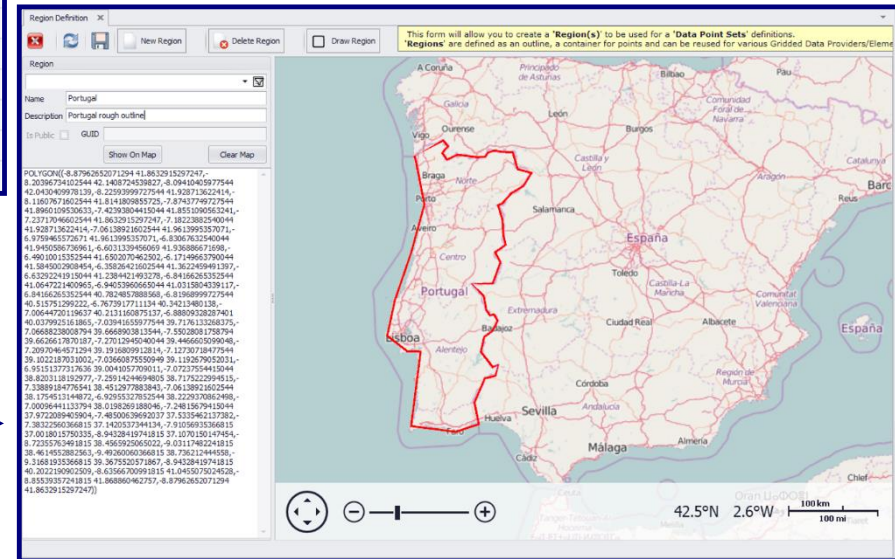
How to manage your weather data by doing nothing!

The SWS Data Manager manages weather data and forecasts so well that most SWS clients don't even know it exists!

- New historical data sets that are delivered to the FTP are automatically imported
- Daily/hourly updates of weather data feeds are automatically imported

Seamless Data Management

1. Define the data sources
2. Map the CSV files Headers
3. That is it – done!

Strict Data Type Management

Speedwell Weather uses a standard SWS data base as the backbone of its own data and forecast business with over 100,000 weather stations storing multiple weather elements and multiple data quality types….it scales!

SWS Pricing and Settlement Hierarchies: Hiding Complexity

Data Type	

ID	Description
1002	Pricing Enh -> Recons -> Exch -> Clim ...
1004	Settlement (Exch -> Clim -> Synop)
1006	CLIMATE all
1007	SYNOP all
1008	Recalibrated -> Recons
1009	Pricing Recons -> Exch -> Clim -> Synop
1010	Pricing Recal -> Recons -> Exch -> Cli...
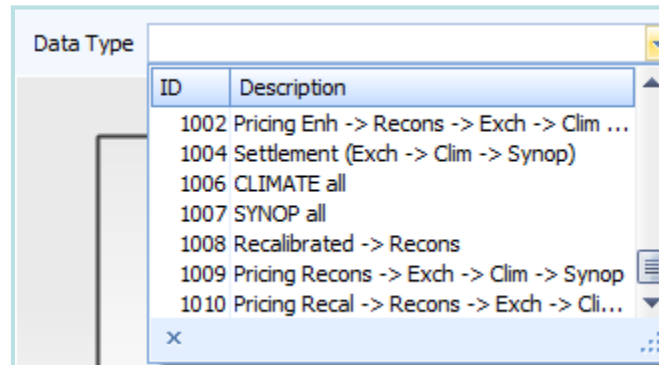
SWS Pricing Hierarchies ensure that the best data are automatically loaded for contract pricing and that settlement automatically data is automatically picked up as soon as the risk period starts
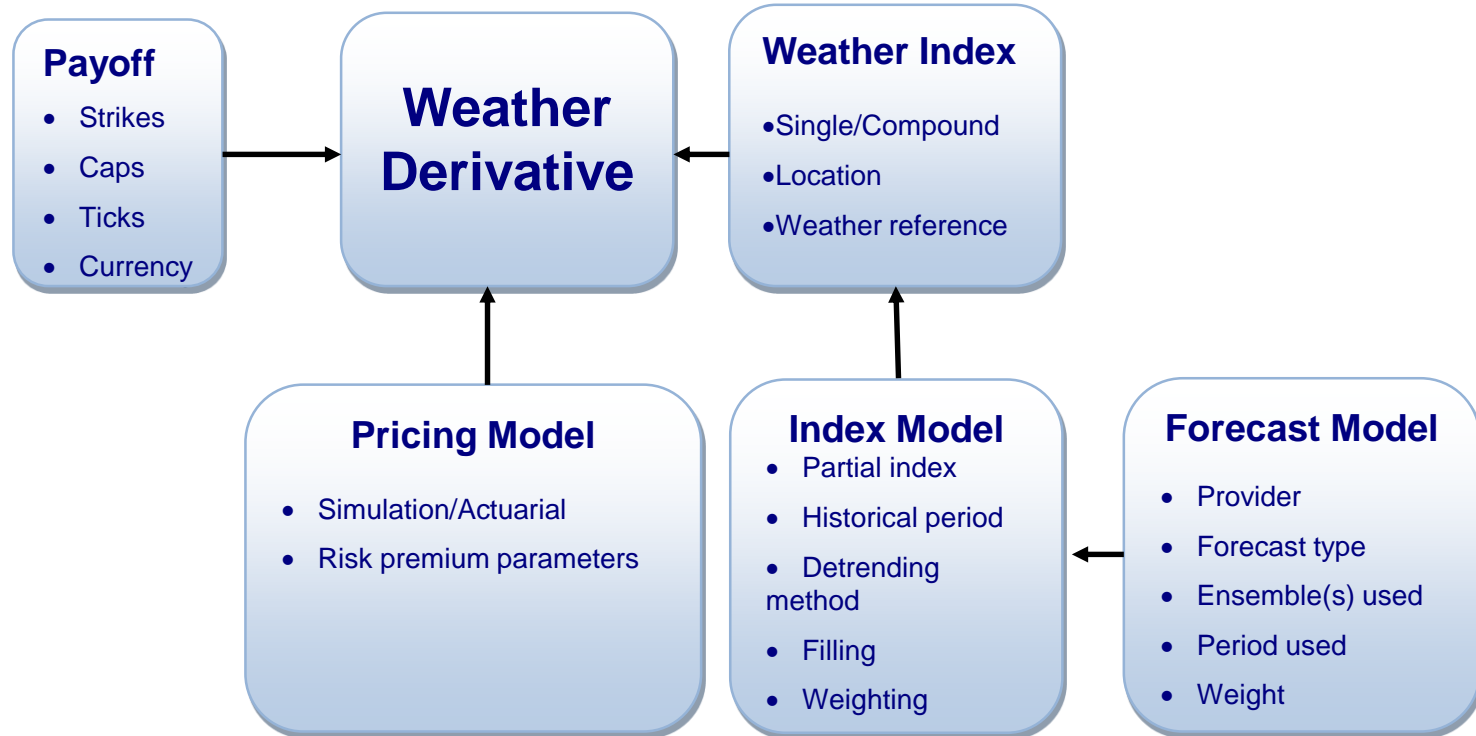
In a nutshell:
• Data are easy to use
• Multiple data types allow full understanding of data provenance and quality
• Hierarchies mean that processing of those data types is simplified but fully transparent

Front Office

Pricing a Weather Derivative

Payoff
- Strikes
- Caps
- Ticks
- Currency

→

Weather Derivative

←

Weather Index
- Single/Compound
- Location
- Weather reference

Pricing Model
- Simulation/Actuarial
- Risk premium parameters

Index Model
- Partial index
- Historical period
- Detrending method
- Filling
- Weighting

Forecast Model
- Provider
- Forecast type
- Ensemble(s) used
- Period used
- Weight

Index Structure Support

- Daily / Hourly / sub Hourly Index
- Basket Index
- Compound Index e.g. Wind + Temp
- Multi stations (baskets, any weights)
- Can mix daily and hourly variables
- Super exotics
- Strips – multi year, month, flexi
- Power Curve Builder Scripting Tool: simplifies the transformation of a wind turbine power curve table into an SWS-compatible index for weighting wind speeds
- Gas-Quanto pricer using daily temperature simulation and gas price simulation (mean-reverting with jump process)

Compound Indices

SWS supports super-exotic structures by allowing complex compounding
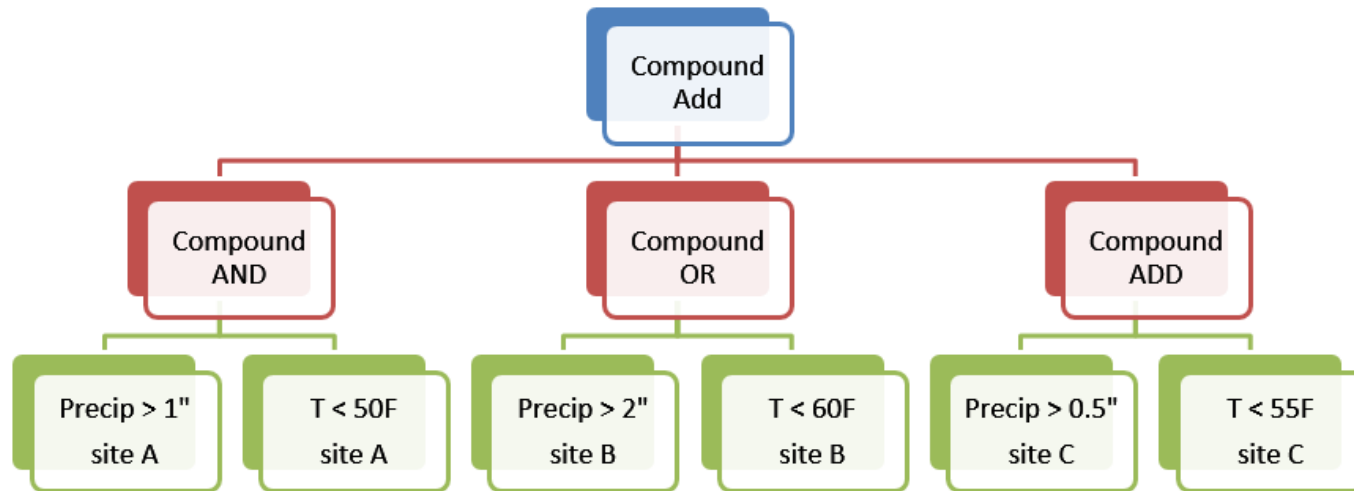
Rich functionality giving you all the necessary pricing tools
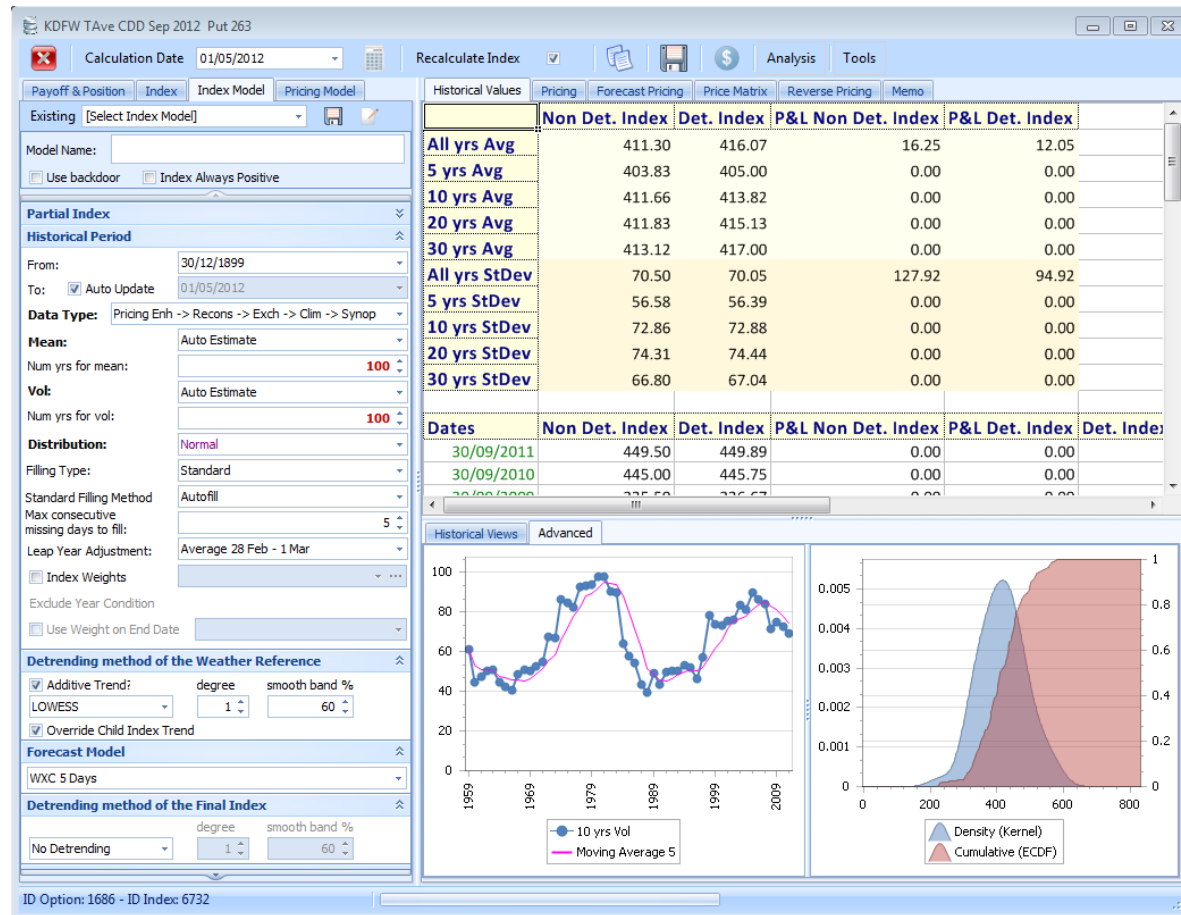
Analysis Tools

- Reverse Pricing
- Time Series Analysis
- Multi-model analysis
- Distribution fitting
- Index model analysis
- Burn analysis
- Correlation analysis
- "Cone chart"

Portfolio Risk Management

Portfolios

SWS supports four types of portfolios:

- *Real Portfolios* are the portfolios that contain actual executed transactions.
- *Working Portfolios* are "throw away" portfolios and can be used for analysis (eg marginal impact of a proposed transaction).
- *Mirrored Portfolios* are working portfolios that mirror a real portfolio but for which a different portfolio risk model is attached to for analysis or reporting purposes.
- *The Enterprise Portfolio* is the portfolio made of all Real Portfolios

There is no limit to the number of Portfolios

Portfolio and Risk Reports

- Historical
- Simulations
- PL
- Expiry VaR
- Daily VaR
- Markowitz Charts
- PCA
- SSD

Automating Portfolio Calculations

Application exe name	Main Parameter	Action
SWSDesktop	**/OVERNIGHT**	Automatic portfolio and risk calculations

Back Office and Invoicing

Summary of Back Office Functionality

- Flow of the weather trade (notification of each stage)
- Generation of confirms
- Generation of invoices
- Payment reports
- Settlement reports
- Export of reports to Excel®
- Trade query
- Static data maintenance – counterparty details...

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Full Support for the Trade Life-Cycle

Take control of the entire trade flow

Automatic Batch Processing of Trades
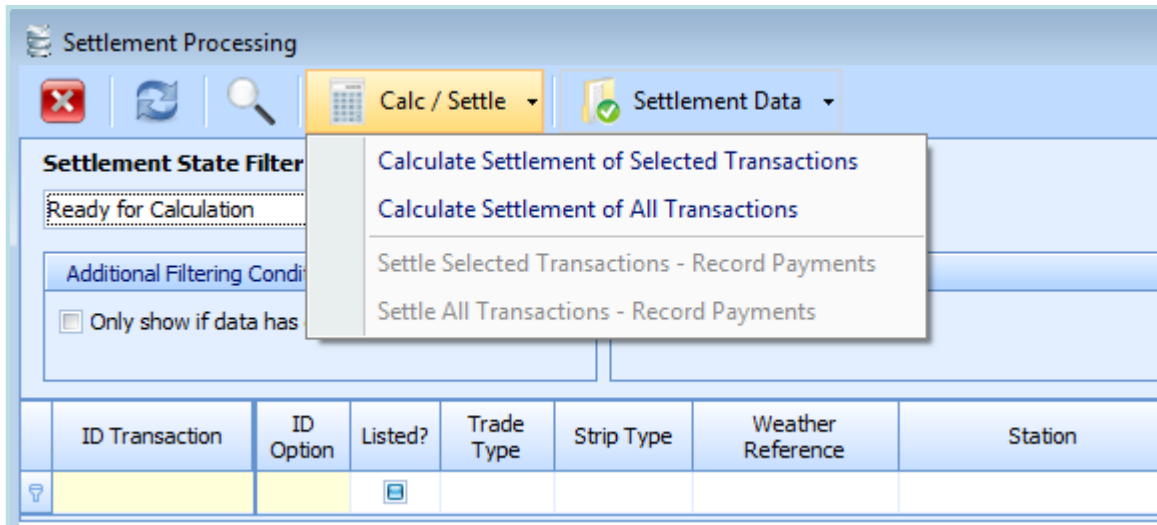
- Configure SWS to automatically calculate and settle trades at the end of each day

- Never forget a trade

- Additional optional components available to further automate trade processing

Automatic Notifications

Technical

Back Office Integration

- SWS can be internally installed in your organisation or hosted by us

- For internal installations, Speedwell have experience of integrating SWS into other existing back office processes

- It is possible to raise email alerts at key stages in the settlement life cycle (eg when a Transaction has been edited). These can be implemented using SQL Server emailing functionalities and triggers or by creating specific Windows Services

SWS Permissions Matrix

Full user permissioning is supported either with standard permissions or configurable permissions

Booking a Weather Trade:

SWS immediately does the following:

- Locks up for editing/deleting the Weather Derivative
- Sends an internal message to SWS desktops
- Makes available the Transaction in the Back Office
- Integrates the Transaction in P&L, VaR, Credit Reports, etc

Only a person with Back Office privileges can:

- Edit the Transaction (e.g. Premium/Transaction Date)
- Mark the Transaction as deleted (the Transaction is never physically deleted from the DB)
- Record statuses
- Record payments
- Settle the Transaction
- Remove the Transaction from the assigned portfolio

Authing

Why SWS? ….Part 1

- Does your weather system handle hourly data?.. strips? ..compounds?.. multi period deals?..multi triggers? ..baskets ..gas quantos?
- When pricing a transaction can you exclude days of the week and specific dates?
- Does it support ultra-exotic deals through a "back door" with those deals still being fully incorporated in portfolio calculations?
- Can you create a structure that handles risk on specific non-consecutive hourly periods in a day?
- Do you handle leap year adjustments robustly? - we offer six different methodologies
- Can your middle office users stress test a portfolio by overriding the front office valuation models with one of their own choice?
- Can you price a weather hedge using INDIVIDUAL members of an ensemble forecast to capture the implicit convexity?
- Does your weather database respect the different data qualities that are used and which may be dramatically different even at the same weather station?

Why SWS? ….Part 2

- Would your audit trail breakdown if a weather data point already used in settling a transaction is later revised by a national met service and subsequently updated after settlement of a weather hedge?
- Can you detrend the underlying weather data AND the final index?
- Does your detrending method respect the differing trends at different times of year?
- Does your system automate the raising of trade confirmations and invoices?
- Do you have a permissioning structure that prevents, for example, accidental deletion of booked trades by front office users or un-authorised changes to front office models by back office users?
- Do you handle credit risk reports?
- Can you easily export weather data and historical forecasts for use in external applications ?
- Can you run a weather hedge valuation or a retrospective portfolio valuation using only the information that was available at that time?

Why SWS? ….Part 3

- Can you retrieve a snapshot of the weather data that was used to settle a transaction before and QC revisions to that data?
- Does your weather database respect the various different types of weather data on which a transaction can be priced?
- Can your database support non-weather variables including energy or commodity prices?
- Does your weather database scale to tens of thousands of weather sites and handle daily, hourly and sub hourly ..down to minutes?
- Does your system support daily VaR calculations at the portfolio level?
- Does your system support full regulatory reporting?
- Does your weather pricing system support Speedwell weatherML for the purpose of sending and receiving weatherXchange RFQs?

Speedwell
Weather