

Speedwell Settlement Services

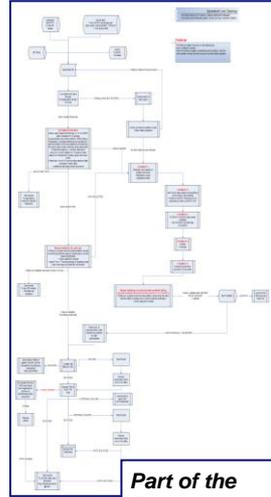
**Speedwell Weather as Settlement Data Provider for
Weather Risk Contracts**

Speedwell Weather Introduction

- Providing weather services since 1999
- Our origins as a weather data provider lie in the weather risk management industry
- We are the dominant provider of OTC Settlement Data for weather risk contracts. We see weather data as a form of financial market data and treat it accordingly.
- Products:
 - Weather Data: history and feeds
 - Weather Forecasts
 - Weather Derivative Software
 - Services / Consultancy
- Clients in insurance, weather derivatives, banking , energy and agriculture sectors world-wide
- Speedwell Weather Derivatives is our FCA-regulated subsidiary
- Offices in the United States and the United Kingdom
- WRMA members since 2000

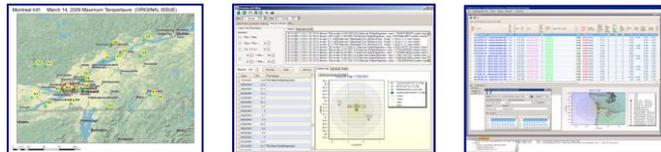
About Weather Data Quality Control

- Weather data quality control – “cleaning” - is fundamental to our provision of weather data
- The availability of reliable “ground truth” is key to the pricing and settling of weather risk contracts and also to accurate modelling of energy demand and crop yields
- We clean over 5,000 sites around the world every day with a dedicated team cross-referencing data from our data base of over 100,000 sites world wide
- Our approach to quality control is that of “do no harm”. Data point revisions are made strictly on an evidence-based approach
- We use a variety of automated checks including internal integrity tests (eg hourly data vs daily, sunshine vs cloud cover etc), comparison with near-by sites, radar, satellite, forecast and gridded data
- However, we believe that quality control should never be fully automated. We have a team dedicated to this process in our UK and US offices. Our quality control process is always be overseen by staff with meteorological experience. Automated processes often fail in extreme conditions...precisely when quality control is most important!
- While quality data is always important – there is a lot of bad data out there- its importance is dramatically elevated when it is used for settlement of a financial contract.



Part of the Speedwell Data Cleaning process flow diagram

Screen shots from some of our data quality control tools.



Why use a third party Settlement Data Provider?

We are aware that some weather transactions are settled on the basis of data provided by a national met service (NMS).

Although data from most G20 national met offices is of a high quality, we continuously see data problems including missing data, mis-reported data and site closures. Note also that on some such networks many stations are manual instruments, often not of WMO standard and usually less reliable.

- **Delayed Data**

Speedwell Action: chase NMS for data, impute temporary value from other information e.g. alternative/backup data sources, interpolate a value from hourly data, use an estimate based on surrounding proxy sites, use an algorithmically determined value from our in-house software, use satellite/radar data to estimate a value until official value becomes available.

- **Missing Data**

Speedwell Action: chase NMS for data, impute temporary value from other information e.g. alternative/backup data sources, interpolate a value from hourly data, use an estimate based on surrounding proxy sites, use an algorithmically determined value from our in-house software*, use satellite/radar data to estimate a value until official value becomes available.

- **Data Errors.** These include keying errors, mis-coded reports, manual reading errors, instrument errors and others.

Speedwell Action: By default, the data is checked via both algorithmic testing and a human visual inspection. Where an error is identified with a high degree of confidence, use the above methods to calculate a replacement estimate. Chase with NMS to seek correction.

- **Non-standard reporting periods** such as cumulative rainfall totals over a number of days.

Speedwell Action: where rainfall has been reported for multiple days (eg Australia) and where those days fall over the start or end of a risk period, we impute the daily rainfall split by using proxy analysis/radar/satellite and other information.

- **Failure or closure of a site.**

Speedwell Action: generation of synthetic value using established relationship between closed sites and group of proxies, as appropriate.

- **Inconsistency of data reporting:** is the data on the NMS web site correct or is the data on their FTP site correct?

Speedwell Action: we are familiar with these differences on a case by case basis and based on experience are usually able to identify the latest data. If in doubt, we will enquire with the NMS.

Requirements of Settlement Data

- **Accuracy**

Reports from most weather stations are of high quality. However, extreme events or reporting problems may cause inaccurate reports. These may be temporary, but even temporary errors can impact in-deal valuations. By using our standard cleaning methods we are able to identify such errors.

- **Reliability**

Reports from most stations are reliable. Indeed, most weather reference sites are selected on the basis that they have been reliable. However closures of hitherto reliable stations may occur within a transaction period and feeds can be delayed. We find that even the most reliable sites occasionally fail to report.

- **Transparency**

Should data points need to be revised, it is important that counterparties understand the tools, method and philosophy that are applied to this process while recognising that it may not be possible nor desirable to be completely prescriptive about the precise method used to derive a given value. It is also important that there is a full audit trail showing the original data, the cleaned/filled data and any subsequent revisions.

- **Independence**

As a settlement agent we are independent. We see both sides of the transaction as our clients.

- **Perception of moral hazard**

Where weather stations themselves are owned by the company taking out the hedge, or, where an NMS operates closely with the national energy company, concerns relating to possible moral hazard need to be anticipated. In this case our role may be extended. This might involve us installing a weather station to verify the readings taken in the primary weather station being used for settlement. However, our standard quality control processes also help verify the data by comparing the primary site to proxies and using other sources such as rainfall radar or interpolated data.



Speedwell Weather Station: Uruguay to support provision of Settlement Data for World Bank – UTE hedge.



Speedwell Weather Station: Armerillo, Chile installed to support provision of Settlement Data for a large rainfall hedge

Settlement Data vs normal Quality-Controlled Data

We provide quality controlled (“cleaned”) feeds for thousands of sites daily. However, for sites where we provide Settlement Data the following are relevant:

- Any specific methods required for the quality control process can reflect specific requirements defined in the term sheet. These methods are detailed in the Settlement Data Contract
- The cleaning of such sites is prioritized
- Extra resources are used to check data integrity including more comprehensive use of satellite and radar imagery
- Settlement Data is delivered in dedicated data types. Speedwell maintains multiple data types for every weather element to differentiate provenance and quality. For example initial cleaned data is usually be delivered in “Settlement Initial” data type. Then at the required interval (eg 30 days) Speedwell will check all data points using any new information and deliver a “Settlement Final” data type
- If required, Speedwell will send a notification of any data point revision to both parties. This states the nature of the change and a brief description of the change.
- Data point revisions for Settlement Data are subject to a sign-off from an second senior member of staff



Speedwell Weather as Settlement Agent: Precedent

Speedwell is the major provider of weather data world-wide for the settlement of OTC weather transactions

Examples include:

- Brazil/Uruguay: 2014-15 we are acting as Settlement Data provider, Settlement Agent, and Calculation Agent for bilateral margining for the largest public weather derivative transaction to date. This relates to a \$ 450m rainfall hedge for the Uruguay national power company, UTE, as arranged by the World Bank. Speedwell's role includes installing and maintaining additional instruments to backup the national meteorological instruments
- Chile: Settlement Data provider for a large rainfall hedge for a hydro producer in Chile. This involved installing additional instruments
- USA: Settlement Data provider for multiple agriculture-related hedges
- Australia: Settlement Agent for a number of hydro-related and mining-related Australian rainfall transactions
- UK: Settlement Data provider for a temperature hedge related to sugar beet production
- UK: Settlement Data provider for a wind-power production multi-site basket
- UK: Settlement Data provider for the weather component of a large UK temperature/gas price hedge
- US and UK: Settlement Data provider for a number of snow depth hedges

.....and many others

Settlement Data Provision: Regulatory Scrutiny

We believe the importance of an independent provider of Settlement Data is highlighted by new regulatory scrutiny relating to providers of financial indices following the recent Libor scandal. Please see here for the consultation document relating to possible future EU regulation in this area.

http://ec.europa.eu/internal_market/consultations/docs/2012/benchmarks/consultation-document_en.pdf

This consultation document specifically refers to weather in section 1.1:

- **Other Indices:** There is a whole range of other indices such as weather indices ("UBS-GWI" UBS-Global Warming Index) used for damages and **parametric weather contracts**. Other indices, such as the PMI, Purchasing Managers Index measure business sentiment.

How using Speedwell addresses this developing issue:

- We are experts in weather data relating to financial contracts.
- We understand the importance of data provenance and audit trails and have built resilient systems to satisfy this need.
- **weatherXchange Ltd is our FCA-regulated subsidiary. This company has been regulated by the FCA or its antecedents since 2000. If required, and in advance of any formal requirements in this area we are able to provide settlement data through weatherXchange. We believe we are the only weather data and forecast provider able to provide weather-related data for settlement of financial contracts through a regulated subsidiary.**
- **Speedwell will comply with new the new Benchmark Regulatory requirements as these develop.**

The Mechanics

- **Pre Trade**

Speedwell can advise on reference site selection using an understanding of problems seen in the past, meta data relating to the site, historic reliability. In larger transactions it is at this time where the installation of independent weather stations may be considered.

- **Contract for provision of Settlement Data**

Speedwell is not party to the term sheet of the transaction. In fact we would normally request that we do NOT see details such as the strike level of the transaction: ignorance of such details is the ultimate guarantee of impartiality. However, the details of the term sheet need to be reflected in the contract for settlement data provision in respect of risk period, final true-up period and any prescribed procedures. Speedwell uses a template approach to such contracts based on previous experience.

The use of Speedwell as Settlement Data provider can lead to a simplification of the term sheet. For example, a prescriptive approach to missing data relating to fall backs can be avoided. Such methods are themselves not always water-tight (what happens if the fall-back also fails?) and no term sheet can cover all eventualities.

- **During the risk period**

Speedwell will provide a feed of raw and cleaned data to both sides of the trade. If required, we will notify both sides of any data point revision by email. We will also keep both sides informed of any general problems.

- **After the risk period**

Speedwell will provide a final data set accommodating latest information.

- **Other Services**

Speedwell is also able to act as Calculation Agent: i.e. notifying each side of the monetary value of any payments due. Speedwell can provide in-period valuations for the purposes of bi-lateral margining.

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