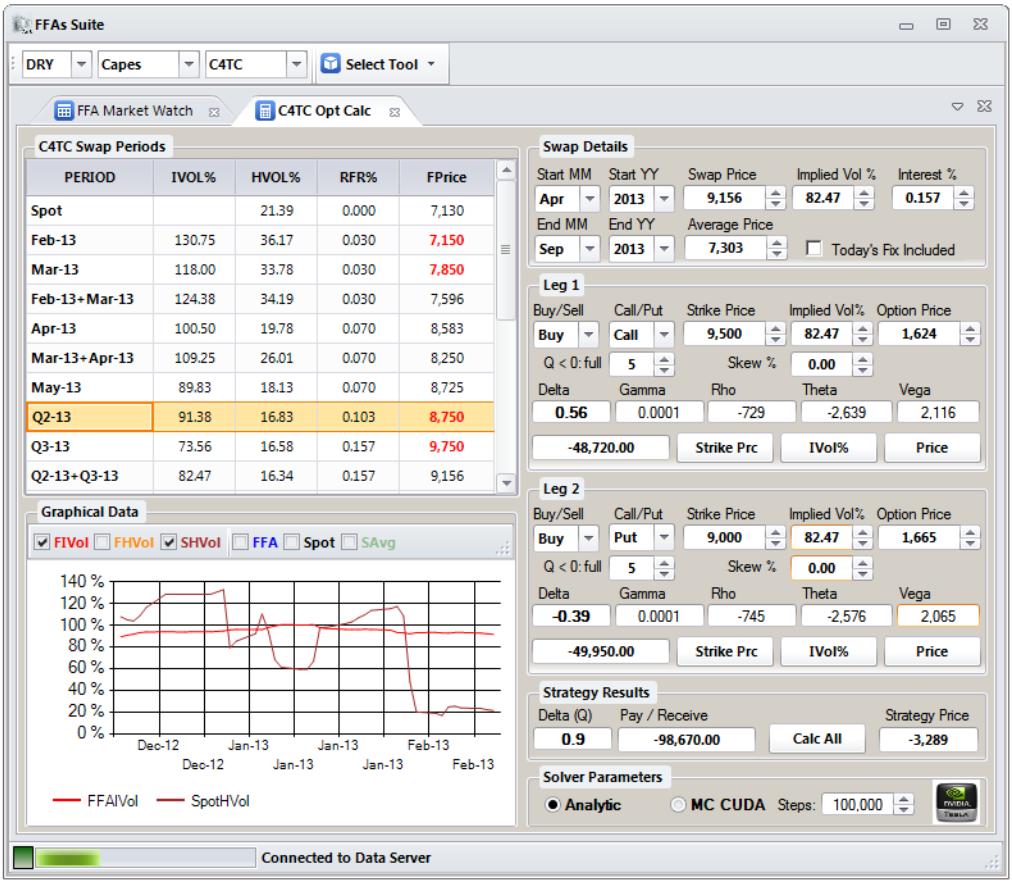
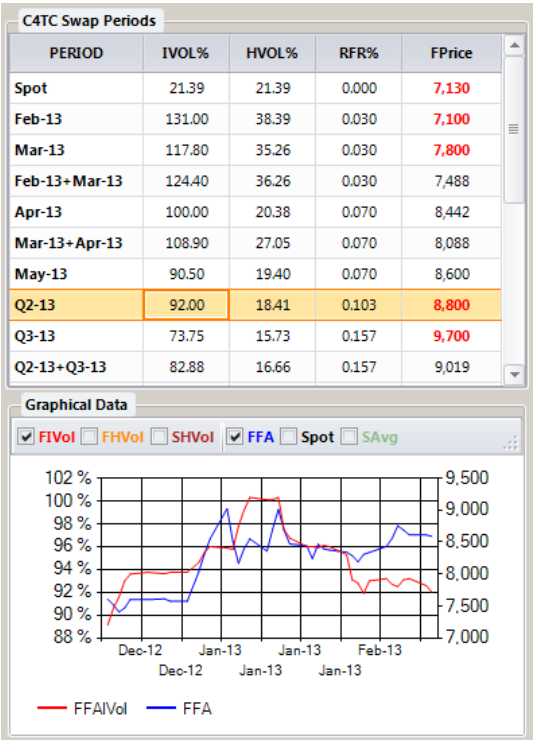
3. The Options Calculator Form

- The **Options Calculator** form displays useful information, regarded as essential for accurately pricing FFA options. On the left top side a table is displayed with historical information regarding the selected asset class. In this example we are displaying the **Capes C4TC** route, as evident in the caption of the form.



- For this selected route a number of predefined contract periods appear on the table, along with their historical **FFA closing** prices [**FPrice]** , **Implied Volatility** [**IVol%]** if available, **Historical Volatility [HVol%]**, and **applicable interest rates** [**RFR%]** for any given contract period. You can **edit these fields** at will, by means of clicking the mouse on any field and altering the displayed value, thus creating your **own curves** and parameters for pricing an option.

- If you **double click on any selected contract period**, like **Q2-13** on the example above, then all relevant data is **automatically transferred** to the option calculator displayed on the right, thus making it very easy to start pricing an option with **ad hoc information**.



- On the bottom of the numerical data table a **graphical representation** of the price evolution of all of these parameters, plus some additional ones, is displayed. You can select to display among:

FIVol: Implied Volatility of FFA options

FHVol: Historical Volatility of FFA contract

SHVol: Historical Volatility of Spot Price

FFA: The FFA settlement price

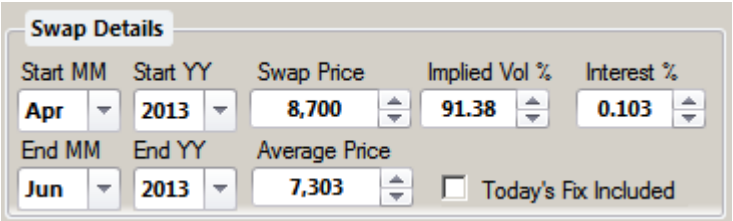
Spot: The spot index price

SAvg: The evolution of the average monthly price as calculated for the purposes of settlement of FFA contracts.

The extent of the supplied series data goes back to the previous two months only.

- In our example to the left for the **Q2-13** contract period we have selected to display the last two months price evolution of the implied volatility (red line) plotted against the evolution of the FFA price (blue line). You can check or uncheck any of the available properties just above the graph to display or hide relevant information. By visually examining the price evolution of selected data, for example the implied volatility, we can determine if current levels are suitable for buying an option, as in this example where volatility has significantly fallen from recent highs.

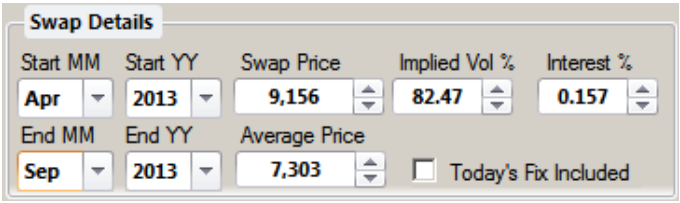
The Swap Details group box:



- On the right of the table data the first group box **[Swap Details]** displays information about the selected contract.

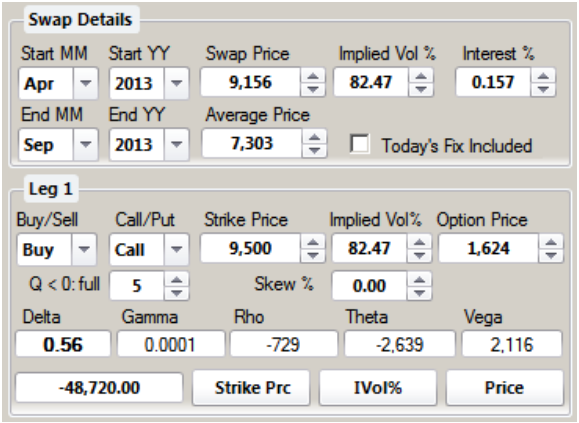
- Once again, if you **double click** on any selected period in the table data all relevant information will be automatically copied to this [**Swap Details]** box. The **[Swap Details]** group box displays information on the **starting** and **ending** periods of the swap, the most recent **swap price**, the **implied volatility** (if available), the prevailing **interest rate** for the period, and the **running spot average** for the respective index the swap is being settled against for the current month. A tick box indicates if today's spot price has been included or not in the spot average calculation.

- There are **three ways to change data in the [Swap Details]** group box, (a) **by double clicking** on the swap period contract on the data table, (b) **by changing the start and end periods of respective months** in the groupbox itself – which would also automatically compute a reference swap price, implied volatility and interest rate, and (c) by **manually making changes** to these fields.



- In this example we changed the end period to Sep-2013 and the calculator **automatically suggested** a new reference swap price, implied volatility and applicable interest rate.

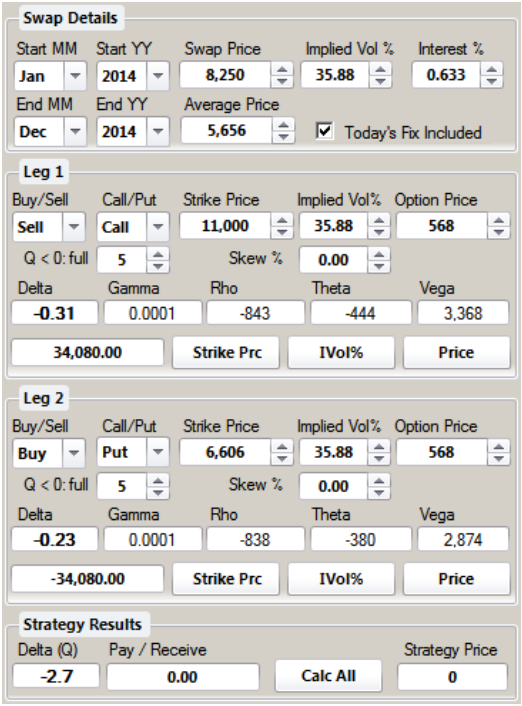
The Option Legs:



- There are two group boxes, [**Leg1]** and [**Leg2]**, inside which we actually enter more precise information to price an option. These two legs can be used in tandem in order to price **more complex** pricing strategies, like a **collar**, or a **straddle** or a **strangle** option spread.
- We can select if we **Buy or Sell** an option, the prevailing **implied volatility**, the **strike price** of the option, the **number of days (Q)** for our strategy, entered as dpm - or enter (-1) to define a full contract, and the **skew** we want to apply on **the implied volatility** when pricing the option.

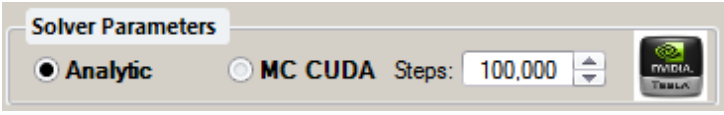
- In the example above we have put in that we are buyers of a call option for 5 dpm, with strike price at 9,500, and we will be using the suggested implied volatility at 82.47% to price the option with zero skew. Pressing the **Price** button will immediately calculate the respective price for this option at **$1,624 / day**.
- Additionally to the price information we are presented also with all the **greeks** for this option, **Delta**, **Gamma**, **Rho**, **Theta** and **Vega**, plus the **actual amount** we will be paying, in this case $48,720.00.
- Solving for the **Price** is the **most common scenario**, although we can also **work backwards** and enter a known price for the option to **calculate the implied volatility** (pressing the **IVol% button**), or finding the closest **strike** price for an option that corresponds to a known price level (pressing the **Strike Prc** button). These alternative options come in handy when we are presented in the market with a quoted price and we need to determine if it is expensive or cheap in terms of the applicable implied volatility this price represents.

Putting it all together, the [Strategy Results] group box:



- We have introduced two calculation legs in order to be able to value **most common strategies** in options trading, like **straddles, straddles and collars**. In this example we would show how we can effectively price a **zero cost collar**, where we sell a call and we buy a put for the same period at zero cost.
- The current cal-14 pmx ffa rate is at 8250. We first input in **[Leg1]** a strike price of 11,000 for the call option we want to sell and we calculate its price at $568/day.
- Next, we define a put option for **[Leg2]** and we input in the Price field the value of $568/day we solved for in the above step. We choose to calculate the Strike Price and we press the **[Strike Prc]** button. As a result we get a strike price of $6,606/day. We round this to something more appropriate for the market, say 6,500, and can use this as a benchmark to input a respective order in the market.
- The **[Strategy Results]** group box displayed at the bottom displays the effective cost of our strategy, in terms of absolute price and total amount to be paid/received, plus the Delta of the synthetic position expressed for convenience in dpm. In our example above for the zero cost collar the delta would be -2.7 dpm, so we have to buy appropriate number of days in the market to delta hedge our position.

Choosing a Pricing Model, the [Solver Parameters] group box:



- For all of our calculations we can either choose the **Analytic Solution**, or **Monte Carlo Simulation** if our PC is equipped with a suitable **NVidia** Graphics card supporting the Cuda development environment. The reason that an NVidia Graphics card is required for Monte Carlo simulation is in order to reduce the time taken to perform the simulation steps by means of utilizing the processing cores of a graphics card, which can be more than 1,000 on a modern high end graphics card.
- The Analytic Model has been tailored made for the needs of the FFAs options market, and is a special closed solution to discretely sampled forward starting Asian Options. The Analytics solution produces an exact match to the Monte Carlo simulation solution, thus it is being very robust and hence there is no real need to use the Monte Carlo approximation.