Improve long-term agreement profitability by automating complex formula-based pricing

As a [Pricing Manager/Sales Rep], I want to have the ability to configure formula-based agreements, so I can:

- Improve contract business contribution margin.
- Eliminate manual errors and increase customer trust.
- Reduce margin compression due to out-of-date pricing

Functional Requirements

- Ability to configure the agreement with a customer or group of customers.
- Ability to select a product or group of products.
- Ability to select the agreement start-date and agreement end-date.
- Ability to select an agreement currency.
- Ability to route the draft agreement through a pre-defined approval workflow.
- Ability to override calculated prices.
- Ability to route recalculated or overridden prices into an approval workflow.
- Ability to use a standard template to guide the user through configuring the complex formula per product or group of products.
    - Ability to activate or de-activate.
    - Ability to select a product or group of products based on the agreement product scope.
    - Ability to configure parameters to be used as an input to calculate product(s) prices. E.g.,
        - Base Adder
        - Price Swing Guardrail (Upper, Lower)
        - Price record decimal precision (e.g., 4 Decimals)
        - Adders: Ability to include multiple adders (Up to 3 Adders)
        - Pricing UoM (Lbs., KG)
        - Price Calculation Frequency (Weekly, Monthly, Quarterly)
        - No. of periods (1, 2, 3, 4)
        - Lag (0, 1, 2)
        - Period offset (+1 Month, - 1 Month)
        - Index Value (Value of, Average of, Minimum of, Maximum of)
        - Select the relevant index from a pre-configured list of approved indexes.
    - The table below illustrates the prescribed calculation scenarios:

Index Value	Periodicity	# of Periods	Lag	Offset	Price Calculation	Date Range
Average of	Monthly	3	-1		Avg of 3 months starting previous month	Nov 1 - Jan 31
Average of	Monthly	2	-2		Avg of 2 months starting 2 months back	Nov 1 - Dec 31
Value of	Monthly	1	-3		Value of 3 months back	Nov 30
Average of	Quarterly	1	-1		Avg of 1 quarter starting previous quarter	Oct 1 - Dec 31
Average of	Quarterly	2	-2		Avg of 2 quarters starting 2 quarters back	Apr 1 - Sep 30
Average of	Quarterly	1	-1	-1M	Avg of 1 quarter starting previous quarter with a one month back offset	Sep 1 - Nov 30
Average of	Quarterly	2	-2	+1M	Avg of 2 quarters starting 2 quarters prior with a one month ahead offset	May 1 - Oct 31
Value of	Quarterly	1	-1		Previous quarter value	Value as of Dec 31
Average of	Weekly	4	-2		Avg of 4 weeks starting 2 weeks back	Avg of weekly values from Dec 21 - Jan 8
Value of	Weekly	1	0		Current Week Price	Value valid on Feb 5

- Ability to configure the table above at the produce level or at the raw material level.
  - Select the mix of raw material(s) related to the selected product.
  - Add the associated contribution weight per raw material type.
  - Determine the decimal precision per raw material.
  - Ability to select the relevant index from a pre-configured list of approved indexes.
- Price Calculation:
  - New Price = Calculated Formula Price

Non-Functional Requirements

- Automatically recalculate prices based on the Calculation Period and the contract start date.
- Store approved prices in a **Price Records** table

Reporting and Dashboards (Not included in the baseline estimate)

- Descriptive Analytics displayed within the agreement header and item objects:
  - Ability to illustrate historical monthly trend of the customer's purchased volume, the actual Raw Material Cost, and the actual unit price per UoM.
  - Ability to illustrate the historical Volume vs. Profitability trend analysis.
  - Ability to analyze the agreement performance by illustrating the relationship trend among Revenue, Cost and Margin

Measures, Calculation and Decision-Making Key Performance Indicators

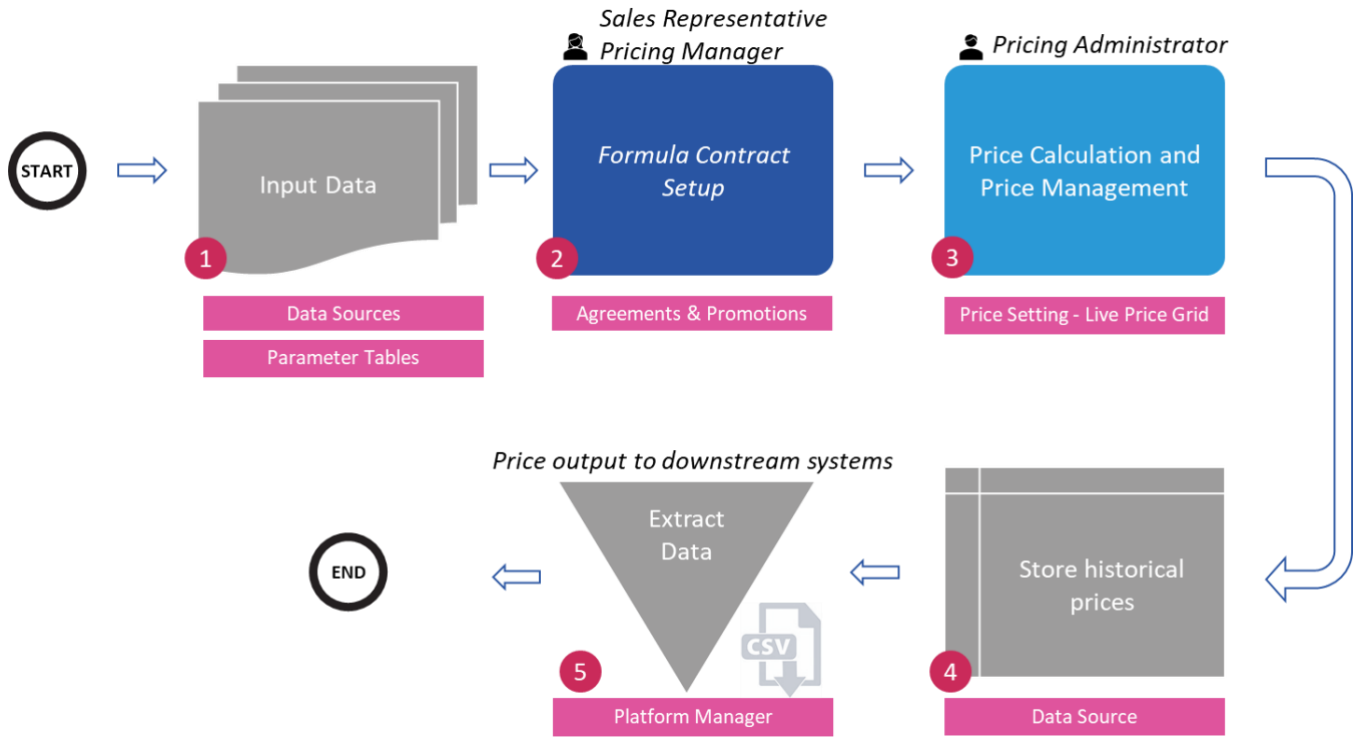
- **Forecast Annualized Revenue:** Next 12 month by month estimated revenue simulating the expected monthly unit price (i.e., based on the expected raw material future cost and the forecasted index value) * the forecast monthly volume (Note, the expected monthly volume is a data input by the customer's demand planning function)
- **Historical Annualized Revenue**: the sum of all trailing 12 months of revenue
- **Annualized Revenue Change:** the difference between the Forecast Annualized Revenue minus the Historical Annualized Revenue.
- **Forecast Annualized Margin:** the sum of the next 12 month by month estimated margin. The month-by-month expected margin is calculated by the difference between the monthly forecast revenue minus the month forecast raw material cost.
- **Historical Annualized Margin:** the sum of all trailing 12 months of margin.
- **Annualized Margin Change:** the difference between the Forecast Annualized Margin minus the Historical Annualized Margin.
- **Forecast Annualized Volume:** the sum of the future 12 months of volume estimated by the customer's demand planning function.
- **Historical Annualized Volume:** the sum of the trailing 12 months of volume
- **Annualized Volume Change:** the difference between the Forecast Annualized Volume minus the Historical Annualized Volume.

Solution Design

The design and the implementation of the Complex Formula Builder is going to utilize the suite of Pfx out-of-the-box features and capabilities across multiple Pfx modules, Agreements & Promotions, Price Setting,

and Integration Manager modules. The flowchart below illustrates the end-to-end process and mapping of the process components to Pfx modules and specific capabilities.

Figure 01 – The end-to-end Formula Contract agreement setup and price calculation process



1) Input Data: Input data is prescribed in the "Input Data" section below.
2) Formula Contract Setup: The design and the implementation of the Complex Formula builder is going utilize the suite of features and out-of-the-box capabilities of Pricefx that **Agreements & Promotions** Module. This modules will be the frontline interface that will be leveraged by either the Sales Representative or in some cases will be utilized by the Pricing Manager in collaboration with the Sales Rep for the purpose of: a) streamlining the negotiation process with the end customer, b) capturing the agreed on contract parameters, c) Approving and producing a customer facing PDF document for the purpose of communicating the approved agreement with the end customer.

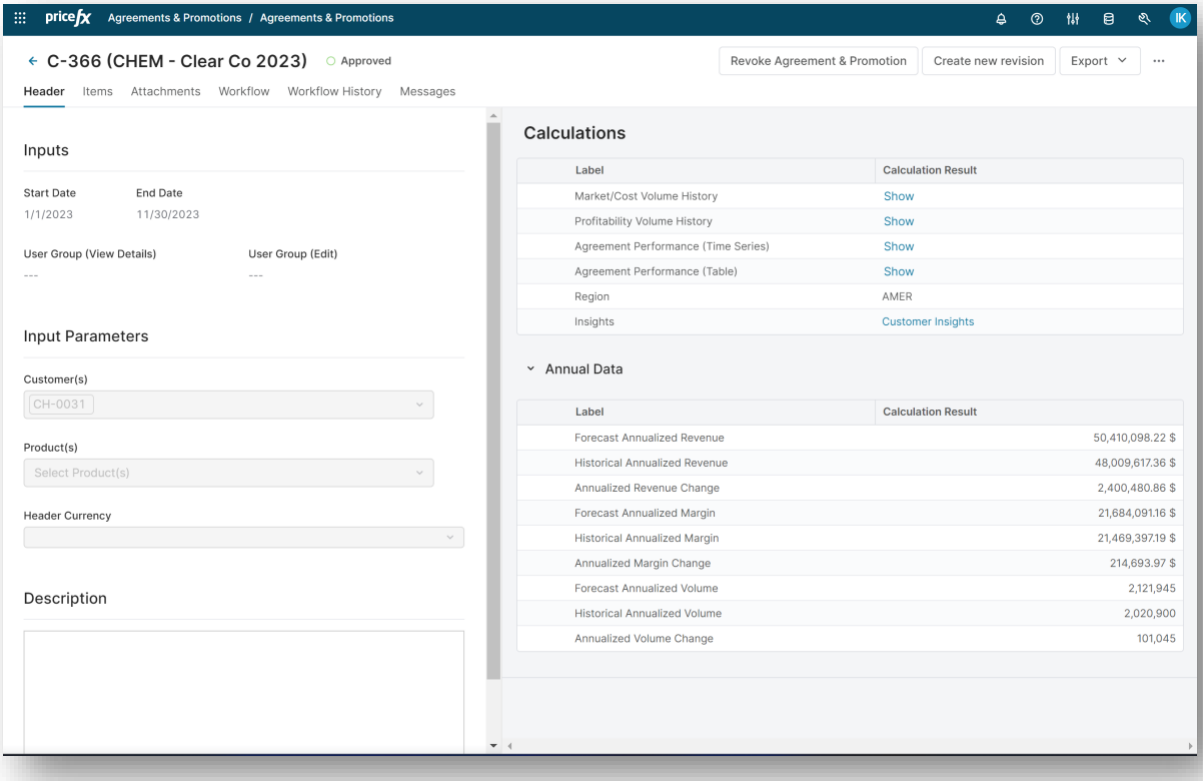
The Agreements & Promotion object within the Agreements & Promotions Module consists of 5 sub-objects, the chart below depict the prescribed process with Pricefx Agreements & Promotions module:

Figure 02 – Agreement sub-objects

- **Header:** is the user interface that will allow the user (Sales Rep, Pricing Manager) to select agreement scope a) Customer(s), b) Product(s), c) Agreement Start and End Dates, d) Agreement

Currency. And provide the user with access to descriptive analytics that KPI's based on the agreement scope.

Figure 03 – Agreement Header User Interface



- **Items:** is the user interface that will allow the user (Sales Rep, Pricing Manager) to configure and build the component of the customer formula by product or group of produces. The below features illustrate the prescriptive solution within the Items tab:
    a. Active: (Yes/No). On/Off Switch to engage or disengage the formula calculation
    b. Product(s): Allows the user to select products from the agreement product scope.
    c. Product Rules: Allows the user to configure the Base Adder, Base Lower and Base Upper Bounds, and the number of precision decimals for the price. The image below illustrates how those parameters will be configured within Pfx.

Figure 04 – Item Selection, Base Adders, and Price swing guardrails.

Product Id	Product Name	Base Adder	Base Lower Bound	Base Upper Bound	Rounding
NC-0001	NyChem63A-B	0.78			4
NC-0002	NyChem63A-HS-B	0.89			4
NC-0003	NyChem64A-B	0.91			4
NC-0004	NyChem64A-HS-B	0.83			4

d. Formula Configuration: Formula configuration is managed by its own guided workflow that is embedded within the Items tab and after the selection of the product(s). it allows the user to map an index to a product(s), and set up the Periodicity, the # of periods, the lag, and the offset parameters. Illustrated in Table-1 above.

   The configuration of the formula can be applied at the raw materials level (one level below the Product Code).

Figure 06 – Raw Material Configuration

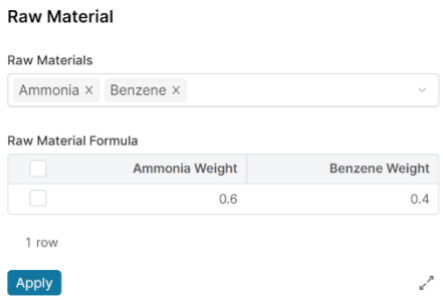


Figure 05 – Index Configuration

Input Data

The following tables can be either manually loaded in Pfx via Pfx Excel Client or can be automatically integrated using CSV files in a Pfx dedicated SFTP folder:

- Index table that includes the index source, monthly and weekly values, rate, UoM, Conversion factor
- Currency conversion table that includes the from and to currencies, monthly and weekly values, FX rates
- Raw Material table: a mapping table between the Product and its constituent raw material along with each raw material contribution/weight to the product.
- Adder 1, Adder 2, Adder 3: parameter tables that stores adders that can be added to formula at the product level.

Out-of-scope business functions and features (Can be configured, but not included in the Chemical Industry Catalog)

- Ability to assign a Fixed Price to a product within the Complex Formula guided template.
- Ability to calculate prices based on Disaster or Severity contract conditions.
- Ability to simulate prices based on index forecasted values.
- Ability to apply rounding rules within each step of the price calculations.

- The Measures and Decision-making KPI's
- Reporting and Dashboards
- Notifications and alerts
- API method integration
- Customer-Facing templates with calculated prices

Implementation Level of Effort

4 sprints/1FTE CE

Base Line Projected Annual Impact*

Direct Benefit = $205.5K Per $100M ARM

Indirect Benefit = $57.5 Per $100M ARM

*Assumptions: Gross Margin % = 10%, Overhead = $150K per annum

Prescribed User Stories			
Use Story Name	**I want to…**	**so I can …**	**Acceptance criteria**
Epic: As a Sales Rep/Pricing Manager/Pricing Administrator, I want to load several data tables into Pfx tables, so I can use it through out the formula contract configuration, and for the next period price calculation.			
Index data table	load the index data into Pfx Index table	use it as an input to the next period price calculation	Data to be loaded in Pfx Data Source table either manually through Pfx Excel Client, or automatically integrated via using CSV file placed on a Pfx dedicated SFTP folder on a pre-agreed frequency. Must have column definition: Index Source, Periodicity, Values, UoM, UoM conversion factor. **(Up to 10 customer's selected fields)**
Exchange Rate table	load the currency conversion data into Pfx Currency Conversion table	use it as an input to the next period price calculation	Data to be loaded in Pfx Data Source table either manually through Pfx Excel Client, or automatically integrated via using CSV file placed on a Pfx dedicated SFTP folder on a pre-agreed frequency. Must have column definition: From Currency, To Currency, Periodicity, Values. **(Up to 10 customer's selected fields)**
~~Raw Material table~~	~~load a mapping table that associate the product with its constituent raw material and their associated contribution to the product~~	~~Use it to: - Associate an index type to each raw material - Configure all the associated Formula parameters at a raw material level - As an input to the next period price calculation~~	~~Data to be loaded in Pfx BOM Product Extension table either manually through Pfx Excel Client, or automatically integrated via using CSV file placed on a Pfx dedicated SFTP folder on a pre-agreed frequency.~~ ~~Must have column definition: Product ID, Raw Material ID, Raw Material Description, Contribution/Weight. **(Up to 5 customer's selected fields)**~~
Epic: As a Sales Rep/Pricing Manager, I want to use an interface that can be used to set up the formula contract parameters, negotiate the parameters with the customer, and approve the formula agreement. Once approved, the parameters will be used as triggers and input to calculate the next period price.			
Agreement Header	Use an interface that allows me to capture the header level of the formula agreements	Ensure that the first step of the formula agreement is defined appropriately, and become the source and an input to the follow up step (i.e., Step 2: Items)	• Pfx will use the header object of the Agreements and Promotions Module as the interface. • Header Inputs: ○ Start Date ○ End Date: This field will be set to 12/31/3999 as a default. ○ Customer(s): provide access to the customer master and ability to select a single customer or multiple customers. User can choose the advanced filter feature to select customers. ○ Product(s): provide access to the product master and ability to select a single customer or multiple customers. User can choose the advanced filter feature to select customers. ○ Agreement Currency: Drop down menu to choose a currency
Agreement Header – Price Calculation Date	set up the agreed-on price update date	ensure price calculation is triggered to calculate the new prices as of that date and set the new price effective start date is calculated based on the calculation date.	• Price calculation frequency selection: a drop down menu that will have the following options: ○ will always be trigger on the 1st day of the month, ○ 1st of the quarter, ○ 1st day of the week
Agreement Item – Active Status	~~Be able to activate/deactivate an agreement item~~	~~have the flexibility to dis-engage the price ca~~	•
Agreement Item – Final Price Decimal Precision	define the decimal precision for final calculated price	Set it up based on the agreement with the customer	• Prices in Pfx appear in accordance with the decimal precision rule. • Rounding will be applied to only the final calculated price. • No rounding will be applied to the intermediary calculations required to produce the final price, such as UoM conversion step, currency conversion step, or any intermediate addition or multiplication operation
Agreement Item – Price	Set a Lower and Upper price swing limits	Ensure that new calculated prices can be	• Price Swing Guardrails are set as an absolute value rather than % • Price Swing Guardrails are set on formula level

Swing Guardrails		only effective if the price swing amount exceeds the pre-determined guardrails	• Example: If ***"Lower Limit" <= P2-P1 <= "Upper Limit"*** then P2 = P1, else, P2-P1 > Upper Limit or P2 – P1 < Lower Limit then P2 = P1 + Price Swing
Agreement Item – Periodicity	Determine the price calculation frequency	Use it as: - Set up the agreed-on frequency with the customer. - Trigger to automatically recalculate the price	• Annually, Semi-Annually, Quarterly, Monthly, Weekly
Agreement item – Index Value	Assign an aggregation method to the index value	Use it to determine the estimated value of the index based on the agreed-on method of calculation	• Average of, Minimum of, Maximum of, Value of.
Agreement Item – Lag/offset rules	define the time-period (Start/End time) that will be considered to calculate the index value	Identify in the contract what index period to use and how frequently to adjust prices	• Please refer to Table-1 above for example of Lag and offset • Lag and offset can be applied at the product code level or at a raw material level
Agreement Item – Adders	Be able to apply adders to the new contract pricing	Add or subtract to the base price either permanently or temporarily for a period of time (i.e. Jan-Feb only - then it reverts back to the normal base price).	• **(Up to 3 Adders)** • Adders are considered a manual entry. (Not pulling from a parameter table of from a data source) • Adders will be added to the new calculated prices.

Agreement Item – Pricing Raw Material	Be able to configure raw material(s) and the associated weight	Use it as input in the new price calculation	• Once selecting the Product Code, allow the user to determine the raw material that will be used to make up the product along with the associated weights.
			• It is no necessary that the weights should add up to 100%
			• Ability to map the raw material to an index.
			• Example: Product Code = X
			  ○ Raw Material 1 = Ammonia
			  ▪ Index 1 = Ammonia IHS Index
			  ▪ Weight = 75%
			  ○ Raw Material 2 = Natural Gas
			  ▪ Index 2 = NYMAX NG Index
			  ▪ Weight = 50%

Agreement – Approval Workflow	Be able to submit the agreement for approval	To ensure agreement conditions are accepted by the required level of authority	• One level of approval (Pricing Manager or Sales Rep → Product Manager) • Approval logic based on metrics from the current agreement on either header or item level
Epic: As a Pricing Manager/Pricing Administrator, I want to use an interface to see all formula-based price records at the Product Code / Customer ID level, so I can effectively manage and administer the price updates and ensure prices are calculated and communicated to the customer based on the agreed-on contract terms.			
Agreement Conditions	Be able to store all agreements conditions a data source	Use it as inputs to or trigger to the automatic price calculation process	• To be updated by Krishna
Price records Key	See prices at the Product ID / Customer Level in a single interface	Leverage Pfx out-of-the-box capabilities to efficiently interact with those prices	• Leverage the out-of-the-box capabilities of Pfx Live Price Grid • The LPG primary keys are Product Code / Customer ID • LPG should automatically include new price records once a new Formula-based agreement is created. • The LPG should automatically remove price records for expired or deleted agreement
Price Records Product and Customer Attributes	See the key product and customer attributes that describe the price record	Use it to interact with the price records	• Product Description and **(up to 3 Product attributes)** • Customer Name and **(up to 3 Customer attributes)** • Formula related attributes **(up to 3 Formula attributes)**

Price Records Formula Attributes	See the key formula parameters	Use it to interact with the price records and understand the variables that influence the new prices	• Index Type, and Index Value • Index Aggregation Method • Periodicity • Lag and offset parameters • Lower and Upper Price Swing Guardrails
Price Records	See the current price and the effective stat date along with the prior price and the prior effective start date	Understand the difference between the old and the new prices	• Current Price • Current Price Effective Start Date • Prior Price • Prior Price Effective Start Date
Automatic Price Calculation	Automatically trigger the price calculation based on the predefined triggers in the formula contract	Ensure that prices are calculated on a timely manner based on the agreed on contract with the customer and reduce any delay.	• Price calculation to be triggered automatically based on an event-based task that will run nightly to determine if any price record should be updated. • Price to be calculated based on pre-defined rules. • Price will be automatically approved
Epic: As a Pricing Manager/Pricing Administrator, I want to store historical price records in a data source within Pfx, so I can use it as the basis to export prices to downstream systems, and/or it can be used for future analytics and for price audit purposes.			
Store Historical Prices	Store prices in a price history table with Pfx	Use it as the source throughout the downstream processes	• Prices will be stored in Pfx Data Source to allow for growth and scalability. • Prices will be stored for up to 2yrs. Pfx will configure a cleaning task to remove prices beyond 2 yrs. Cleaning Task will run on the weekend. • Price History table will include similar key and attributes in the LPG
Extract new Price Records	Extract new price records from the Historical Price Record table	Use it use to trigger processes in downstream applications	• Prices will be exported using a CSV file placed on an agreed on Pfx SFTP folder. • Prices will configure a backend task to run on a nightly basis in order to scan the price record history table for new prices and export them on a single CSV file. • CSV file will include per line the Customer ID, Product Code, New Price, Effective Start Date, Valid-to date (agreement end date) • Customer will have to configure a task to remove the newly placed outbound files from the SFTP folder into another folder.

Scope Validation and Project Readiness Workshop – Validation Questions:			
Questions		Answers	
Q1	Are the formulas managed at the Product level or at the Raw Material level?	A1	
Q2	If both, how many formula contracts are at the product level vs. the raw material level?	A2	
Q3	What are the typical variables in the formula? E.g., Index + Adders + Overage	A3	
Q4	Will there be multiple customers on the same agreement? (i.e. impact on outbound integration)	A4	
Q5	Are there different rules for ship-to vs. sold-to that will impact the final calculated prices and should be managed within the Formula-Builder? E.g. Special freight, surcharge, Inco-terms	A5	
Q6	If the answer is yes, then, What % of the sold-to customers that this requirements impact?	A6	
Q7	Will there be rounding rules negotiated within the contract that impact the intermediate calculation steps before calculating the final price? calculation	A7	
Q8	If the answer is yes, then, What % of the sold-to customers that this requirements impact?	A8	
Q9	Do you negotiate a "Floor Price" within the formula contract?	A9	
Q10	If the answer is yes, then, What % of the sold-to customers that this requirements impact?	A10	
Q11	Product exclusions, which products can you sell to which customers. (APL: Authorized product list)	A11	
Q12	Scale Pricing (on order level) – into what extend does the quantity per order line influence the price?	A12	
Q13	Do you communicate 1) Agreement T&C with the customer, 2) Price updates? on Pdf or excel?	A13	
Q14	How do handle Fixed Price Agreements for Formula-based customers?	A14	

