

User Manual

Crude Oil Model Dashboard

(Version - 1.0)

Submitted to

VOPAK

	NAME	DATE
Prepared By	Swarnendu Haldhar	23-06-2018
Reviewed By	Ishraque Ahmad	24-06-2018
Approved By	Archan	26-06-2018

1. REPORT NAME: User Input Interface

The screenshot displays the 'User Input Interface' for the 'Crude_Oil_Model'. It includes a top navigation bar with tabs for 'Cal_Year', 'Company', 'Location', and 'Discharge_Port'. Below this, there are input fields for 'Year', 'Company', 'Refinery Location', 'Product', and 'Discharge_Port'. A map of India shows the 'All India Pipeline Network and Refineries Location'. To the right, there is a table for 'Refinery Configuration' and a 'PIPELINE DETAILS' section.

Refinery Configuration Table:

Refinery Configuration	Capacity
CDU	6.00
VDU	2.10
HCU	1.95
DCU	1.36
ASPHALT	0.60
LUBE UNIT	0.20

PIPELINE DETAILS:

Imported Crude	Domestic Crude
Vadras-Bina Pipeline	NA

Annotations in the image include: 'FCCU-R % is by default 10% But user can change the %' pointing to the FCCU-R input field; 'Selected company refinery' pointing to the 'Refinery Configuration' table; 'Configuration with capacity' pointing to the 'Capacity' column; 'Imported crude from pipeline' pointing to the 'Imported Crude' column; and 'Domestic crude from pipeline' pointing to the 'Domestic Crude' column.

A. BEST CASE(NO EXCEPTION)

You have to select all the mandatory field to proceed the next tab.

This screenshot shows the 'User Input Interface' with all mandatory fields filled. A black oval highlights the area where an error message would typically appear, with the text 'No Error message' pointing to it.

B. EXCEPTION(MANDATORY FIELDS)

All fields are mandatory. Failure to select any one prompt an error message.

This screenshot shows the 'User Input Interface' with some fields empty. A red oval highlights the error message 'Please Select all * Fields', with the text 'Error message' pointing to it.

C. BACKEND LOGIC(CODE SNAPSOTS)

Please Select all the * Fields which is mandatory field .

Qlik Sense Desktop hub Crude_Oil_Model

Save Crude_Oil_Model

No selections applied

User Input Interface

Please Select all * Fields

Year *

Company *

Refinery Location *

Product

Discharge_Port *

FCCU-R 10 %

TOTAL REFINERY CAPACITY 387.90

Refinery Configuration Capacity

Refinery Configuration	Capacity
ASPHALT	0.00
CDU	0.00
DCCU	0.00
DCU	0.00
FCCU	0.00
FCCU-R	0.00

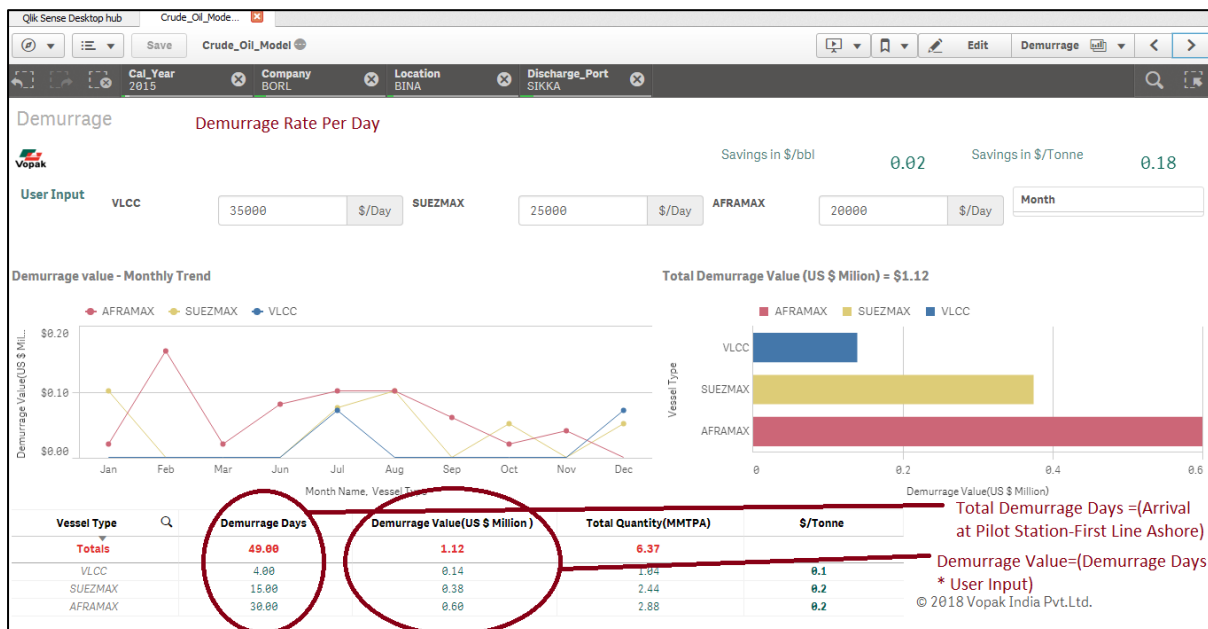
PIPELINE DETAILS

Company

- BORL
- BPCL
- CPCL
- ESSAR
- HMEL
- HPCL
- IOCL
- IOCL
- IOCL

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2. REPORT NAME:- Demurrage



A. BEST CASE(NO EXCEPTION)

You have to select all the mandatory field to proceed the next tab.

Qlik Sense Desktop hub

Crude_Oil_Model

Save

Crude_Oil_Model

Demurrage

No Error Message

Savings in \$/bbl 0.02 Savings in \$/Tonne 0.18

User Input

VLCC

35000 \$/Day SUEZMAX 25000 \$/Day AFRAMAX 20000 \$/Day Month

B. EXCEPTION(MANDATORY FIELDS)

All fields are mandatory. Failure to select any one prompt an error message .

Qlik Sense Desktop hub

Crude_Oil_Model

Save

Crude_Oil_Model

Demurrage

Error Message

Savings in \$/bbl 0.00 Savings in \$/Tonne 0.00

User Input

No selections applied

Please Select all * Fields

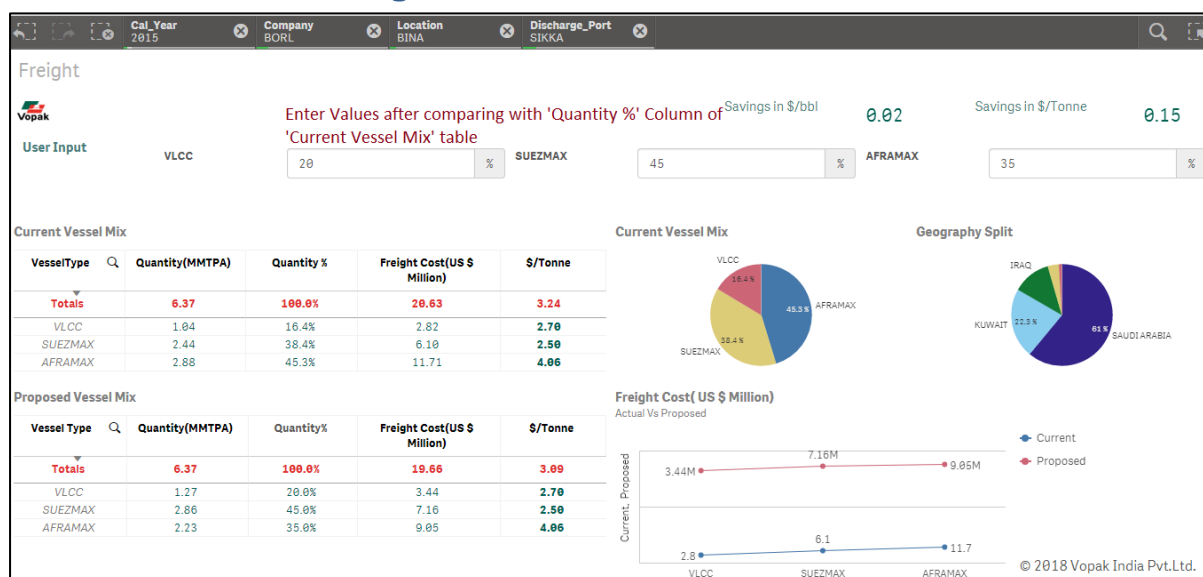
\$/Day SUEZMAX 25000 \$/Day AFRAMAX 20000 \$/Day Month

C. BACKEND LOGIC(CODE SNAPSHTS)

```

126
127 Master_Data_Demurrage:
128
129 LOAD
130     "Vessel Type" as Dem_Vessel_Type,
131     Quantity as Dem_Quantity,
132     "First Line Ashore2" as Dem_Date,
133     year("First Line Ashore2") as Cal_Year,
134     "Demurrage Days",
135     Refiner as Company,
136     "Discharge Port" as Discharge_Port
137
138 FROM [lib://Trans/Master Data - Corrected - v2.0.xlsx]
139 (ooxml, embedded labels, table is Trade);
140 Store Master_Data_Demurrage into [lib://Trans/Master_Data_Demurrage.qvd];
141 Drop Table Master_Data_Demurrage;
142
143
144 Master_Dem:
145 LOAD
146     Dem_Vessel_Type,           //Vessel type
147     Dem_Quantity,             //Demurrage Quantity
148     Dem_Date,                 // Demurrage Date
149     //Cal_Year,
150     Month(Dem_Date) as Month_Name,    //Month Name
151     "Demurrage Days" as Dem_Day,      // Demurrage Days
152     //Company,
153     //Discharge_Port,
154     AutoNumber(Company&Discharge_Port&Cal_Year) as Check6 //Link key with fact table
155 FROM [lib://Trans/Master_Data_Demurrage.qvd]
156 (qvd);
157
158
  
```

3. REPORT NAME:- Freight



Purpose of Tab: The Freight Tab calculates the freight cost of the proposed vessel mix that the refiner desires.

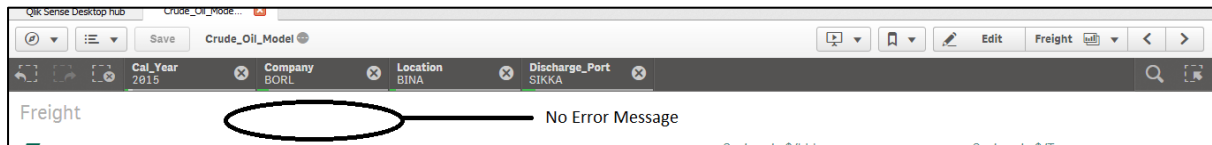
Backend Logic: Compare the percentage entered by the user in the input boxes to the actual percentage of the vessel mix in the “Current Vessel Mix” table. The freight corresponding to the revised quantity calculated as per the entered percentage values is calculated from the back end table by matching the revised quantity to the quantities in the table and picking the corresponding freight. Once done, the revised sum acts as the new freight and is displayed in the “Proposed Vessel Mix” table.

e.g.: In the above snapshot, current quantity equals 1.04 MMTPA for VLCC. This equals 16.4% of total import. The desired % of VLCC given by the user is 20%. We calculate 20% of total import to be 1.27 MMTPA. The application goes to the backend excel sheet and identifies the row at which the import sum equals 1.27 MMTPA. The corresponding row in the freight column is identified and the new freight is calculated as the sum of all rows till this row. The sum is displayed as the new freight value of 3.44 million USD.

The difference between the sums of freight for all three vessel types is divided by the import quantity to obtain the savings in freight

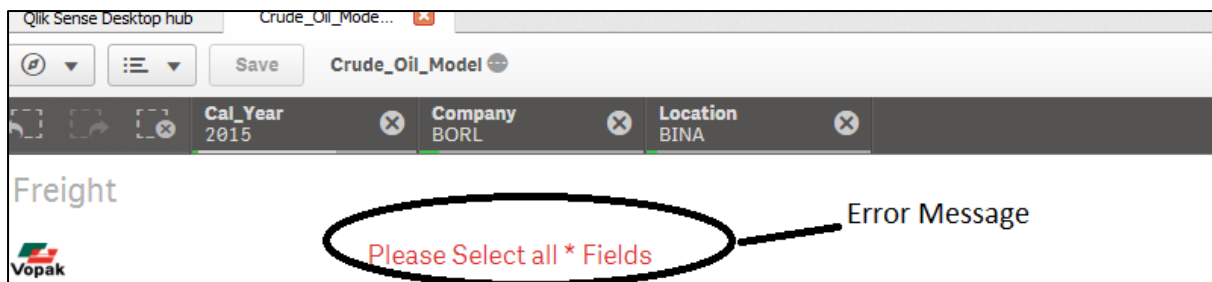
A. BEST CASE(NO EXCEPTION)

You have to select all the mandatory field to proceed the next tab.

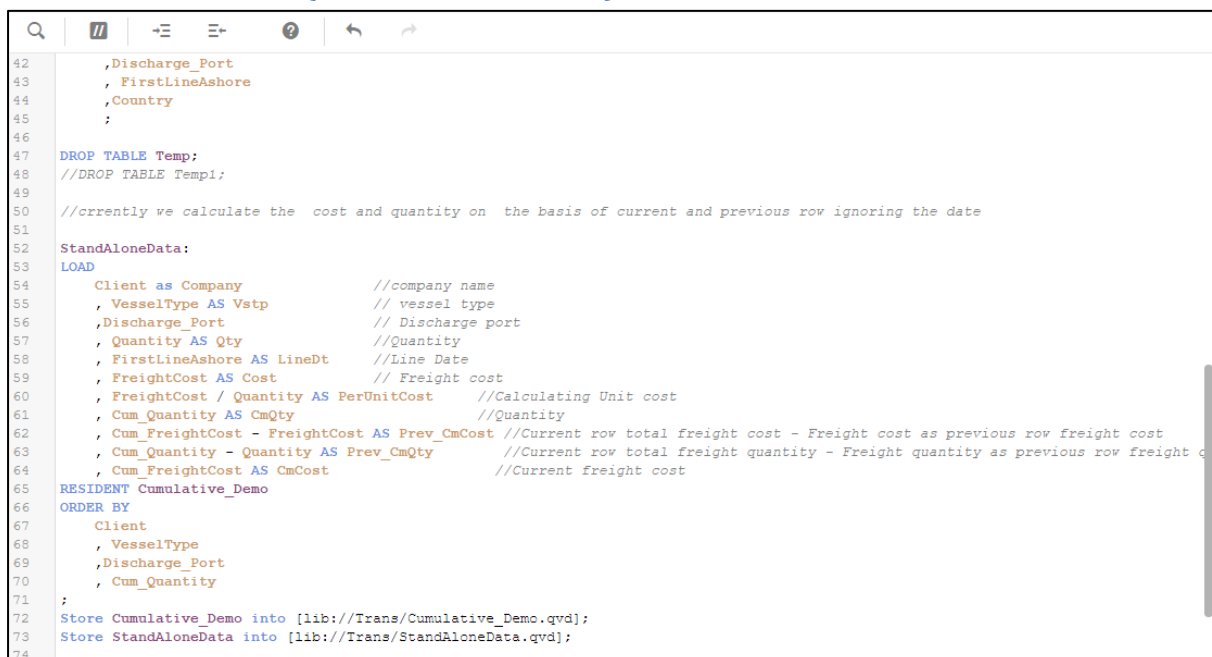


B. EXCEPTION(MANDATORY FIELDS)

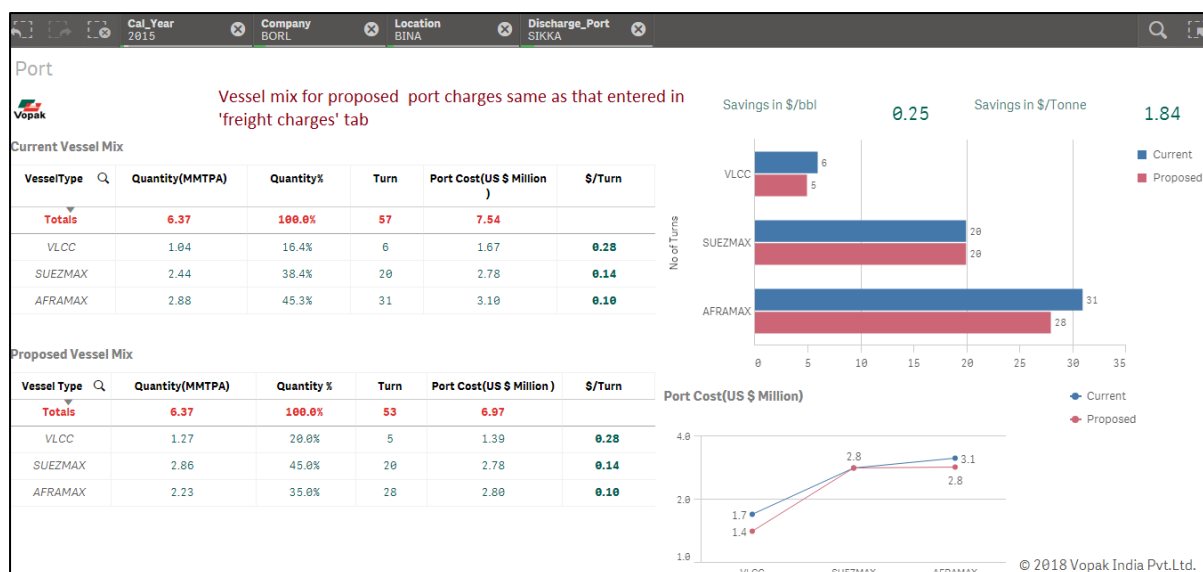
All fields are mandatory. Failure to select any one prompt an error message .



C. BACKEND LOGIC(CODE SNAPSHTS)



4. REPORT NAME:- Port



Purpose of Tab: The Port Tab calculates the Port cost of the proposed vessel mix that is already input in freight tab.

Backend Logic:

1. **No of turn calculation:** The application uses the percentage entered in the “Freight Charges” Tab to calculate the quantity imported for that combination. Once done the quantity import is divided by the cargo size in the following table to get the new no. of turns per vessel type:

Vessel Type	Cargo Size
VLCC	270000
SUEZMAX	140000
AFRAMAX	80000

2. **Port Charges Calculation:** Once the revised No. of turns are obtained we check the Port Charges Master for the same combination of vessel type, discharge port and client and use the same logic used in the Freight Charges calculation to obtain the row at which the No. of turns match the new number. Once the row is locked, the corresponding Port charges are calculated from that row until the first row to obtain the new number.

The New Port Charges per vessel type are divided by the respective New No. of Turns to get the \$/Turn figures.

The difference between the sums of port charges for all three vessel types is divided by the import quantity to obtain the savings in Port Charges.

A. BEST CASE(NO EXCEPTION)

You have to select all the mandatory field to proceed the next tab.

Port

No error message

B. EXCEPTION(MANDATORY FIELDS)

All fields are mandatory. Failure to select any one prompt an error message .

Port

Please Select all * Fields

Error message

C. BACKEND LOGIC(CODE SNAPSHTS)

```

77      ,Discharge_Port
78      , FirstLineAshore
79      ;
80
81 DROP TABLE Temp_Port_Charge;
82 //DROP TABLE Temp1;
83
84 //currently we calculate the cost and Turn on the basis of current and previous row ignoring the dat
85
86 StandAloneData_Port:
87 LOAD
88     Client as Company           //company name
89     , VesselType AS Vstp        // vessel type
90     ,Discharge_Port            // Discharge port
91     , Turns AS Turns1          //Turn
92     , FirstLineAshore AS LineDt //Line Date
93     , Port_Cost AS Cost        // Port cost
94     , Port_Cost / Turns AS PerUnitCost //Calculating Unit cost
95     , Cum_Turns AS CmTurn      //Current Turn
96     , Cum_Port_Cost - Port_Cost AS Prev_CmCost //Current row total port cost - port cost as prev
97     , Cum_Turns - Turns AS Prev_CmTurn      //Current row total port turns - prot as previous row Pot
98     , Cum_Port_Cost AS CmCost                //Current Port cost
99 RESIDENT Temp_Port_Charge_Demo
100 ORDER BY
101     Client
102     , VesselType
103     ,Discharge_Port
104     , Cum_Turns
105
106 ;
107 Store Temp_Port_Charge_Demo into [lib://Trans/Temp_Port_Charge_Demo.qvd];
108 Store StandAloneData_Port into [lib://Trans/StandAloneData_Port.qvd];
109

```


3. REPORT NAME:- Crude Mix

This report is used to calculate the savings in \$/bbl of the selected refinery after comparing the current import to the refinery unit capacities, both divided into 3 API categories: <22, 22-30, >30, in other words, Heavy, Medium and Light Crude.

Current Import				
API	Quantity(MMTPA)	Quantity %	Value(US \$ Million)	
Totals	6.37		2,517.1	
<22	0.00	0.00%	0.0	
>=22<30	1.13	17.80%	408.8	
>=30	5.23	82.20%	2,108.2	

Purpose:

The table shows the breakdown of current import into three API categories and the respective percentages. The application also takes into account “Single port serving multiple refineries” cases. These include Vadinar Port importing crude for IOCL’s Panipat, Mathura and Koyali refineries; and Paradip port importing crude oil for IOCL’s Haldia, Paradip and Barauni refineries.

Logic Used:

$$(Total\ Import) = (CDU - Domestic) /$$

$$(Sum\ of\ (CDU - Domestic) of\ all\ refineries\ served\ by\ that\ port)$$

Projections				
With out hinterland blending				
API	Max Quantity(MMTPA)	MAX Quantity %	Corr. Import(MMTPA)	Value(US \$ Million)
Totals	6.00		6.37	2,372.5
<22	1.96	32.6%	2.08	650.6
>=22<30	0.14	2.4%	0.15	54.7
>=30	3.90	65.0%	4.14	1,667.2

Purpose:

This table gives segregation of refinery units into three categories of API. Hinterland Blending % has also been considered for hinterland refineries. Pipeline norms allow only a certain percentage of heavy crude to be blended. Usual process is to calculate the percentage of the pipeline throughput. However, as one pipeline can be serving multiple refineries, we have considered the percentage blending on the respective CDU capacities of the refineries.

Logic Used for <22 Hinterland Blending:

- User enters the percentage blending of heavy allowed for the pipeline
- The application calculates this percentage of CDU
- This figure is then compared with the sum of all units considered for <22
- The system considers the lesser of the two values as that becomes the new maximum permissible heavy crude for that refinery

In the above case, no value was entered and hence the system considers 100% blending which implies the refinery can take heavy crude equivalent to the sum of the unit capacities i.e. 1.96 MMTPA

Hinterland Blending(<22) = %

User Input For <22 Blending %

User inputs 20% allowable blending i.e. 20% of 6 MMTPA which equals 1.2 MMTPA.

Hinterland Blending(<22) = %

20% allowable hinterland blending

The system compares the two value and finds $1.2 < 1.96$ and replaces the <22 capacity with this figure. The remaining $(1.96 - 1.2) = 0.76$ MMTPA is logically moved down to the next category of API i.e. 22-30. Hence the new capacity of the refinery to accept (22-30) Crude is $(0.14 + 0.76) = 0.90$ MMTPA

Projections		After User Input			
API	Max Quantity(MMTPA)	MAX Quantity %	Corr. Import(MMTPA)	Value(US \$ Million)	
Totals	6.00		6.37	2,410.6	
<22	1.20	20.0%	1.27	399.0	
>=22<30	0.90	15.0%	0.95	344.5	
>=30	3.90	65.0%	4.14	1,667.2	

The table then calculates the percentage of the three API categories and gives us the figures the refiner can import ideally in all 3 categories as per the current import

User Input

<22) % = - % (>22<30)% - %

Without User Input

Proposed Figures(User Input)

API	Max Quantity(MMTPA)	MAX Quantity %	Value(US \$ Million)
Totals	0.00		0.0
<22	-	-	-
>=22<30	-	-	-
>=30	-	-	-

It then gives the user an option to enter the percentage of import for each API category (maximum value is calculated in the “Projections” Tab).

If the user does not utilize all the units for Heavy Crude to the fullest, the balance percentage is then passed on to the Medium Crude category.

User Input

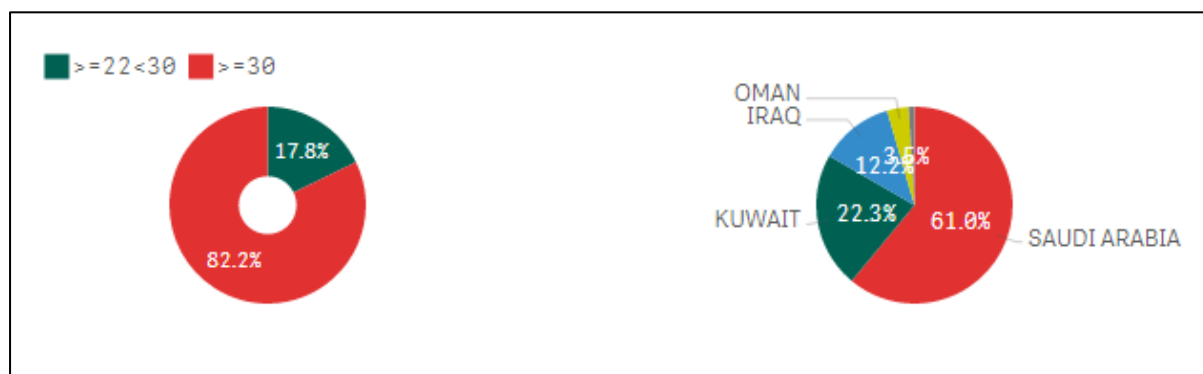
<22) % = % (>22<30)% %

After user input

Proposed Figures(User Input)

API	Max Quantity(MMTPA)	MAX Quantity %	Value(US \$ Million)
Totals	6.37		2,422.0
<22	1.15	18.00%	359.1
>=22<30	0.95	15.00%	344.5
>=30	4.27	67.00%	1,718.5

As can be seen, user enters 18% Heavy Crude and this leaves a balance of 2%, which is then added to Medium Crude to give a total Medium Crude Import Capacity of (15+2) equals 17%



The pie charts indicate the import details by API and by geography

Country List <22

Country	\$/Tonne	\$/bbl
	313.3	42.7
IRAN	277.9	37.9
COLUMBIA	287.7	39.2
BRAZIL	319.5	43.6

Country List (22-30)

Country	\$/Tonne	\$/bbl
	360.7	49.2
COLUMBIA	293.7	40.1
IRAQ	302.3	41.2
MEXICO	320.8	43.8

Country List >30

Country	\$/Tonne	\$/bbl
	402.9	55.0
OMAN	284.5	38.8
IRAN	349.7	47.7
GABON	359.4	49.0

Input Geography

Country

Crude Price 2015

API	\$/Tonne	\$/bbl
<22	313.3	42.75
>=22<30	360.7	49.21
>=30	402.9	54.96

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The table lists down the crude price for that year for the respective API categories and also gives the user the option to change the geography of import for each category if he wishes to do so.

Country List <22

Country	Q	\$/Tonne	\$/bbl
		313.3	42.7
IRAN		277.9	37.9
COLUMBIA		287.7	39.2
BRAZIL		319.5	43.6

Country List (22-30)

Country	Q	\$/Tonne	\$/bbl
		360.7	49.2
COLUMBIA		293.7	40.1
IRAQ		302.3	41.2
MEXICO		320.8	43.8

Country List >30

Country	Q	\$/Tonne	\$/bbl
		402.9	55.0
OMAN		284.5	38.8
IRAN		349.7	47.7
GABON		359.4	49.0

Input Geography

Country

Crude Price 2015

API	Q	\$/Tonne	\$/bbl
<22		313.3	42.75
>=22<30		360.7	49.21
>=30		402.9	54.96

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The average price of the geographies selected is then displayed in the Price table, which is then used as the multiplying factor for each API category in the savings calculations

A. BEST CASE(NO EXCEPTION)

You have to select all the mandatory field to proceed the next tab.

B. EXCEPTION(MANDATORY FIELDS)

All fields are mandatory. Failure to select any one prompt an error message .

C. BACKEND LOGIC(CODE SNAPSNOTS)

```

Main2:

LOAD
  API_Gravity,           //Api gravity field is just divide the api into 3 category which is ('<22,>=22-<30,>=30')
  Discharge_Port,       //Discharge Port
  //Company,
  Region_Crud,          //Region field for Crude Mix Tab
  Country_Crud,         //Region field for Crude Mix Tab
  //Cal_Year,
  Qty as Qty_Crud,      //Import Quantity field for Crude Mix Tab
  //AutoNumber(Company&Cal_Year) as Check2,
  AutoNumber(API_Gravity&Cal_Year) as Check3, //Link key which is linked with Price Master table
  AutoNumber(Company&Discharge_Port) as Check5, //Link key which is linked with fact table
  AutoNumber(Company&Discharge_Port&Cal_Year) as Check6 //Link key which is linked with fact table
FROM [lib://Trans/New.qvd]
(qvd);

Main:

LOAD
  //API_Gravity,
  Country_Value,         //Country Field of Price Master
  "Price Quantity",      //Quantity Field of Price Master
  Price,                 //Value field of Price Master
  //Cal_Year,
  AutoNumber(API_Gravity&Cal_Year) as Check3 //Link key which is linked with Main2(crude mix) table

```