**Price Dynamics**

**TechSci has considered FY 2021 Trade data to depict the Actual Practices (Normal Scenario). FY 2022 and FY 2023 were odd years due to CoVid-19 and significant impact due to changes in the global geo-political environment.**

**Import Price Acrylic Acid Grade wise, FY 2021**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **CIF (USD/KG)** | **Landed (USD/KG)** | **CIF(INR/KG)** | **Landed (INR/KG)** |
| EAA | 1.08 | 1.34 | 79.88 | 99.19 |
| GAA | 1.09 | 1.35 | 80.93 | 99.86 |
| Total | 1.09 | 1.34 | 80.27 | 99.44 |

China is the major exporter of ester acrylic acid that constitute export volume of 58,80,840 kg followed by Indonesia with the export volume of 18,16,450 kg at the JNPT port.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **CIF(USD/KG)** | **Landed (USD/KG)** | **CIF(INR/KG)** | **Landed (INR/KG)** |
| **JNPT** | 1.20 | 1.47 | 87.34 | 107.57 |
| **China** | 1.27 | 1.58 | 92.49 | 115.51 |
| **Indonesia** | 1.10 | 1.34 | 80.55 | 98.17 |
| **South Korea** | 1.03 | 1.26 | 75.31 | 92.03 |
| **Russia** | 0.89 | 1.09 | 64.71 | 79.56 |
| **Others** | 4.41 | 5.27 | 321.99 | 384.73 |

The imported price of ester acrylic acid from Russia is lowest at the landed price of INR79.56 per kg followed by South Korea at INR 92.03.

The import of ester acrylic acid from China is highest constitute 40.79% followed by South Korea 36.93% at the JNPT port.

Indonesia is the major exporter of ester acrylic acid that constitute export volume of 87,81,710 kg followed by Japan with the export volume of 5,62,300 kg at the Vizag port.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **CIF(USD/KG)** | **Landed (USD/KG)** | **CIF(INR/KG)** | **Landed (INR/KG)** |
| **Vizag** | 0.94 | 1.17 | 68.33 | 85.35 |
| **Indonesia** | 0.93 | 1.15 | 67.55 | 84.14 |
| **Japan** | 1.04 | 1.33 | 75.87 | 96.91 |
| **South Korea** | 0.97 | 1.23 | 71.16 | 89.74 |

The imported price of ester acrylic acid from Indonesia is the lowest at the landed price of INR 84.14 per kg followed by South Korea at INR 89.74 at the Vizag port.

Malaysia is the major exporter of glacial acrylic acid that constitute export volume of 52,11,390 kg followed by Russian with the export volume of 29,63,298.50 kg at the JNPT port.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **CIF(USD/KG)** | **Landed (USD/KG)** | **CIF(INR/KG)** | **Landed (INR/KG)** |
| **JNPT** | **1.11** | **1.35** | **80.82** | **98.24** |
| **China** | 1.37 | 1.69 | 100.07 | 123.40 |
| **Indonesia** | 1.11 | 1.35 | 80.85 | 98.36 |
| **Malaysia** | 1.16 | 1.41 | 84.71 | 102.97 |
| **Russia** | 0.89 | 1.07 | 65.19 | 77.79 |
| **Others** | 1.20 | 1.49 | 87.87 | 109.05 |

The imported price of glacial acrylic acid from Russia is lowest at the landed price of INR 77.79 per kg followed by Indonesia at INR 98.36 at the JNPT port.

China is the major exporter of glacial acrylic acid that constitute export volume of 23,92,000 kg followed by Malaysia with the export volume of 21450 kg at the Vizag port.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **CIF(USD/KG)** | **Landed (USD/KG)** | **CIF(INR/KG)** | **Landed (INR/KG)** |
| **Vizag Port** | 1.02 | 1.31 | 74.69 | 95.38 |
| **China** | 1.02 | 1.31 | 74.69 | 95.41 |
| **Malaysia** | 1.01 | 1.26 | 74.09 | 92.24 |
| **Others** | 0.00 | 0.00 | 0.00 | 0.00 |

The imported price of glacial acrylic acid from Malaysia is lowest at the landed price of INR 92.24 per kg followed by China at INR 95.41 at the JNPT port.

**Relationship among Feedstock and Energy Prices and Acrylic Acid: Multi Variate Linear Regression Analysis**

Based on insights from major manufacturers globally, the Energy and Feedstock price movement significantly contributes to determining the price of Acrylic Acid. However, the factors impacting the price of Acrylic Acid will vary in different geographies primarily because of the feedstock production routes and energy mix.

Multivariate Linear Regression Analysis

* TechSci Research used the Multivariate Linear regression, a technique that estimates a single regression model with more than one outcome variable.
* A multivariate linear regression analysis was performed to understand the combined impact of Crude Oil and Propylene Polymer Grade price fluctuation on the price trend of Ester Acrylic Acid.

 Correlation

* TechSci Research used the Correlation to derive the correlation coefficient between Crude Oil, Propylene Polymer Grade, Ester Acrylic Acid and Glacial Acrylic Acid while considering the price forecast.
* The correlation coefficient is a statistical measure of the strength of a linear relationship between two variables ranging from -1 to 1.
* A correlation of -1.0 indicates a perfect negative correlation, and a correlation of 1.0 indicates a perfect positive correlation.
* The coefficients have been observed leaning towards positive 1, realising a positive correlation.

TechSci considered Crude Oil Price (FOB) India Basket, and Propylene Polymer Grade Contracted Price (Ex-Hazira) from the TechSci database.

**Steps Involved**

**Feedstock and Energy Prices of Propylene**, Crude Oil, Ester Acrylic Acid and Glacial Acrylic Acid have been considered to do the Multi Variate Linear Regression Analysis.

**Step 1:**Crude oil Prices over the last 10 years, starting from April 2012 have been considered for the regression analysis.

**Step 2:**Linear regression analysis between the Crude oil prices with Propylene price was performed to understand the correlation (Multiple R), R-squared factor of the regression analysis.

**Step 3:** The procedure in step 2 was repeated, this time between Propylene Price and Ester Acrylic Acid.

**Step 4:** A multivariate regression analysis was performed to understand the combined impact of Crude Oil and Propylene Polymer Grade price fluctuation on the price trend of Ester Acrylic Acid.

**Step 5:** The procedure in Steps 2, 3 and 4 was repeated with Crude Oil and Polymer Grade Propylene Prices (feedstock prices).

**Step 6:** Another multivariate analysis was performed to determine the combined impact of Energy and feedstock prices.

**Step 7:** The correlation factors from the above analysis were evaluated to find the strongest correlation among them.

**Step 8:** The regression coefficients of each of the input variables of the analysis with the strongest correlation were chosen along with the intercept along the best fit line.

*Note: In this method*, *TechSci has assumed the Crude Oil and Propylene Polymer Grade to be independent variables as the corelation factor for these prices. The double impact of Crude Oil as a feedstock source and as an energy source has been neglected deliberately as its impact on feedstock prices is already reflected in the price trend of Propylene and Ester Grade Acrylic Acid.*

**Propylene Crude Oil- Regression**

**SUMMARY OUTPUT**

|  |  |
| --- | --- |
| ***Regression Statistics*** | |
| Multiple R | 0.729199772 |
| R Square | 0.531732307 |
| Adjusted R Square | 0.473198845 |
| Standard Error | 11436.78469 |
| Observations | 10 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **ANOVA** |  |  |  |  |  |
|  | ***Df*** | ***SS*** | ***MS*** | ***F*** | ***Significance F*** |
| Regression | 1 | 1188219647 | 1188219647 | 9.084245 | 0.01671123 |
| Residual | 8 | 1046400353 | 130800044.1 |  |  |
| Total | 9 | 2234620000 |  |  |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | ***Coefficients*** | ***Standard Error*** | ***t Stat*** | ***P-value*** | ***Lower 95%*** | ***Upper 95%*** | ***Lower 95.0%*** | ***Upper 95.0%*** |
| Intercept | 23438.07676 | 12313.76858 | 1.903404032 | 0.093476 | -4957.524498 | 51833.67803 | -4957.524498 | 51833.67803 |
| 45878.31196 | 1.009352603 | 0.334887153 | 3.01400813 | 0.016711 | 0.237101442 | 1.781603763 | 0.237101442 | 1.781603763 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **RESIDUALOUTPT** | |  |  | |
|  | |  |  | |
| ***Observation*** | | ***Predicted 56350*** | ***Residuals*** | |
| 1 | | 70534.66568 | -11954.66568 | |
| 2 | | 62943.45221 | -18463.45221 | |
| 3 | | 46130.30962 | -11340.30962 | |
| 4 | | 46093.90048 | -2453.900478 | |
| 5 | | 51689.27425 | 9520.725748 | |
| 6 | | 59434.36794 | 2275.632064 | |
| 7 | | 56215.19866 | 2254.801344 | |
| 8 | | 47678.6941 | 13741.3059 | |
| 9 | | 68974.02183 | 6900.978172 | |
| 10 | | 79456.11524 | 9518.884762 | |
| **PROBABILITYOUTPUT** | | | |
|  |  | | |
| ***Percentile*** | ***56350*** | | |
| 5 | 34790 | | |
| 15 | 43640 | | |
| 25 | 44480 | | |
| 35 | 58470 | | |
| 45 | 58580 | | |
| 55 | 61210 | | |
| 65 | 61420 | | |
| 75 | 61710 | | |
| 85 | 75875 | | |
| 95 | 88975 | | |

Note: Linear Regression suggested to know the relationship between— Crude Oil, Propylene, Ester Acrylic Acid, and Glacial Acrylic Acid at 95% confidence level.

* + R Square values were positive with a varying degree in all possible propositions, indicating a positive linear relationship but it was not closer to 1. It indicates that there are various factors too which impact more on price.

**R Square (R²):** R², in this case, is 53%, which implies that the Crude Oil Prices can explain 53% of the variation in the Propylene Polymer Grade Prices.

**Glacial Acrylic Acid Delivered Price Propylene Regression**

**SUMMARY OUTPUT**

|  |  |
| --- | --- |
| ***Regression Statistics*** | |
| Multiple R | 0.730522533 |
| R Square | 0.533663172 |
| Adjusted R Square | 0.475371068 |
| Standard Error | 29456.12319 |
| Observations | 10 |

**ANOVA**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | ***Df*** | ***SS*** | ***MS*** | ***F*** | ***Significance F*** |
| Regression | 1 | 7943441122 | 7943441122 | 9.154982 | 0.016416 |
| Residual | 8 | 6941305549 | 867663193.6 |  |  |
| Total | 9 | 14884746670 |  |  |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | ***Coefficients*** | ***Standard Error*** | ***t Stat*** | ***P-value*** | ***Lower 95%*** | ***Upper 95%*** | ***Lower 95.0%*** | ***Upper 95.0%*** |
| Intercept | 19993.33655 | 37874.5961 | 0.527882502 | 0.611905 | -67345.64 | 107332.3 | -67345.64 | 107332.3 |
| 56350 | 1.885395645 | 0.62312295 | 3.025720118 | 0.016416 | 0.4484715 | 3.32232 | 0.448472 | 3.32232 |

**RESIDUAL OUTPUT**

|  |  |  |
| --- | --- | --- |
| ***Observation*** | ***Predicted 135903.36*** | ***Residuals*** |
| 1 | 130439.8135 | 22202.37654 |
| 2 | 103855.7349 | 33258.83514 |
| 3 | 85586.25105 | 4597.028947 |
| 4 | 102272.0025 | -12749.54252 |
| 5 | 135398.404 | -25048.79401 |
| 6 | 136341.1018 | -12869.86183 |
| 7 | 130232.4199 | -21004.07994 |
| 8 | 135794.3371 | -30478.18709 |
| 9 | 163047.7311 | 53522.88885 |
| 10 | 187746.4141 | -11430.6641 |

**PROBABILITY OUTPUT**

|  |  |
| --- | --- |
| ***Percentile*** | ***135903.36*** |
| 5 | 89522.46 |
| 15 | 90183.28 |
| 25 | 105316.15 |
| 35 | 109228.34 |
| 45 | 110349.61 |
| 55 | 123471.24 |
| 65 | 137114.57 |
| 75 | 152642.19 |
| 85 | 176315.75 |
| 95 | 216570.62 |

R², in this case, is 53%, which implies that the Propylene Polymer Grade Prices can explain 53% of the variation in the Glacial Acrylic Acid Prices.

**Ester Acrylic Acid Delivered Price Propylene Regression**

**SUMMARY OUTPUT**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ***Regression Statistics*** | | | | | | | |
| Multiple R | | 0.75275785 | | | | | |
| R Square | | 0.566644381 | | | | | |
| Adjusted R Square | | 0.512474928 | | | | | |
| Standard Error | | 24190.96085 | | | | | |
| Observations | | 10 | | | | | |
| **ANOVA** |  | |  |  |  |  |
|  | ***Df*** | | ***SS*** | ***MS*** | ***F*** | ***Significance F*** |
| Regression | 1 | | 6121563773 | 6121563773 | 10.46059 | 0.0119798 |
| Residual | 8 | | 4681620694 | 585202586.8 |  |  |
| Total | 9 | | 10803184468 |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | ***Coefficients*** | | ***Standard Error*** | ***t Stat*** | ***P-value*** | ***Lower 95%*** | ***Upper 95%*** | ***Lower 95.0%*** | ***Upper 95.0%*** |
| Intercept | | 26047.27123 | 31104.66592 | 0.837407201 | 0.426671 | -45680.22 | 97774.76 | -45680.22 | 97774.76 |
| 56350 | | 1.655119473 | 0.511742254 | 3.234283391 | 0.01198 | 0.4750397 | 2.835199 | 0.47504 | 2.835199 |

**RESIDUAL OUTPUT**

|  |  |  |
| --- | --- | --- |
| ***Observation*** | ***Predicted 129734.52*** | ***Residuals*** |
| 1 | 123004.17 | 21949.79002 |
| 2 | 99666.9854 | 31080.4346 |
| 3 | 83628.8777 | 3155.462295 |
| 4 | 98276.68504 | -12350.39504 |
| 5 | 127357.1342 | -22436.94419 |
| 6 | 128184.6939 | -11817.71393 |
| 7 | 122822.1068 | -19228.99683 |
| 8 | 127704.7093 | -23058.67928 |
| 9 | 151629.4613 | 38623.87873 |
| 10 | 173311.5264 | -5916.83637 |

**PROBABILITY OUTPUT**

|  |  |
| --- | --- |
| ***Percentile*** | ***129734.52*** |
| 5 | 85926.29 |
| 15 | 86784.34 |
| 25 | 103593.11 |
| 35 | 104646.03 |
| 45 | 104920.19 |
| 55 | 116366.98 |
| 65 | 130747.42 |
| 75 | 144953.96 |
| 85 | 167394.69 |
| 95 | 190253.34 |

***Note:***

***Linear Regression***

R², in this case, is 56%, which implies that the Propylene Polymer Grade Prices can explain 56% of the variation in the Ester Acrylic Acid Prices*.*

**Correlation Multiverse Regression**

**Crude Oil FOB Price (Indian Basket) Average (INR/Ton) (FY2013-17)**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2013** | **2014** | **2015** | **2016** | **2017** | **2018** | **2019** | **2020** | **2021** | **2022** | **2023** |
| 45878 | 46660 | 39139 | 22482 | 22446 | 27989 | 35663 | 32473 | 24016 | 45114 | 55499 |

**Propylene Polymer Grade (Contract) Ex-Hazira (India)**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2013** | **2014** | **2015** | **2016** | **2017** | **2018** | **2019** | **2020** | **2021** | **2022** | **2023** |
| 56350 | 58850 | 44480 | 34790 | 43640 | 61210 | 61710 | 58470 | 61420 | 75875 | 88975 |

**Ester Acrylic Acid Delivered Price**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2013** | **2014** | **2015** | **2016** | **2017** | **2018** | **2019** | **2020** | **2021** | **2022** | **2023** |
| 129735 | 144954 | 130747 | 86784 | 85926 | 104920 | 116367 | 103593 | 104646 | 190253 | 167395 |

**Glacial Acrylic Acid Delivered Price**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2013** | **2014** | **2015** | **2016** | **2017** | **2018** | **2019** | **2020** | **2021** | **2022** | **2023** |
| 135903 | 152642 | 137115 | 90183 | 89522 | 110350 | 123471 | 109228 | 105316 | 216571 | 176316 |

**Crude Oil FOB Price (Indian Basket) Average (INR/Ton)**

|  |  |
| --- | --- |
| **Crude Oil FOB Price (Indian Basket) Average (INR/Ton)** | 1 |
| **Propylene Polymer Grade (Contract) Ex-Hazira (India)** | 0.682768984 |
| **Ester Acrylic Acid Delivered Price** | 0.870148652 |
| **Glacial Acrylic Acid Delivered Price** | 0.833443453 |

**Propylene Polymer Grade (Contract) Ex-Hazira (India)**

|  |  |
| --- | --- |
| **Crude Oil FOB Price (Indian Basket) Average (INR/Ton)** | - |
| **Propylene Polymer Grade (Contract) Ex-Hazira (India)** | 1 |
| **Ester Acrylic Acid Delivered Price** | 0.747626538 |
| **Glacial Acrylic Acid Delivered Price** | 0.72707761 |

**Ester Acrylic Acid Delivered Price**

|  |  |
| --- | --- |
| **Crude Oil FOB Price (Indian Basket) Average (INR/Ton)** | - |
| **Propylene Polymer Grade (Contract) Ex-Hazira (India)** | - |
| **Ester Acrylic Acid Delivered Price** | 1 |
| **Glacial Acrylic Acid Delivered Price** | 0.995191406 |

**Glacial Acrylic Acid Delivered Price**

|  |  |
| --- | --- |
| **Crude Oil FOB Price (Indian Basket) Average (INR/Ton)** | - |
| **Propylene Polymer Grade (Contract) Ex-Hazira (India)** | - |
| **Ester Acrylic Acid Delivered Price** | - |
| **Glacial Acrylic Acid Delivered Price** | 1 |

***Note:***

* *TechSci Research used the Correlation Coefficient while considering the price forecast.*
* *The correlation coefficient is a statistical measure of the strength of a linear relationship between two variables.*
* *Its values can range from -1 to 1.*
* *A correlation of -1.0 indicates a perfect negative correlation, and a correlation of 1.0 indicates a perfect positive correlation.*
* *In the above Correlation table, the coefficients have been observed leaning towards positive 1, realising a positive correlation.*

**SUMMARY OUTPUT**

|  |  |
| --- | --- |
| *Regression Statistics* | |
| Multiple R | 0.905124426 |
| R Square | 0.819250227 |
| Adjusted R Square | 0.767607435 |
| Standard Error | 16701.89527 |
| Observations | 10 |

**ANOVA**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | *df* | *SS* | *MS* | *F* | *Significance F* |
| Regression | 2 | 8850511329 | 4425255665 | 15.86378644 | 0.002510569 |
| Residual | 7 | 1952673138 | 278953305.5 |  |  |
| Total | 9 | 10803184468 |  |  |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | ***Coefficients*** | ***Standard Error*** | ***t Stat*** | ***P-value*** | ***Lower 95%*** | ***Upper 95%*** | ***Lower 95.0%*** | ***Upper 95.0%*** |
| Intercept | 16856.72005 | 21675.34092 | 0.777691115 | 0.462220988 | -34397.31675 | 68110.75685 | -34397.31675 | 68110.75685 |
| 45878.31 | 2.235347891 | 0.714682724 | 3.127748603 | 0.016662091 | 0.54539179 | 3.925303992 | 0.54539179 | 3.925303992 |
| 56350 | 0.477526422 | 0.516317501 | 0.924869719 | 0.385807353 | -0.743370463 | 1.698423307 | -0.743370463 | 1.698423307 |

**RESIDUAL OUTPUT**

|  |  |  |
| --- | --- | --- |
| *Observation* | *Predicted 129734.52* | *Residuals* |
| 1 | 149131.9752 | -4178.015158 |
| 2 | 125587.0917 | 5160.328285 |
| 3 | 83724.88849 | 3059.451507 |
| 4 | 87870.36833 | -1944.078329 |
| 5 | 108652.2033 | -3732.013305 |
| 6 | 126043.5285 | -9676.548548 |
| 7 | 117367.0585 | -13773.9485 |
| 8 | 99870.53019 | 4775.49981 |
| 9 | 153934.5444 | 36318.79558 |
| 10 | 183404.1613 | -16009.47134 |

**PROBABILITY OUTPUT**

|  |  |
| --- | --- |
| *Percentile* | *129734.52* |
| 5 | 85926.29 |
| 15 | 86784.34 |
| 25 | 103593.11 |
| 35 | 104646.03 |
| 45 | 104920.19 |
| 55 | 116366.98 |
| 65 | 130747.42 |
| 75 | 144953.96 |
| 85 | 167394.69 |
| 95 | 190253.34 |

**Note:**

* *A regression is a statistical technique that relates a dependent variable to one or more independent (explanatory) variables.*
* *A regression model is able to show whether changes observed in the dependent variable are associated with changes in one or more of the explanatory variables.*
* *TechSci Research used various techniques to understand the price trend, correlation and forecast supported with primary interview among key suppliers.*

**Linear Regression**

1. Linear regression is a statistical technique that examines the linear relationship between a dependent variable and one or more independent variables.
2. Linear relationship means the change in an independent variable(s) causes a change in the dependent variable.
   * **Positive Linear Relationship:** When the independent variable increases, the dependent variable increases too.
   * **Negative Linear Relationship:** When the independent variable increases, the dependent variable decreases.

**Exponential Smoothing (Based on Past Data)**

* Exponential smoothing forecasting is based on the AAA version (additive error, additive trend, and additive seasonality) of the Exponential Triple Smoothing (ETS)
* TechSci Research used the Exponential Smoothing while considering the price forecast and Primary interviews from the industry shown the confidence on the output.

**Regression Statistics**

**R Square (R²)**

* Represents the power of a model. It shows the amount of variation in the dependent variable the independent variable explains and always lies between values 0 and 1.
* As the R² increases, more variation in the data is explained by the model and better the model gets at prediction.
* A low R² would indicate that the model doesn’t fit the data well and that an independent variable doesn’t explain the variation in the dependent variable well.
* R², in this case, is 81%, which implies that the Crude Oil Prices and Propylene Polymer Grade Prices can explain 81% of the variation in the Ester Acrylic Acid Prices.

**Adjusted R²**

* R² multiplied by an adjustment factor.
* This is used while comparing different regression models with different independent variables
* This number comes in handy while deciding on the right independent variables in multiple regression models.

**Multiple R**

* is the positive square root of R²

**Standard Error**

* is different from the standard error of the coefficients.
* This is the estimated standard deviation of the error of the regression equation and is a good measure of the accuracy of the regression line.
* It is the square root of the residual mean squared errors.

**Price Forecast**

TechSci Research has applied two approaches for the price forecast.

* **Approach 1**: Linear Regression Analysis Based on Historical Data of GAA and AA
* **Approach 2**: Primary Research— Surveys conducted at different levels among the participants of acrylic acid supply chain.

**Approach 1**: Linear Regression Analysis based on historical data of GAA and AA

The forecasting exercise is based on the historical price movement. The forecasted value is conditioned below.

* The crude oil prices will remain within average limits during the next ten years.
* No technological innovations of substantial magnitude will take place which may lead to sea-change in technologies / processes used today.
* Change in the Historical Exchange Rate will follow the same trend.
* Absence of any abnormal situation

**Crude Oil Forecast**

|  |  |  |
| --- | --- | --- |
| **Year** | **Historical Value** | **Forecast** |
| 2013 | 45878.31 | - |
| 2014 | 46660.19 | - |
| 2015 | 39139.32 | - |
| 2016 | 22481.97 | - |
| 2017 | 22445.9 | - |
| 2018 | 27989.42 | - |
| 2019 | 35662.75 | - |
| 2020 | 32473.41 | - |
| 2021 | 24016.01 | - |
| 2022 | 45114.01 | - |
| 2023 | 55498.98 | 55498.98 |
| 2024 |  | 55769.42 |
| 2025 |  | 56039.861 |
| 2026 |  | 56310.301 |
| 2027 |  | 56580.741 |
| 2028 |  | 56851.181 |
| 2029 |  | 57121.622 |
| 2030 |  | 57392.062 |
| 2031 |  | 57662.502 |
| 2032 |  | 57932.942 |
| 2033 |  | 58203.383 |
| 2034 |  | 58473.823 |
| 2035 |  | 58744.263 |
| 2036 |  | 59014.704 |
| 2037 |  | 59285.144 |
| 2038 |  | 59555.584 |
| 2039 |  | 59826.024 |
| 2040 |  | 60096.465 |
| 2041 |  | 60366.905 |
| 2042 |  | 60637.345 |
| 2043 |  | 60907.785 |
| 2044 |  | 61178.226 |
| 2045 |  | 61448.666 |
| 2046 |  | 61719.106 |
| 2047 |  | 61989.547 |
| 2048 |  | 62259.987 |

**Propylene Forecast**

|  |  |  |
| --- | --- | --- |
| **Year** | **Historical Value** | **Forecast** |
| 2013 | 56350 | - |
| 2014 | 58580 | - |
| 2015 | 44480 | - |
| 2016 | 34790 | - |
| 2017 | 43640 | - |
| 2018 | 61210 | - |
| 2019 | 61710 | - |
| 2020 | 58470 | - |
| 2021 | 61420 | - |
| 2022 | 75875 | - |
| 2023 | 88975 |  |
| 2024 | - | 91037.201 |
| 2025 | - | 94205.878 |
| 2026 | - | 97374.555 |
| 2027 | - | 100543.23 |
| 2028 | - | 103711.91 |
| 2029 | - | 106880.59 |
| 2030 | - | 110049.26 |
| 2031 | - | 113217.94 |
| 2032 | - | 116386.62 |
| 2033 | - | 119555.3 |
| 2034 | - | 122723.97 |
| 2035 | - | 125892.65 |
| 2036 | - | 129061.33 |
| 2037 | - | 132230.01 |
| 2038 | - | 135398.68 |
| 2039 | - | 138567.36 |
| 2040 | - | 141736.04 |
| 2041 | - | 144904.72 |
| 2042 | - | 148073.39 |
| 2043 | - | 151242.07 |
| 2044 | - | 154410.75 |
| 2045 | - | 157579.42 |
| 2046 | - | 160748.1 |
| 2047 | - | 163916.78 |
| 2048 | - | 167085.46 |

**Glacial Acrylic Acid Forecast**

|  |  |  |
| --- | --- | --- |
| **Year** | **Historical Value** | **Forecast** |
| 2013 | 135903.6 | - |
| 2014 | 152641.8 | - |
| 2015 | 137113.9 | - |
| 2016 | 90182.75 | - |
| 2017 | 89522.04 | - |
| 2018 | 110350.2 | - |
| 2019 | 123471.3 | - |
| 2020 | 109227.5 | - |
| 2021 | 105316.6 | - |
| 2022 | 216570.1 | - |
| 2023 | 176315.5 | 176315.5 |
| 2024 | - | 180264.77 |
| 2025 | - | 184214.05 |
| 2026 | - | 188163.32 |
| 2027 | - | 192112.6 |
| 2028 | - | 196061.87 |
| 2029 | - | 200011.15 |
| 2030 | - | 203960.42 |
| 2031 | - | 207909.69 |
| 2032 | - | 211858.97 |
| 2033 | - | 215808.24 |
| 2034 | - | 219757.52 |
| 2035 | - | 223706.79 |
| 2036 | - | 227656.07 |
| 2037 | - | 231605.34 |
| 2038 | - | 235554.61 |
| 2039 | - | 239503.89 |
| 2040 | - | 243453.16 |
| 2041 | - | 247402.44 |
| 2042 | - | 251351.71 |
| 2043 | - | 255300.99 |
| 2044 | - | 259250.26 |
| 2045 | - | 263199.54 |
| 2046 | - | 267148.81 |
| 2047 | - | 271098.08 |
| 2048 | - | 275047.36 |

**Ester Acrylic Acid**

|  |  |  |
| --- | --- | --- |
| **Year** | **Historical Value** | **Forecast** |
| 2013 | 129734.7 | - |
| 2014 | 144953.5 | - |
| 2015 | 130746.8 | - |
| 2016 | 86783.81 | - |
| 2017 | 85925.87 | - |
| 2018 | 104920.8 | - |
| 2019 | 116367 | - |
| 2020 | 103592.3 | - |
| 2021 | 104646.5 | - |
| 2022 | 190252.8 | - |
| 2023 | 167394.4 | 167394.44 |
| 2024 | - | 170624.02 |
| 2025 | - | 173853.59 |
| 2026 | - | 177083.17 |
| 2027 | - | 180312.74 |
| 2028 | - | 183542.32 |
| 2029 | - | 186771.89 |
| 2030 | - | 190001.47 |
| 2031 | - | 193231.04 |
| 2032 | - | 196460.62 |
| 2033 | - | 199690.19 |
| 2034 | - | 202919.77 |
| 2035 | - | 206149.34 |
| 2036 | - | 209378.92 |
| 2037 | - | 212608.5 |
| 2038 | - | 215838.07 |
| 2039 | - | 219067.65 |
| 2040 | - | 222297.22 |
| 2041 | - | 225526.8 |
| 2042 | - | 228756.37 |
| 2043 | - | 231985.95 |
| 2044 | - | 235215.52 |
| 2045 | - | 238445.1 |
| 2046 | - | 241674.67 |
| 2047 | - | 244904.25 |
| 2048 | - | 248133.83 |

**Approach 2**: Primary Research— Surveys conducted at different levels among the participants of acrylic acid supply chain.

Key Findings include:

* It was understood that various factors are in play such as Exchange rate, Conversion rate, Demand / availability scenario, Feedstock price changes, Geo-political scenario, Global economy, etc, Inflation, Taxation.
* Presently, crude oil price fluctuations are showing considerable volatility due to several socio-political factors worldwide. Various influencing factors for price movement include raw-materials / feedstock prices and demand – supply balances in the region which built the relationship of product to substitute products having comparable properties and common end-uses as well as their prices.
* Feedstock prices directly affect the price of product. Increased feedstock prices, if passed on to end-users, increase the inflation and if not, they squeeze the margins of producers leading to making the industry unattractive for further investments. This leads to supply crunch and shortage of product in the market. The shortage leads to further increase in prices of product.

Respondent shared their forecasted estimates as given below:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Year** | **Ester Acrylic Acid CIF** | **Ester Acrylic Acid Landed Price** | Logistic Cost | Ester Acrylic Acid Dollars of the Day |
| FY2013 | 106603 | 126529 | 3205 |  |
| FY2014 | 119056 | 141311 | 3643 |  |
| FY2015 | 107384 | 127456 | 3291 |  |
| FY2016 | 70250 | 83381 | 3403 |  |
| FY2017 | 69410 | 82384 | 3542 |  |
| FY2018 | 84890 | 100758 | 4162 |  |
| FY2019 | 94571 | 112248 | 4119 |  |
| FY2020 | 80240 | 98687 | 4906 |  |
| FY2021 | 79879 | 99194 | 5452 |  |
| FY2022 | 148900 | 184579 | 5674 |  |
| FY2023 | 132037 | 161895 | 5500 |  |
| FY2028F | 163756 | 200787 | 6324 | 191704 |
| FY2033F | 196377 | 240785 | 7235 | 229582 |
| FY2038F | 227655 | 279135 | 8179 | 264606 |
| FY2043F | 257571 | 315816 | 9152 | 299880 |
| FY2048F | 281602 | 345281 | 10081 | 327351 |

**Pessimistic/ Realistic/Optimistic Ester Acrylic Acid**

|  |  |  |  |
| --- | --- | --- | --- |
| **Year** | Pessimistic Ester Acrylic Acid Delivered Price | **Realistic Ester Acrylic Acid Delivered Price** | Optimistic Ester Acrylic Acid Delivered Price |
| FY2013 |  | 129735 |  |
| FY2014 |  | 144954 |  |
| FY2015 |  | 130747 |  |
| FY2016 |  | 86784 |  |
| FY2017 |  | 85926 |  |
| FY2018 |  | 104921 |  |
| FY2019 |  | 116367 |  |
| FY2020 |  | 103592 |  |
| FY2021 |  | 104647 |  |
| FY2022 |  | 190253 |  |
| FY2023 |  | 167394 |  |
| FY2028F | 197023 | 207110 | 217621 |
| FY2033F | 235228 | 248020 | 261319 |
| FY2038F | 271670 | 287315 | 303331 |
| FY2043F | 306939 | 324968 | 343994 |
| FY2048F | 334715 | 355362 | 376807 |

**Glacial Acrylic Acid**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Year** | **Glacial Acrylic Acid CIF** | **Glacial Acrylic Acid Landed Price** | **Logistic Cost** | **Glacial Acrylic Acid Dollars of the Day** |
| FY2013 | 111800 | 132698 | 3205 |  |
| FY2014 | 125534 | 148999 | 3643 |  |
| FY2015 | 112748 | 133823 | 3291 |  |
| FY2016 | 73113 | 86780 | 3403 |  |
| FY2017 | 72440 | 85980 | 3542 |  |
| FY2018 | 89465 | 106188 | 4162 |  |
| FY2019 | 100556 | 119352 | 4119 |  |
| FY2020 | 84987 | 104322 | 4906 |  |
| FY2021 | 80925 | 99864 | 5452 |  |
| FY2022 | 169509 | 210897 | 5674 |  |
| FY2023 | 138565 | 170816 | 5500 |  |
| FY2028F | 169397 | 208825 | 6324 | 199144 |
| FY2033F | 219305 | 270348 | 7235 | 256948 |
| FY2038F | 261726 | 322643 | 8179 | 304675 |
| FY2043F | 304888 | 375851 | 9152 | 355280 |
| FY2048F | 334974 | 412940 | 10081 | 389677 |

**Pessimistic/ Realistic/Optimistic Glacial Acrylic Acid**

|  |  |  |  |
| --- | --- | --- | --- |
| **Year** | Pessimistic Glacial Acrylic Acid Delivered Price | **Realistic Glacial Acrylic Acid Delivered Price** | Optimistic Glacial Acrylic Acid Delivered Price |
| FY2013 |  | 135904 |  |
| FY2014 |  | 152642 |  |
| FY2015 |  | 137114 |  |
| FY2016 |  | 90183 |  |
| FY2017 |  | 89522 |  |
| FY2018 |  | 110350 |  |
| FY2019 |  | 123471 |  |
| FY2020 |  | 109228 |  |
| FY2021 |  | 105317 |  |
| FY2022 |  | 216570 |  |
| FY2023 |  | 176316 |  |
| FY2028F | 204670 | 215148 | 226067 |
| FY2033F | 263267 | 277583 | 292468 |
| FY2038F | 312808 | 330822 | 349265 |
| FY2043F | 363644 | 385003 | 407543 |
| FY2048F | 398442 | 423020 | 448549 |

***Note:***

|  |  |
| --- | --- |
| **Unit** | **INR/Ton** |
| CIF | Cost + Insurance + Freight (Excluding Import Duties, Taxes and Logistic Cost) |
| Landed Price | Cost + Insurance + Freight + Import Duties and Taxes |
| Delivered Price | Cost + Insurance + Freight + Import Duties and Taxes + Logistic Cost |
| Logistic Cost | Calculated from Vizag Port to Kochi |

**Basis for Price Forecasting**

The price of Acrylic Acid has been forecasted by using following factors, wherein:

* The price during last ten years is considered.
* These prices, if available monthly or quarterly, are averaged on annual basis.

**TechSci Research took into consideration the anomalies of price fluctuation due to many factors such as:**

* Exchange rate
* Conversion rate
* Demand / availability scenario
* Feedstock price changes
* Geo-political scenario
* Global economy, etc.
* Inflation
* Taxation.

The uncertainty over development of economic environment renders the forecasting exercise futile. Therefore, the forecasting exercise is always done with set of assumptions.

**The Assumptions in this exercise are as under:**

* The crude oil prices will remain within average limits during the forecasted years.

The technologies in exploration and production activities will continuously evolve leading to lower cost of production, better margins, and extra investment in E&P activities.

* No technological innovations of substantial magnitude will take place which may lead to sea-change in technologies / processes used today.
* Current Exchange Rate will change during the forecast period.

**Ester Acrylic Acid Price: Region Wise**

**Ester Acrylic Acid Price (CIF Price, Landed Price, Logistic Cost)**

|  |  |  |
| --- | --- | --- |
|  | **Ester Acrylic Acid CIF Price** | **Ester Acrylic Acid Landed Price** |
| **FY2013** | 106603 | 126529 |
| **FY2014** | 119056 | 141311 |
| **FY2015** | 107384 | 127456 |
| **FY2016** | 70250 | 83381 |
| **FY2017** | 69410 | 82384 |
| **FY2018** | 84890 | 100758 |
| **FY2019** | 94571 | 112248 |
| **FY2020** | 80240 | 98687 |
| **FY2021** | 79879 | 99194 |
| **FY2022** | 148900 | 184579 |
| **FY2023** | 132037 | 161895 |
| **FY2028F** | 163756 | 200787 |
| **FY2033F** | 196377 | 240785 |
| **FY2038F** | 227655 | 279135 |
| **FY2043F** | 257571 | 315816 |
| **FY2048F** | 281602 | 345281 |

**Pessimistic/Optimistic/ Realistic Ester Acrylic Acid Price: West Region**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **West Logistic Cost** | **Pessimistic\_West Ester Acrylic Acid Delivered Price** | **Realistic\_West Ester Acrylic Acid Delivered Price** | **Optimistic\_West Ester Acrylic Acid Delivered Price** |
| **FY2013** | 2979 |  | 129508 |  |
| **FY2014** | 3376 |  | 144686 |  |
| **FY2015** | 3086 |  | 130542 |  |
| **FY2016** | 3183 |  | 86564 |  |
| **FY2017** | 3273 |  | 85657 |  |
| **FY2018** | 3856 |  | 104614 |  |
| **FY2019** | 3795 |  | 116043 |  |
| **FY2020** | 4533 |  | 103220 |  |
| **FY2021** | 5056 |  | 104250 |  |
| **FY2022** | 5260 |  | 189839 |  |
| **FY2023** | 5100 |  | 166995 |  |
| **FY2028F** | 5887 | 197745 | 206674 | 217276 |
| **FY2033F** | 6670 | 235528 | 247455 | 261758 |
| **FY2038F** | 7473 | 272221 | 286608 | 303862 |
| **FY2043F** | 8352 | 307506 | 324168 | 344039 |
| **FY2048F** | 9232 | 334873 | 354513 | 377202 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |

**Pessimistic/Optimistic/ Realistic Ester Acrylic Acid Price: South Region**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **South Logistic Cost** | **Pessimistic\_South Ester Acrylic Acid Delivered Price** | **Realistic\_South Ester Acrylic Acid Delivered Price** | **Optimistic\_South Ester Acrylic Acid Delivered Price** |
| **FY2013** | 2990 |  | 129519 |  |
| **FY2014** | 3394 |  | 144705 |  |
| **FY2015** | 3096 |  | 130552 |  |
| **FY2016** | 3197 |  | 86578 |  |
| **FY2017** | 3347 |  | 85731 |  |
| **FY2018** | 3897 |  | 104655 |  |
| **FY2019** | 3886 |  | 116134 |  |
| **FY2020** | 4583 |  | 103270 |  |
| **FY2021** | 5150 |  | 104344 |  |
| **FY2022** | 5307 |  | 189886 |  |
| **FY2023** | 5174 |  | 167069 |  |
| **FY2028F** | 6024 | 196222 | 206811 | 217172 |
| **FY2033F** | 6869 | 234404 | 247654 | 260656 |
| **FY2038F** | 7744 | 270584 | 286879 | 302256 |
| **FY2043F** | 8632 | 305792 | 324448 | 343363 |
| **FY2048F** | 9497 | 333775 | 354778 | 375852 |

**Pessimistic/Optimistic/ Realistic Ester Acrylic Acid Price : North Region**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **North Logistic Cost** | **Pessimistic\_North Ester Acrylic Acid Delivered Price** | **Realistic\_North Ester Acrylic Acid Delivered Price** | **Optimistic\_North Ester Acrylic Acid Delivered Price** |
| **FY2013** | 3357 |  | 129887 |  |
| **FY2014** | 3818 |  | 145129 |  |
| **FY2015** | 3445 |  | 130901 |  |
| **FY2016** | 3557 |  | 86937 |  |
| **FY2017** | 3715 |  | 86099 |  |
| **FY2018** | 4403 |  | 105162 |  |
| **FY2019** | 4338 |  | 116586 |  |
| **FY2020** | 5171 |  | 103857 |  |
| **FY2021** | 5746 |  | 104940 |  |
| **FY2022** | 5955 |  | 190534 |  |
| **FY2023** | 5790 |  | 167685 |  |
| **FY2028F** | 6568 | 196945 | 207354 | 217888 |
| **FY2033F** | 7536 | 235333 | 248320 | 261258 |
| **FY2038F** | 8538 | 271736 | 287673 | 303380 |
| **FY2043F** | 9526 | 306960 | 325342 | 343984 |
| **FY2048F** | 10385 | 334718 | 355666 | 376651 |

**Pessimistic/Optimistic/ Realistic Ester Acrylic Acid Price: East Region**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **East Logistic Cost** | **Pessimistic East Ester Acrylic Acid Delivered Price** | **Realistic\_ East Ester Acrylic Acid Delivered Price** | **Optimistic East Ester Acrylic Acid Delivered Price** |
| **FY2013** | 3495 |  | 130025 |  |
| **FY2014** | 3983 |  | 145294 |  |
| **FY2015** | 3536 |  | 130992 |  |
| **FY2016** | 3675 |  | 87056 |  |
| **FY2017** | 3832 |  | 86216 |  |
| **FY2018** | 4494 |  | 105253 |  |
| **FY2019** | 4457 |  | 116705 |  |
| **FY2020** | 5336 |  | 104023 |  |
| **FY2021** | 5858 |  | 105052 |  |
| **FY2022** | 6172 |  | 190752 |  |
| **FY2023** | 5935 |  | 167830 |  |
| **FY2028F** | 6816 | 197181 | 207603 | 218149 |
| **FY2033F** | 7865 | 235646 | 248650 | 261605 |
| **FY2038F** | 8962 | 272137 | 288097 | 303827 |
| **FY2043F** | 10097 | 307499 | 325913 | 344588 |
| **FY2048F** | 11210 | 335494 | 356491 | 377524 |

**Glacial Acrylic Acid Price: Region Wise**

**Glacial Acrylic Acid Price (CIF Price, Landed Price, Logistic Cost)**

|  |  |  |
| --- | --- | --- |
|  | **Glacial Acrylic Acid CIF** | **Glacial Acrylic Acid Landed Price** |
| **FY2013** | 111800 | 132698 |
| **FY2014** | 125534 | 148999 |
| **FY2015** | 112748 | 133823 |
| **FY2016** | 73113 | 86780 |
| **FY2017** | 72440 | 85980 |
| **FY2018** | 89465 | 106188 |
| **FY2019** | 100556 | 119352 |
| **FY2020** | 84987 | 104322 |
| **FY2021** | 80925 | 99864 |
| **FY2022** | 169509 | 210897 |
| **FY2023** | 138565 | 170816 |
| **FY2028F** | 169397 | 208825 |
| **FY2033F** | 219305 | 270348 |
| **FY2038F** | 261726 | 322643 |
| **FY2043F** | 304888 | 375851 |
| **FY2048F** | 334974 | 412940 |

**Pessimistic/Optimistic/ Realistic Ester Acrylic Acid Price: West Region**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **West Logistic Cost** | **Pessimistic\_West Ester Acrylic Acid Delivered Price** | **Realistic\_ West Ester Acrylic Acid Delivered Price** | **Optimistic\_West Ester Acrylic Acid Delivered Price** |
| **FY2013** | 2979 |  | 135677 |  |
| **FY2014** | 3376 |  | 152375 |  |
| **FY2015** | 3086 |  | 136909 |  |
| **FY2016** | 3183 |  | 89963 |  |
| **FY2017** | 3273 |  | 89253 |  |
| **FY2018** | 3856 |  | 110044 |  |
| **FY2019** | 3795 |  | 123148 |  |
| **FY2020** | 4533 |  | 108855 |  |
| **FY2021** | 5056 |  | 104920 |  |
| **FY2022** | 5260 |  | 216157 |  |
| **FY2023** | 5100 |  | 175916 |  |
| **FY2028F** | 5887 | 205436 | 214711 | 225726 |
| **FY2033F** | 6670 | 263666 | 277019 | 293030 |
| **FY2038F** | 7473 | 313544 | 330116 | 349989 |
| **FY2043F** | 8352 | 364455 | 384203 | 407754 |
| **FY2048F** | 9232 | 398783 | 422172 | 449191 |

**Pessimistic/Optimistic/ Realistic Ester Acrylic Acid Price: South Region**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **South Logistic Cost** | **Pessimistic\_South Ester Acrylic Acid Delivered Price** | **Realistic\_ South Ester Acrylic Acid Delivered Price** | **Optimistic\_South Ester Acrylic Acid Delivered Price** |
| **FY2013** | 2990 |  | 135688 |  |
| **FY2014** | 3394 |  | 152393 |  |
| **FY2015** | 3096 |  | 136919 |  |
| **FY2016** | 3197 |  | 89977 |  |
| **FY2017** | 3347 |  | 89328 |  |
| **FY2018** | 3897 |  | 110084 |  |
| **FY2019** | 3886 |  | 123238 |  |
| **FY2020** | 4583 |  | 108905 |  |
| **FY2021** | 5150 |  | 105015 |  |
| **FY2022** | 5307 |  | 216203 |  |
| **FY2023** | 5174 |  | 175990 |  |
| **FY2028F** | 6024 | 203848 | 214849 | 225613 |
| **FY2033F** | 6869 | 262386 | 277217 | 291771 |
| **FY2038F** | 7744 | 311621 | 330387 | 348095 |
| **FY2043F** | 8632 | 362375 | 384483 | 406898 |
| **FY2048F** | 9497 | 397428 | 422436 | 447529 |

**Pessimistic/Optimistic/ Realistic Ester Acrylic Acid Price: North Region**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **North Logistic Cost** | **Pessimistic North Ester Acrylic Acid Delivered Price** | **Realistic\_ North Ester Acrylic Acid Delivered Price** | **Optimistic North Ester Acrylic Acid Delivered Price** |
| **FY2013** | 3357 |  | 136056 |  |
| **FY2014** | 3818 |  | 152817 |  |
| **FY2015** | 3445 |  | 137268 |  |
| **FY2016** | 3557 |  | 90336 |  |
| **FY2017** | 3715 |  | 89695 |  |
| **FY2018** | 4403 |  | 110591 |  |
| **FY2019** | 4338 |  | 123690 |  |
| **FY2020** | 5171 |  | 109493 |  |
| **FY2021** | 5746 |  | 105610 |  |
| **FY2022** | 5955 |  | 216852 |  |
| **FY2023** | 5790 |  | 176606 |  |
| **FY2028F** | 6568 | 204579 | 215392 | 226334 |
| **FY2033F** | 7536 | 263351 | 277884 | 292362 |
| **FY2038F** | 8538 | 312833 | 331181 | 349263 |
| **FY2043F** | 9526 | 363603 | 385377 | 407459 |
| **FY2048F** | 10385 | 398391 | 423324 | 448301 |

**Pessimistic/Optimistic/ Realistic Ester Acrylic Acid Price: East Region**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **East Logistic Cost** | **Pessimistic East Ester Acrylic Acid Delivered Price** | **Realistic\_ East Ester Acrylic Acid Delivered Price** | **Optimistic East Ester Acrylic Acid Delivered Price** |
| **FY2013** | 3495 |  | 136194 |  |
| **FY2014** | 3983 |  | 152982 |  |
| **FY2015** | 3536 |  | 137359 |  |
| **FY2016** | 3675 |  | 90455 |  |
| **FY2017** | 3832 |  | 89812 |  |
| **FY2018** | 4494 |  | 110682 |  |
| **FY2019** | 4457 |  | 123810 |  |
| **FY2020** | 5336 |  | 109658 |  |
| **FY2021** | 5858 |  | 105722 |  |
| **FY2022** | 6172 |  | 217069 |  |
| **FY2023** | 5935 |  | 176751 |  |
| **FY2028F** | 6816 | 204815 | 215640 | 226595 |
| **FY2033F** | 7865 | 263663 | 278214 | 292708 |
| **FY2038F** | 8962 | 313234 | 331605 | 349710 |
| **FY2043F** | 10097 | 364142 | 385948 | 408063 |
| **FY2048F** | 11210 | 399167 | 424150 | 449174 |