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Variable Margin Methodology: PET North America

ICIS
Independent Commodity Intelligence Services

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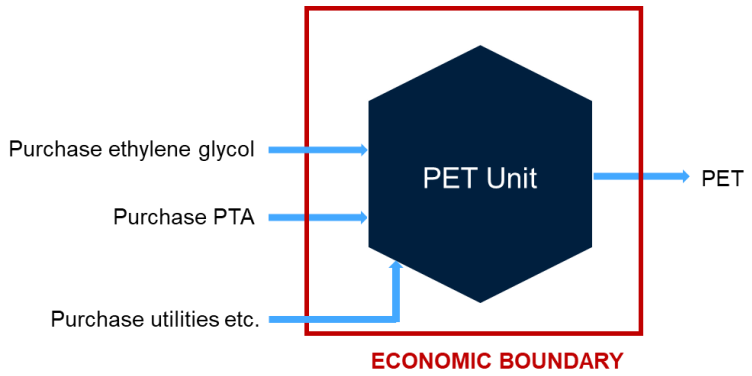
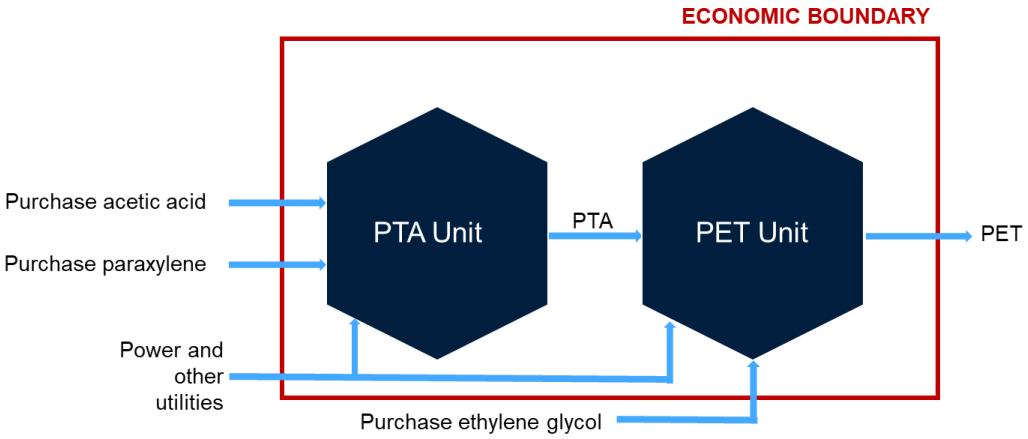
BUSINESS MODEL

ICIS calculate margins for Polyethylene Terephthalate (PET). This product is made from PTA (Purified Terephthalic Acid) and ethylene glycol. PTA is produced from paraxylene and acetic acid, and ethylene glycol is produced from ethylene. Both of these ultimately originate from crude oil.

The diagram below shows the production processes for PET used in ICIS' margins model.





THE MARGIN CALCULATION

- The margin measure provides an assessment of the ex-works cash margin obtained for the product over raw material costs, credit for selling co-products, and key variable manufacturing costs, including power and steam, catalysts and chemicals. This measure can also be termed as a variable margin, contribution or benefit.
- This margin measure provides simple signals on the direction of business margins as dictated by the environment, thus informing market positioning by sellers, buyers and traders.
- ICIS does not model beyond raw material costs, credit for selling co-products and key variable manufacturing costs. Further analysis would cease to be generic to the

industry and would be highly specific to individual business operations, their site structure, location, ownership and financial structures. Such detail would not fairly reflect or be applicable in a wider industry context. It may also be more subjective, open to fair challenges and not feasible to reference in commercial discussions.

- ICIS models plant operations for a series of 'representative' plants around the world. These representative plants have no flexibility with respect to feedstock or process configuration and ICIS assumes the plants to be purchasing inputs and selling outputs at constant prices. In North America, representative plants are modelled as if they are located in Houston.
- As the process model is generic and not based on any individual operation, the contribution measure is indicative. Instead of absolute value terms, it is most valuable as an index and in step-change terms.
- ICIS plant manufacturing and feedstock yield assumptions incorporate data from Intratec (www.intratec.us), an independent provider of chemical production cost reports.
- Ex-works product price assessments link to ICIS pricing quotations for large-volume commodity products, with netbacks assessed using the ICIS petrochemicals logistics model. To estimate representative transport costs, the ICIS logistics model considers a network with nodes at individual production sites connected by streets and ports linking each continent. The logistics model incorporates shipping data from Xeneta (www.xeneta.com), and duties data from SimplyDuty (www.simplyduty.com).

The calculation below shows how ICIS derives the PET margin in North America. The example is based on contract sales prices, is denominated in US dollars per tonne, and uses average prices for the year 2017.

Paraxylene-based PET margin ($/tonne)

PET spot price	1247
Adjustments incl. logistics costs/netbacks	2
PET product value	1249
Co-product sales	0
Total income	1249
Purchase of feedstocks (paraxylene, acetic acid etc)	845
Utilities	100
Variable costs	945
PET margin	**1249 – 945 = 304**

PTA-based PET margin ($/tonne)

PET spot price	1247
Adjustments incl. logistics costs/netbacks	2
PET product value	1249
Co-product sales	0
Total income	1249
Purchase of feedstocks (PTA, ethylene glycol etc)	1136
Utilities	53
Variable costs	1186
PET margin	**1249 – 1186 = 63**

INTEGRATED AND STANDALONE

- Non-integrated or standalone market participants produce PET only. Our margin model assumes plants are co-located and that PTA is transferred as part of the process.

- Standalone analysis, which considers the polymer unit in isolation, helps to identify marginal opportunities, e.g. whether PTA is receiving a higher margin than PET and could be sold instead of processing it further.

- Integrated market participants produce both PTA and PET. The business model is to buy feedstock, process it into PTA, convert the PTA into PET, and sell the PET. Crucially, PTA is transferred to the PET unit at cost. This business model is applicable to many PET manufacturing facilities in North America.

- The margin is therefore measured across the supply chain from feedstock through to PET.

Analysis of integrated plants demonstrates business volatility and the influence of price floors, which can lead to an uneconomic integrated margin, and generally force a reduction in supply.

MODEL YIELD PATTERN AND CALCULATION

Plant manufacturing data relates to the variable cost components of chemical unit operations. Yield pattern data relates to the overall material balance of the PTA unit. For example, for one tonne of PET produced, 0.8 - 0.9 tonnes of PTA is required,

Intratec provides the plant manufacturing and feedstock yield data used in the model.

- This analysis demonstrates business volatility and the influence of price floors (as an uneconomic margin generally forces supply reductions).

ASSESSMENT INPUTS

The following pricing inputs are used to generate the full content of the ICIS PET North America margins:

US GULF

- Paraxylene in North America Contract DEL US (ICIS pricing, Contract Price Assessment, Monthly, US cts/lb)
- Acetic Acid in North America Spot FOB US (ICIS pricing, Full Market Range, Weekly) $/tonne)
- PTA in North America Contract DEL US (ICIS pricing, Contract Price Assessment, Monthly, US cts/lb)
- PET Bottle Grade in North America Contract DEL US (ICIS pricing, Weighted Average, Monthly, US cts/lb)
- Ethylene Glycol in North America Contract FOB USG (ICIS pricing, Contract Price Assessment, Monthly, US cts/lb)

The methodology associated with each ICIS pricing individual pricing quotation referenced above is available on the ICIS Compliance and Methodology website.

In addition to the listed ICIS pricing inputs, the model also takes into account logistics costs (calculated through the ICIS logistics model), and utility costs.

A key objective of the calculation procedure is to provide a weekly summary that strongly aligns to the reported market price positions on the date of publication.

Where inputs are unavailable for individual weeks, e.g. due to public holidays, prior-week data is carried forward to the current week. This is for the specific purpose of populating the model and preventing model inconsistency. This form of data interpolation infers some limited data points that may not be market derived, and customers should be aware of this assumption.

PET NORTH AMERICA WEBPAGE

Filter data on the website using the following criteria.

- **Location:** Select US Gulf
- **Process**: Select either PET ex Paraxylene or PET ex PTA
- **Price terms**: ICIS generates PET variable margins only for contract price terms in North America.

Variable margins data are available online from January 2014 onwards. Six months trailing data shows as default.

The website deploys the following data, all per tonne of PET.

- **Main product value, ex-works**: the estimated PET netback value for the producer, taking into account the ICIS assessed price, shipping costs, handling costs and applicable duties.
- **Co-product credits**: the revenues from the other products generated in a process, also ex-works. This data is also available broken down into co-product types.
- **Feedstock and utility costs**: or total variable input costs for a process. This data is also available broken down into the component feedstock costs and utility costs.

Calculated outputs are:

- **Variable cost** = [Feedstock and utility costs] – [Co-product credits]
- **Variable margin** = [Main product value] + [Co-product credits] – [Feedstock and utility costs]

A selected variable margin (i.e. a margin for a specific location, process and price term) is comparable with margins of different process technologies in the same region, and with margins using the same technology in different regions. Subscribers can review margin performance by week, month, quarterly and per annum. Subscribers can view the flows of different products, in terms of their volume and value, into and out of the representative production unit used to calculate the polystyrene variable margin.

PUBLISHING FREQUENCY

The ICIS Weekly Margin – PET North America model is based on the latest data at the close of business in Asia on Friday and released to customers on the following Monday subject to schedule planning. When the Monday is a public holiday in the UK, margins will be made available the following day. ICIS does not publish an update on some public holidays. Holiday dates and days of publication may be subject to revision.