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Variable Margin Methodology: Caustic Soda North America

ICIS
Independent Commodity Intelligence Services

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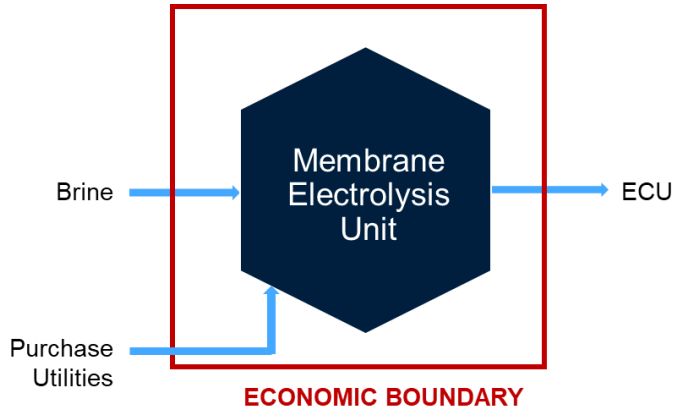
THE BUSINESS MODEL

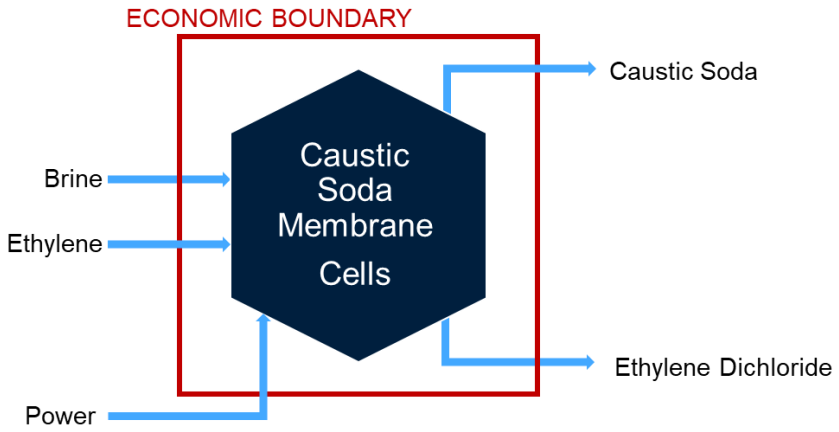
Caustic Soda is produced via electrolysis of brine (salt water), producing chlorine and caustic soda.). The main inputs for caustic soda in North America are brine and electricity. Salt is mined or produced from seawater.

As there is no reliable market price for chlorine, the model offers two methods of margin analysis for caustic soda.

- Margins are calculated in terms of an ECU (1 tonne chlorine, 1.1 tonnes caustic soda, and roughly 0.03 tonnes of hydrogen). For the sake of calculating the ECU value, chlorine is given a zero value.
- Margins EDC to calculate caustic margins. It is assumed that all of the chlorine is converted to ethylene dichloride, which does have market pricing. Ethylene dichloride in this model is counted as a co-product, and has ethylene as a feedstock. Ethylene is assumed to be bought on the merchant market.

The membrane electrolysis process is the one that is modelled here.





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, chemicals and catalysts. 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.

- 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.

- The model assumes that the ethylene is obtained from the merchant market.

- Ex-works product price assessments are linked to ICIS pricing quotations for large volume commodity products with netbacks assessed using typical logistic cost assessments.

- 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 caustic soda for the US Gulf. The example is based on spot sales prices, is denominated in US dollars per tonne, and uses average prices for the year 2017.

Variable margin ($/tonne)

Caustic soda spot price	500
Logistics costs/netbacks	(10)
Caustic soda product value	**500**
Co product sales	**262**
Total income	**762**
Purchase feedstock (ethylene/salt)	297
Utilities	177
Variable costs	**474**

Caustic soda margin	**762 – 474 = 288**

MODEL YIELD PATTERN AND CALCULATION

Plant manufacturing data relates to the variable cost components of plant operations. Yield pattern data relates to the overall material balance of the unit. For example, for one tonne of caustic soda produced, a plant will use approximately 1.5 tonnes of salt as feedstock. ICIS calculations also take into consideration additional chemicals and catalysts required for the synthesis of caustic soda.

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

This analysis demonstrates the volatility of the business 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 Caustic Soda North America margins:

US GULF

- Caustic soda at US Gulf Spot FOB US Gulf (ICIS pricing, weekly range) ($/dry metric tonne)
- Ethylene dichloride at US Gulf Spot FOB US Gulf (ICIS pricing, weekly range) ($/tonne)
- Ethylene in US Gulf Spot Del (Pipeline) (weekly average) (cts/lb converted to $/tonne)
- Sulphuric Acid at US Gulf Spot CFR US Gulf, 98% grade (ICIS pricing, weekly range) ($/tonne)

CONVERSIONS

The following conversion factors are used:

- Ethane: 742.2 US gal per tonne
- Benzene: 299 US gal per tonne
- Gasoline: 358.8 US gal per tonne
- Residual Fuel Oil: 264 US gal per tonne (42 US gal/bbl)
- Natural Gas: 0.0173 tonnes of fuel oil equivalents per MMBtu

The methodology associated with each ICIS pricing individual pricing quotation referenced above can be found on the ICIS Compliance and Methodology website.

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

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

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.

As the majority of petrochemical trades are in US dollars, all data used in the ICIS Margin – Caustic Soda North America model are denominated in USD unless specifically stated otherwise.

CAUSTIC SODA NORTH AMERICA WEBPAGE

Filter data on the website using the following criteria.

- **Area**: Select US Gulf.
- **Process**: Choose between Caustic Soda Membrane (ECU basis) and Caustic Soda Membrane (EDC Co-product)
- **Price terms**: Variable margins are generated for spot price terms.
- **Frequency**: Viewable with weekly, monthly, quarterly, or yearly granularity.
- **Currency**: Allows prices to be displayed in either EUR or USD.
- **Unit**: Allows conversion from displayed unit to unit of choice in data download only.

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 caustic soda:

- **Main product value, ex-works**: the estimated caustic soda 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, quarter 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 caustic soda variable margin.

PUBLICATION FREQUENCY

The ICIS Weekly Margin – Caustic Soda North America model is based on the latest data at the close of business in Europe on Friday and released to customers on the following Monday, subject to schedule planning. Updates are not published on some public holidays. Holiday dates and days of publication may be subject to revision.