

# Caustic Soda Production Plant Setup, Feasibility Study, ROI Analysis and Business Plan Consultant

*A Detailed DPR Covering CapEx, OpEx, Membrane Cell Electrolysis Process, ROI Analysis, Global Opportunity in Alumina, Pulp & Paper, and Chemical Manufacturing*

BROOKLYN, NY, UNITED STATES, May 19, 2026 /EINPresswire.com/ -- Setting up a caustic soda production plant gives you entry into one of the most broadly consumed industrial chemicals in the world. Sodium hydroxide (NaOH) is an essential input across alumina refining, textile processing, pulp and paper bleaching, soap and detergent production, water treatment, and organic and inorganic chemical synthesis. Demand is structurally diversified across a dozen industries, meaning no single downturn concentrates revenue risk. The chlor-alkali plant setup also produces chlorine and hydrogen as co-products - both commercially valuable - which provides a revenue stream beyond caustic soda alone and improves overall plant economics.



IMARC Group's [Caustic Soda Production Plant Project Report](https://www.imarcgroup.com/caustic-soda-manufacturing-plant-project-report/requestsampl) is a complete DPR and caustic soda production feasibility study for chemical manufacturers, investors, and project developers. It covers the full chlor-alkali plant setup - from brine preparation through membrane cell electrolysis, caustic concentration, chlorine processing, and hydrogen recovery - with complete caustic soda plant CapEx and OpEx modelling and 10-year financial projections.

Request a sample report: <https://www.imarcgroup.com/caustic-soda-manufacturing-plant-project-report/requestsampl>

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Caustic soda is indispensable in the Bayer process for extracting alumina from bauxite ore. Approximately 0.4-0.5 tonnes of NaOH are consumed per tonne of alumina produced. India's aluminium industry - growing alongside EV battery infrastructure, aerospace, packaging, and construction - is the largest single caustic soda consuming segment domestically. Every new alumina refinery or capacity expansion creates a long-term, contracted caustic soda production stream.

India's textile industry is the world's second largest by volume. Mercerization and scouring of cotton fabric, dyeing processes, and synthetic fibre production all consume caustic soda at scale. Pulp and paper mills use NaOH in kraft pulping and bleaching. Soap and detergent manufacturing uses caustic soda for saponification. These three industries alone provide a highly stable, multi-source demand foundation for any caustic soda production plant.

India's urban water treatment expansion, Clean Ganga Mission, and industrial effluent treatment mandates use caustic soda for pH adjustment and neutralisation. PVC manufacturing and organic chemical synthesis consume chlorine, the co-product of the chlor-alkali process, creating integrated chemical complex demand for full plant output. Hydrogen, the third co-product, is increasingly valuable as a clean energy feedstock.

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A caustic soda production plant's commercial output covers three co-products, each with independent markets:

- **Low-purity liquid caustic (10-20% NaOH):** The base product as it exits electrolysis. Supplied directly to nearby alumina, textile, or paper customers who can accept dilute liquid product. Lowest transport cost, highest water content.
- **50% liquid caustic (50-55% NaOH):** Concentrated by multiple-effect evaporation during production. The standard commercial product for industrial supply. Most widely traded globally. A sodium hydroxide manufacturing plant targeting the broader industrial market typically supplies 50% liquid caustic.
- **Solid caustic (90-95% NaOH):** Solid form produced by further evaporation and flaking. Preferred for export, long-distance transport, and customers requiring high-purity solid alkali (soap manufacturing, water treatment chemicals). Highest per-tonne value form of caustic soda.
- **Hydrogen gas (H<sub>2</sub>):** Produced at the anode of each electrolytic cell. Liquefied for storage and transport. Primary markets: PVC production (via EDC/VCM route), water treatment,

agrochemicals, and pharmaceutical synthesis. Chlorine revenue is essential to overall caustic soda plant ROI.

- **Hydrogen (H<sub>2</sub>):** Produced at the cathode. High-purity electrolytic hydrogen. Can be used as boiler fuel within the plant, supplied to adjacent hydrogen peroxide producers, or - increasingly - compressed and sold as industrial or fuel-cell grade hydrogen. Hydrogen is gaining value as the green hydrogen economy develops.

For more information on caustic soda manufacturing plants, visit:

<https://www.imarcgroup.com/caustic-soda-manufacturing-plant-project-report>

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- **Brine Purification:** Rock salt or solar salt is dissolved in water to form saturated brine. A membrane cell caustic soda plant requires ultra-pure brine to protect the ion-exchange membrane from fouling. Brine purification removes calcium, magnesium, and sulphate ions through precipitation and ion exchange. Brine quality is the single most critical factor for membrane life and consistent production purity
- **Brine Management:** Depleted brine returning from the anolyte loop is re-saturated with fresh salt and dechlorinated before re-entering the cell. Closed-loop brine management reduces salt and chemical consumption
- **Electrolysis:** Purified brine enters the anode compartment of the bipolar membrane electrolyser. DC current drives the electrochemical reaction: chloride ions are oxidised to chlorine gas at the anode, and water is reduced to hydrogen gas and hydroxide ions at the cathode. The ion-exchange membrane allows Na<sup>+</sup> ions to migrate from anolyte to catholyte while preventing Cl<sup>-</sup> back-migration, producing high-purity caustic soda solution on the cathode side
- **Chlorine Handling:** Wet chlorine gas exits the anode compartment, is cooled, dried with sulphuric acid, and either liquefied for storage and transport or directed to downstream derivatives production. Chlorine handling is the highest safety-criticality step in the plant
- **Caustic Soda Concentration:** The catholyte exits the cell as 30-35% NaOH solution. Multiple-effect evaporators (typically triple-effect) concentrate the solution to 50% NaOH. Further concentration to flake grade requires additional evaporation and a flaking drum or belt.

Energy cost for evaporation is the primary driver of the 50-60% utility share of total OpEx

- Hydrogen gas from the cathode compartment is collected, washed, compressed, and either used as plant fuel or purified to sellable grade. Clean electrolytic hydrogen with purity above 99.9% has growing commercial value
- Caustic soda solution is tested for NaOH concentration, NaCl content, iron, and carbonate. Product is dispatched in road tankers (liquid) or packed in bags or drums (flakes/solid). Caustic soda production unit cost is determined by electricity tariff, salt cost, and membrane replacement frequency

Key process parameters:

Production capacity:

- The proposed production facility is designed with an annual production capacity ranging between 100,000 - 300,000 MT, enabling economies of scale while maintaining operational flexibility

Operating costs breakdown:

- Electricity: 25-35%
- Labor: 10-20% after financing costs, depreciation, and taxes

Capital expenditure (CAPEX) components:

- Electrolysis: 50-60% of total OpEx - electrolysis at 2,150-2,200 kWh per tonne of NaOH makes this one of the most electricity-intensive chemical processes in industry
- Membrane (bipolar/monopolar): 30-40% of OpEx

Facility layout and safety considerations:

- Key areas: electrolysis hall, brine plant, chlorine handling area, caustic evaporation unit, hydrogen recovery system, storage tanks, safety exclusion zones
- Equipment: bipolar membrane electrolysers, brine purification plant, multiple-effect evaporators, chlorine liquefaction unit, hydrogen compression system
- Safety features: chlorine emergency scrubbers, explosion-proof electrical installation throughout hydrogen zones, caustic handling lined piping and vessels, effluent treatment

- **High-capacity rectifier/transformer for DC supply** (the single largest CapEx component), steam supply for evaporation, cooling water system
- **Electrolyser commissioning, membrane qualification, operator training, and initial working capital including salt inventory**

For more information, visit our website:

<https://www.imarcgroup.com/request?type=report&id=9091&flag=C>

Global Caustic Soda Market Report

The global caustic soda market reached 84.37 million tons in 2025 and is projected to reach 95.70 million tons by 2034 at a CAGR of 1.4%. Asia Pacific holds the dominant share at approximately 55% of global consumption, driven by China's massive alumina, chemical, and textile industries.

**China:** The world's largest producer and consumer of caustic soda. China's alumina, PVC, and textile industries are the dominant demand anchors. China's push for membrane cell technology adoption and renewable energy integration in chlor-alkali production is reshaping global technology standards.

**US and EU:** Mature markets with stable demand from chemical, pulp and paper, and water treatment sectors. The US and EU are upgrading aging mercury and diaphragm cell facilities to membrane cell technology under regulatory pressure. OxyVinyls announced a USD 1.1 billion expansion at its La Porte, Texas chlor-alkali plant. INEOS Inovyn launched an Ultra Low Carbon Chlor-Alkali range (February 2024) cutting CO<sub>2</sub> footprint by up to 70%.

**Middle East:** Rapid industrial expansion is creating greenfield caustic soda demand. In 2025, Chandra Asri launched a joint venture in Indonesia to build a world-scale caustic soda and EDC plant, targeting completion by 2027. The Middle East is expanding downstream petrochemical chains that consume caustic soda for chemical synthesis.

**India:** The India caustic soda market reached 2.8 million tons in 2025 and is projected to reach 4.1 million tons by 2034 at a CAGR of 3.98%. India's installed capacity is approximately 6.4 million MTPA - 100% membrane cell technology. FY 2024-25 production reached 5.05 million MT at approximately 80% utilisation. Gujarat's West Zone - centred on Dahej, Bharuch, and Gandhidham - is India's primary chlor-alkali hub, benefiting from proximity to the Rann of Kutch salt flats and Gujarat's industrial port infrastructure. Key producers include Grasim Industries, DCM Shriram, GACL, Epigral, Kutch Chemicals, and Tata Chemicals.

Global Caustic Soda Market Report

Location decisions for a caustic soda manufacturing plant setup directly affect electricity cost, salt procurement, and product logistics:

- **Electricity at 2,150-2,200 kWh per MT of NaOH means power cost is the single largest operational variable.** Sites with access to long-term power purchase agreements, captive power capacity, or renewable energy supply significantly improve caustic soda plant OpEx and overall competitiveness
- **Solar salt and rock salt are the primary feedstocks.** Proximity to the Rann of Kutch (India's largest salt flat), coastal salt works in Rajasthan, Gujarat, or Tamil Nadu minimises inbound raw material cost. On-site brine wells are used where subsurface salt deposits are available, enabling on-site production of saturated brine
- **Chlorine offtake is critical to plant economics.** A PVC, EDC, or water treatment chemical customer within pipeline distance converts the chlorine co-product from a liability into a production revenue stream. Hydrogen co-product value increases with proximity to hydrogen peroxide producers or hydrogen energy users
- **Caustic soda is exported as 50% liquid in ISO tankers or as solid flakes.** Sites near major chemical export ports (Mundra, Dahej, Hazira, Kandla) reduce export logistics cost and improve access to global buyers
- **India - PCPIR (Petroleum, Chemicals and Petrochemicals Investment Region) incentives for large chlor-alkali investments in Gujarat, Andhra Pradesh, and Odisha; National Programme on Use of Membrane Cells providing tax credits for technology upgrades; state power subsidies in Gujarat for industrial units. EU - carbon border adjustment benefits for low-emission membrane cell producers**

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IMARC Group's Caustic Soda Plant Project Report is a complete caustic soda production business plan and technical reference:

- **from brine preparation through membrane cell electrolysis, caustic concentration, chlorine processing, hydrogen recovery, and dispatch**
- **electrolysers, rectifier/transformer, brine plant, evaporators, chlorine liquefaction, hydrogen system, and safety infrastructure**
- **electricity, salt, membrane replacement, utilities, labour, maintenance**



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