

# Manufacturing of *Propylene Oxide*

## Investment Opportunities in Chemical Industry

# Introduction

Propylene oxide is an organic compound with the molecular formula  $\text{CH}_3\text{CHCH}_2\text{O}$ . This colorless volatile liquid with an odor resembling ether, is produced on a large scale industrially. Its major application is its use for the production of polyether polyols for use in making polyurethane plastics. Propylene oxide liquid and vapor are extremely flammable. Vapors may travel long distances and are heavier than air. Vapor may cause flash fire or explosion. Aqueous mixtures with propylene oxide concentrations as low as 0.75% may be flammable.



Propylene oxide is used in agriculture as an insecticidal fumigant and sterilant, to control bacteria contamination, moulds contamination, insect infestations, and microbial spoilage of food products as well as to control insects in non-food products. Propylene oxide is also a commercially important industrial chemical finding application as an intermediate for a wide array of products.

Propylene Oxide is a synthetic, highly-flammable, volatile, colorless liquid that is soluble in water and miscible with many organic solvents. Propylene oxide is used primarily as a chemical intermediate in the production of polyether's and propylene glycol. It is also used as a pesticide and a fumigant for the sterilization of packaged foods and plastic medical instruments.



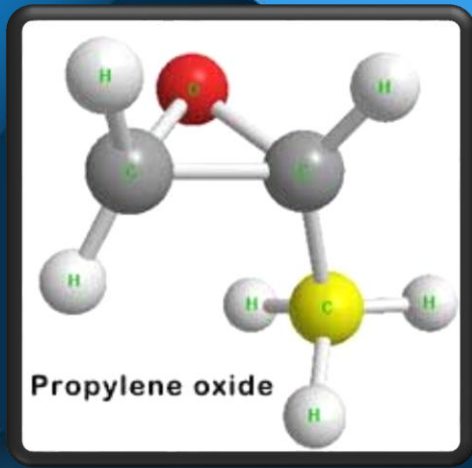
Acute inhalation exposure to vapors of this compound can result in respiratory tract irritation, coughing, difficulty in breathing (dyspnea) and buildup of fluid in the lungs (pulmonary edema) that can possibly lead to pneumonia. Inhale high concentrations of the vapors for short time periods may cause headache, motor weakness, The purpose of this bulletin is to disseminate recent information on the potential carcinogenicity of propylene oxide. The chronic effects of this chemical in animals have produced evidence that cancer is associated with exposure to propylene oxide. This bulletin describes of those animal, presents the known human health effects of propylene oxide, and suggests guidelines for minimizing occupational exposures. Propylene oxide at room temperature is a volatile, colorless, highly flammable liquid with a sweet, ether-like odor. The odor threshold for propylene oxide vapor is reported to be 200 parts of propylene oxide per million parts of air (200 ppm) in humans.

## Uses

- Polyols used for the polyurethane foam (PUF) for the coatings, adhesives and sealants furniture, refrigerator, automotive industries,
- Propylene glycol ethers for the use as solvents in resins, cleaners, waxes paints, inks, and coatings
- Propylene glycols, even for the production of unsaturated polyester resins transportation, automotive, marine industries, and, construction
- Propylene glycols used as solvents in cosmetics, pharmaceuticals, food
- Propylene glycols is also used in aircraft de-icers and engine coolants
- Butanediol and its related products used for resins and solvents.
- Most propylene oxide is used as an intermediate in the production of polyether polyols for polyurethane foams, and in the production of propylene glycol for unsaturated polyester resins.



- The major use of propylene oxide is in the production of polyether's (the primary component of polyurethane foams) and propylene glycol.
- Propylene oxide is also used in the fumigation of foodstuffs and plastic medical instruments and in the manufacture of propylene glycol and glycol ethers, as herbicides, as solvents, and in the preparation of lubricants, surfactants, and oil demulsifiers
- Minor quantities are used for sterilizing medical equipment and for fumigating foodstuffs

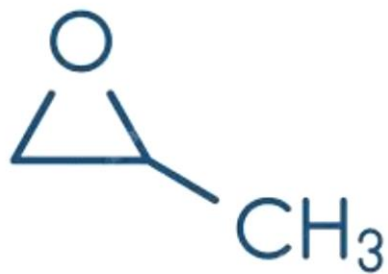


## Process

Propylene oxide is traditionally made by chlorohydrin and epoxidation routes, but newer technologies based on hydrogen peroxide or cumene hydro peroxide have been commercialized. A significant amount of propylene oxide capacity is still based on the older chlorohydrin process.

The plants using this route are often integrated with chlor-alkali plants which consume a large amount of power in making chlorine and caustic soda. Consequently, extensive effluent treatment is needed to handle the waste stream. Another process that had once gained in popularity was the propylene oxide /styrene monomer (propylene oxide /SM) route. The disadvantage here, though, is the potential coproduction of 2.25 tonnes of styrene for every tonne of propylene oxide, which can present difficulties in balancing the markets for propylene oxide and styrene. This can lead to volatility over time in performing the operations economically.

Capital costs can also be relatively high in the propylene oxide /SM route. A number of propylene oxide /SM plants have been built by companies such as Spain's Repsol, Ellba (Shell/BASF) and Netherlands-based LyondellBasell. New propylene oxide technologies without co-products have now been developed and commercialized, including a cumene hydro peroxidation technology. In addition, a number of companies have developed technologies to make propylene oxide from propylene and hydrogen peroxide a process known as HPPO.



propylene oxide



# Market Outlook

Global propylene oxide market is expected to show significant growth of increasing polyurethanes' demand in various segments including packaging, automotive, footwear, furniture, and construction. Rising use of polyurethanes in sealants, thermal insulators, and flooring materials will drive industry growth over the next seven years. Rising infrastructure spending in China, Malaysia, Singapore, Brazil, India, UAE, Saudi Arabia, and Qatar is expected to drive demand over the forecast period. In addition, growing automotive sector in various countries including in China, Mexico, the U.S., and India is expected to increase market. Propylene glycol is widely deployed as a construction chemical for use in paints, grouts, adhesives, waterproofing materials, and coatings, in both infrastructure and the construction industry.

A wide-ranging number of propylene glycol applications are anticipated to be an important driver of the propylene oxide market in the days ahead. Another industry that is witnessing a resurgence in recent times is the automotive industry. This should directly benefit the propylene oxide market as the products are utilized in a number of components such as flexible foams, paints, adhesives, and sealants. Thus, it can be said that the propylene oxide market is intrinsically linked to the automotive industry.

Propylene is used to produce flexible foams for bedding, furniture, carpet underlay, bedding and seat cushioning in automotive while polyurethanes are used to produce rigid foams for thermal insulation in packaging & commercial refrigeration and construction industry. Toxic nature of propylene oxide, development of alternatives of oxide, negative effects of the product in the environment, and the high price of raw materials will hinder the growth of the market.

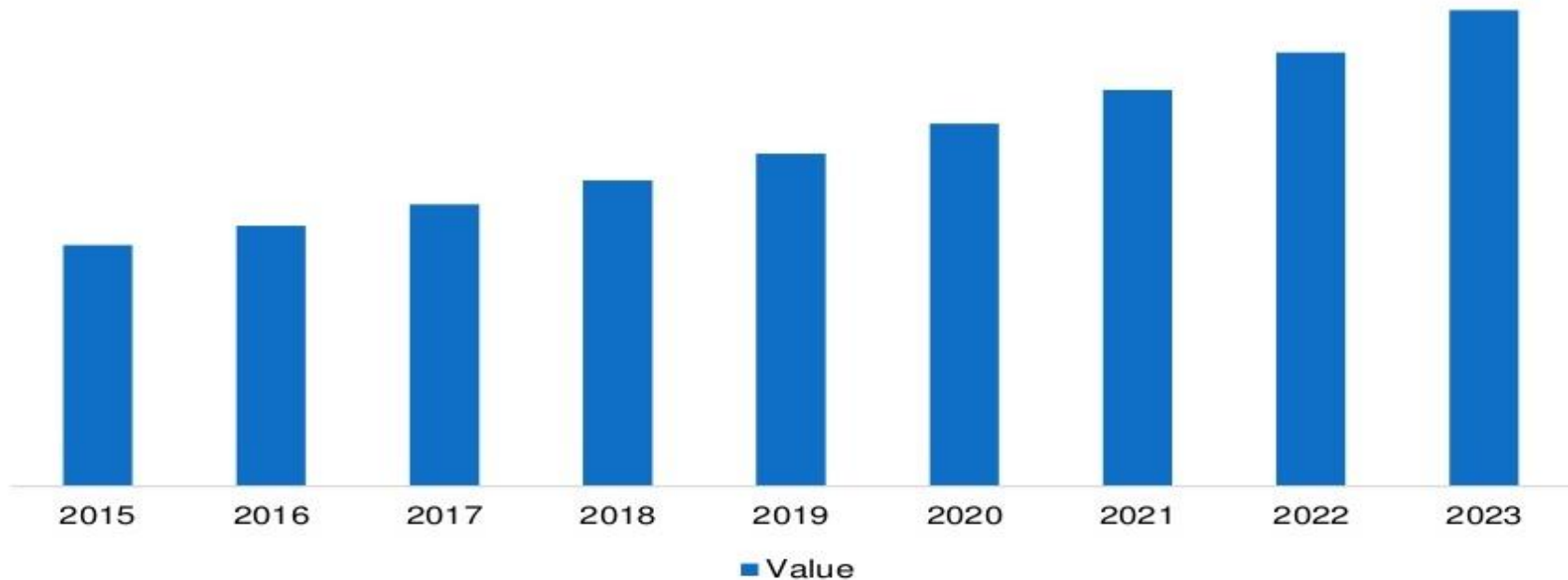
Propylene oxide finds its application in tub-shower, gasoline tanks, and boat hulls. Rise in the consumption of products that include polyalkylene glycols, propylene glycols, and propylene glycol ethers will propel market expansion. High consumption in lubricants, defoamers, greases, oil-field chemicals, latex paints, wetting agents, and water scavengers will increase the revenue generated by the market.

Europe was the largest in terms of Propylene Oxide consumption. However, it is anticipated that it would lose its market share due to the economic crisis and increasing environmental regulations and safety.

The propylene oxide market is expected to grow at a CAGR of around 5.9% during 2019-2024. The increasing infrastructure spending in emerging economies, like China, India, and Brazil is likely to provide opportunities. The increasing use of propylene derivative, polyurethane, in the construction industry, has widely helped the propylene oxide market to have a strong hold in the construction and infrastructure segments.

# Global Propylene Oxide Market, 2015-2023 (USD Million)

GLOBAL PROPYLENE OXIDE MARKET, 2015 – 2023 (USD MILLION)



Propylene oxide ( $\text{CH}_3\text{CHCH}_2\text{O}$ ) is a colorless volatile liquid. It is an organic compound used in the production of polyether polyols, which in turn is used in the production of polyurethane plastics. Propylene oxide can be produced by hydrochlorination or oxidation. Propylene oxide has various applications in automotive and construction industries. Flexible foams, paints, sealants, coolants, car seats brakes, and hydraulic fuels are components which propylene oxide in the automotive industry Also, it is used as a chemical for paints, waterproofing, coatings, adhesives, grouts, and materials. However, availability of substitutes for propylene oxide are restraining growth of the market. In the Middle East & Africa region, growing hotel construction, and public infrastructure have been driving the construction industry in the region. Besides, the residential construction is also strong in North America, due to high housing demand due to growing population demand for homes,



and trend of nuclear families, which is further projected to drive the demand for propylene oxide market. Whereas, Europe has been witnessing healthy recovery of construction activities, which is expected to further increase the demand for propylene oxide in the years to come. Hence, all such trends in the global construction industry are expected to positively influence the demand for propylene oxide. Propylene oxide (PO) is a key intermediate in the chemical industry. For instance, PO is mainly used to produce polyether polyols (65%), as well as propene glycol (30%) and propene glycol ethers (4%) (The second and third largest applications, respectively) which are mainly applied to manufacture commercial products such as adhesives, solvents, and foams. The annual worldwide production of PO amounted to 8.06 million tons and will likely go beyond 9.56 million tons and this market is annually growing.

Northeast Asia is forecast to remain the major source of new propylene oxide requirements. The Indian Subcontinent will benefit from an even faster demand growth rate, albeit from a much smaller base. Northeast Asia will continue to add capacity at a sustained rate: North America, Southeast Asia, the Indian Subcontinent and Western Europe are also expected to increase their capacity base, but to a much lesser extent. Overall, capacity additions are projected to be greater than consumption growth. Despite some environmental concerns in some countries (the United States, Canada, Japan), MTBE has continued to be an attractive gasoline blend stock as the global demand for octane has increased because of the growth of smaller engines and the low complexity of Chinese refineries. Nevertheless, a recent change in Chinese gasoline policy is expected to alter the MTBE market in the medium term; the country is now aiming to develop an E-10 gasoline, comprising 10% ethanol—thus requiring less MTBE.

The number of new PO/TBA plants is therefore expected to gradually slow down over the next five years. There are three main routes to commercial production of propylene oxide—chlorohydrin, peroxidation (PO/SM, PO/TBA), and hydro peroxidation (HPPO and HPCU) processes. While the recent hydro peroxidation processes have gained significant momentum over the past decade, the traditional routes (chlorohydrin, peroxidation) still dominate globally. The majority of new PO production units are now designed to minimize or even avoid coproduct generation, as the marketing of coproducts has presented its own set of challenges for producers. More specifically, styrene markets had been in oversupply for quite some time, leading to limited investment into new PO/SM facilities; PO/SM investments are nevertheless now resuming as the styrene market has recovered following a decade of industry restructuring and asset rationalization.

Propylene oxide belongs to the epoxide family of products, and is used principally in the manufacture of polyether polyols, propylene glycols, glycol ethers, and polyalkylene glycols. Overall, propylene oxide consumption is broadly tied to the general economy and has been increasingly linked to emerging countries (China, in particular), where improvements in living standards are driving an increasing use of a wide range of polymers and chemicals.

Propylene oxide capacity has increased at an average rate of 3% per year, driven mainly by new developments in Asia. Meanwhile, Propylene oxide consumption has grown at a stronger pace (4.2% per year on average) leading to a tightening of markets and rising average operating rates across the propylene oxide industry. The industry-wide utilization rate was estimated at 93%, up from the 88% recorded five years ago.

## Key Players

- BASF,
- The Dow Chemical,
- Huntsman International,
- Royal Dutch Shell,
- INEOS, Balchem,
- SKC,
- Sumitomo Chemical,
- Repsol,
- LyondellBasell Industries,
- SABIC,
- Tokuyama



# Major Queries/Questions Answered in the Report?

1. What is Propylene Oxide Manufacturing industry ?
2. How has the Propylene Oxide Manufacturing industry performed so far and how will it perform in the coming years ?
3. What is the Project Feasibility of Propylene Oxide Manufacturing Plant ?
4. What are the requirements of Working Capital for setting up Propylene Oxide Manufacturing plant ?

- 5. What is the structure of the Propylene Oxide Manufacturing Business and who are the key/major players ?**
- 6. What is the total project cost for setting up Propylene Oxide Manufacturing Business?**
- 7. What are the operating costs for setting up Propylene Oxide Manufacturing plant ?**
- 8. What are the machinery and equipment requirements for setting up Propylene Oxide Manufacturing plant ?**

- 9. Who are the Suppliers and Manufacturers of Plant & Machinery for setting up Propylene Oxide Manufacturing plant ?**
- 10. What are the requirements of raw material for setting up Propylene Oxide Manufacturing plant ?**
- 11. Who are the Suppliers and Manufacturers of Raw materials for setting up Propylene Oxide Manufacturing Business?**
- 12. What is the Manufacturing Process of Propylene Oxide?**

- 13. What is the total size of land required for setting up Propylene Oxide Manufacturing plant ?**
- 14. What will be the income and expenditures for Propylene Oxide Manufacturing Business?**
- 15. What are the Projected Balance Sheets of Propylene Oxide Manufacturing plant ?**
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- 17. What is the Built up Area Requirement and cost for setting up Propylene Oxide Manufacturing Business?**

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**19. What are Statistics of Import & Export for Propylene Oxide?**

**20. What is the time required to break-even of Propylene Oxide Manufacturing Business?**

**21. What is the Break-Even Analysis of Propylene Oxide Manufacturing plant?**

**22. What are the Project financials of Propylene Oxide Manufacturing Business?**





- 23. What are the Profitability Ratios of Propylene Oxide Manufacturing Project?**
- 24. What is the Sensitivity Analysis-Price/Volume of Propylene Oxide Manufacturing plant?**
- 25. What are the Projected Pay-Back Period and IRR of Propylene Oxide Manufacturing plant?**
- 26. What is the Process Flow Sheet Diagram of Propylene Oxide Manufacturing project?**

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**Along with financial details as under**

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# Reasons for Buying our Report:

- **This report helps you to identify a profitable project for investing or diversifying into by throwing light to crucial areas like industry size, market potential of the product and reasons for investing in the product**
- **This report provides vital information on the product like it's characteristics and segmentation**
- **This report helps you market and place the product correctly by identifying the target customer group of the product**

- **This report helps you understand the viability of the project by disclosing details like machinery required, project costs and snapshot of other project financials**
- **The report provides a glimpse of government regulations applicable on the industry**
- **The report provides forecasts of key parameters which helps to anticipate the industry performance and make sound business decisions**

# Our Approach:

- **Our research reports broadly cover Indian markets, present analysis, outlook and forecast for a period of five years.**
- **The market forecasts are developed on the basis of secondary research and are cross-validated through interactions with the industry players**
- **We use reliable sources of information and databases. And information from such sources is processed by us and included in the report**

# **Scope of the Report**

**The report titled “Market Survey cum Detailed Techno Economic Feasibility Report on Propylene Oxide.” provides an insight into Propylene Oxide market in India with focus on uses and applications, Manufacturing Process, Process Flow Sheets, Plant Layout and Project Financials of Propylene Oxide project. The report assesses the market sizing and growth of the Indian Propylene Oxide Industry. While expanding a current business or while venturing into new business, entrepreneurs are often faced with the dilemma of zeroing in on a suitable product/line. And before diversifying/venturing into any product, they wish to study the following aspects of the identified product:**



- **Good Present/Future Demand**
- **Export-Import Market Potential**
- **Raw Material & Manpower Availability**
- **Project Costs and Payback Period**

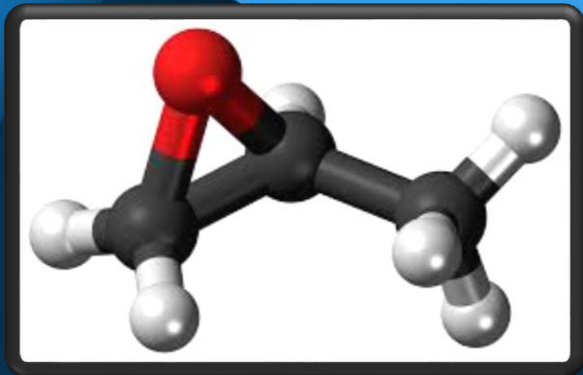
**We at NPCS, through our reliable expertise in the project consultancy and market research field, have demystified the situation by putting forward the emerging business opportunity in the Propylene Oxide sector in India along with its business prospects. Through this report we have identified Propylene Oxide project as a lucrative investment avenue.**

# Tags

#propyleneoxide #Propylene #PropyleneOxide #toxic #polymerindustry  
#plasticindustry #entrepreneurship #PolymerIndustry  
#DetailedProjectReport #BusinessPlan #marketresearchreport  
#ProjectReportForBankLoan #PreFeasibilityandFeasibilityStudy  
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#Chemicals #FutureofChemcialIndustry #processindustry  
#indianchemicalindustry #chemicalindustry #chemicalbusiness  
#chemicalmarket #chemicalproducts #Fertilisers #electrochemistry  
#marketresearch Technology Profile: Propylene Oxide Production,  
Manufacturers of propylene oxide, Project Report on Propylene Oxide –  
Manufacturing,

Technology Profile: Propylene Oxide Production, Propylene Oxide Manufacture Technology, Environmentally friendly way to produce propylene oxide, Feasibility Report, Project Report, Technology Book on Propylene Oxide, Business Ideas, Startup Project, Project Consultancy on Propylene Oxide, Niir Project Consultancy Services, Project Profile, Small Scale Industry, manufacturing business, technology on Propylene Oxide, Consultancy Services, Consultant for Propylene Oxide, Feasibility Report on Propylene Oxide, Production of Propylene Oxide, project cost, Investment Opportunities of Propylene Oxide, Industry Trends, Project Reports and Technology Books on Propylene Oxide, Industry, Market Detailed Analysis Report, Profitable business on Propylene Oxide, Process technology books, Business consultancy, Business consultant, Project identification and selection, Startup Project for Propylene Oxide, Startup ideas, Project for, startups, Startup project plan,

Business start-up, Business Plan for a Startup Business, Great Opportunity for Startup, Small Start-up Business Project, Start-up Business Plan for Propylene Oxide, Setting up and opening your Propylene Oxide Business, Feasibility Reports List, Detailed Project Reports List, Project Reports, Business Ideas, Technology Book, Manufacturing , Business, Market Research Report, Techno-Economic Feasibility Study, Feasibility Report, Project Report & Profile, Project Consultancy, Project Opportunities, Technology Books, Consultancy for Propylene Oxide,



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### ▪ Detailed Project Reports

**NPCS is manned by engineers, planners, specialists, financial experts, economic analysts and design specialists with extensive experience in the related industries.**

**Our Market Survey cum Detailed Techno Economic Feasibility Report provides an insight of market in India. The report assesses the market sizing and growth of the Industry. While expanding a current business or while venturing into new business, entrepreneurs are often faced with the dilemma of zeroing in on a suitable product/line.**



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- **Project Costs and Payback Period**

**The detailed project report covers all aspect of business, from analyzing the market, confirming availability of various necessities such as Manufacturing Plant, Detailed Project Report, Profile, Business Plan, Industry Trends, Market Research, Survey, Manufacturing Process, Machinery, Raw Materials, Feasibility Study, Investment Opportunities, Cost and Revenue, Plant Economics, Production Schedule,**



**Working Capital Requirement, uses and applications, Plant Layout, Project Financials, Process Flow Sheet, Cost of Project, Projected Balance Sheets, Profitability Ratios, Break Even Analysis. The DPR (Detailed Project Report) is formulated by highly accomplished and experienced consultants and the market research and analysis are supported by a panel of experts and digitalized data bank.**

**We at NPCS, through our reliable expertise in the project consultancy and market research field, have demystified the situation by putting forward the emerging business opportunity in India along with its business prospects.....[Read more](#)**



# Contact us

## **NIIR PROJECT CONSULTANCY SERVICES**

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# **Niir PROJECT CONSULTANCY SERVICES**

**An ISO 9001:2015 Company**



[www.entrepreneurindia.co](http://www.entrepreneurindia.co)

# Who are we?

- *One of the leading reliable names in industrial world for providing the most comprehensive technical consulting services*
- *We adopt a systematic approach to provide the strong fundamental support needed for the effective delivery of services to our Clients' in India & abroad*



*We at NPCS want to grow with you by providing solutions scale to suit your new operations and help you reduce risk and give a high return on application investments. We have successfully achieved top-notch quality standards with a high level of customer appreciation resulting in long lasting relation and large amount of referral work through technological breakthrough and innovative concepts. A large number of our Indian, Overseas and NRI Clients have appreciated our expertise for excellence which speaks volumes about our commitment and dedication to every client's success.*





*We bring deep, functional expertise, but are known for our holistic perspective: we capture value across boundaries and between the silos of any organization. We have proven a multiplier effect from optimizing the sum of the parts, not just the individual pieces. We actively encourage a culture of innovation, which facilitates the development of new technologies and ensures a high quality product.*



# What do we offer?

- *Project Identification*
- *Detailed Project Reports/Pre-feasibility Reports*
- *Market Research Reports*
- *Business Plan*
- *Technology Books and Directory*
- *Industry Trend*
- *Databases on CD-ROM*
- *Laboratory Testing Services*
- *Turnkey Project Consultancy/Solutions*
- *Entrepreneur India (An Industrial Monthly Journal)*

## How are we different ?

- *We have two decades long experience in project consultancy and market research field*
- *We empower our customers with the prerequisite know-how to take sound business decisions*
- *We help catalyze business growth by providing distinctive and profound market analysis*
- *We serve a wide array of customers , from individual entrepreneurs to Corporations and Foreign Investors*
- *We use authentic & reliable sources to ensure business precision*



# Our Approach

Requirement collection

Thorough analysis of the project

Economic feasibility study of the Project

Market potential survey/research

Report Compilation

# Contact us

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# THANK YOU

**For more information, visit us at:**

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