

# Food Grade Gases Market Report: Trends, Forecast and Competitive Analysis to 2030

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## Abstracts

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### Food Grade Gases Trends and Forecast

The future of the global food grade gases market looks promising with opportunities in the meat, poultry & seafood industry, dairy & frozen products industry, beverages industry, fruits & vegetables industry, convenience food products industry, and bakery & confectionery products industry markets. The global food grade gases market is expected to reach an estimated \$11.5 billion by 2030 with a CAGR of 6.5% from 2024 to 2030. The major drivers for this market are significant growth in the food and beverage industry, growing demand for premium-quality meat and seafood products among health-conscious consumers, and growing expenditure capacities of the consumers globally.

Lucintel forecasts that freezing and chilling will remain the largest segment over the forecast period due to growing use of freezing & chilling products to handle various harmful microorganisms effectively, as well as, freezing helps to slow down enzymatic activities and enhance the shelf-life of food products.

North America will remain the largest region over the forecast period due to consumption of frozen food, rising consumer spending capacity in countries like the United States and Canada, as well as, growing demand for food grade gases for seafood, poultry, frozen meat, and others in this region.

### Emerging Trends in the Food Grade Gases Market

The food-grade gases market is evolving rapidly, influenced by advancements in technology, shifts in consumer behavior, and increasing regulatory standards. Food-grade gases, including carbon dioxide (CO<sub>2</sub>), nitrogen (N<sub>2</sub>), and oxygen (O<sub>2</sub>), are essential for food preservation, packaging, and processing. Emerging trends in this market reflect a growing focus on sustainability, enhanced food safety, and technological innovation. As industries adapt to new consumer demands and environmental challenges, these trends are reshaping the landscape of food-grade gases, offering new opportunities for growth and improvement.

**Sustainable and Green Technologies:** There is a significant shift towards sustainable and eco-friendly technologies in the food-grade gases market. Companies are investing in green practices such as CO<sub>2</sub> recovery and recycling systems, which reduce the carbon footprint associated with gas production and usage. Innovations include the development of low-emission gas production methods and the use of renewable energy sources. These technologies not only help in meeting regulatory requirements but also cater to the increasing consumer demand for environmentally responsible products, driving industry growth while addressing environmental concerns.

**Advancements in Modified Atmosphere Packaging:** Modified atmosphere packaging is becoming more sophisticated with advancements in gas mixture technologies. The trend includes the use of precise gas blends to extend the shelf life of perishable goods, maintain product freshness, and enhance food safety. New technologies in modified atmosphere packaging involve improved gas controls and sensors that ensure optimal conditions for different food types. These advancements are crucial for meeting consumer expectations for high-quality, long-lasting food products and are increasingly adopted in sectors like ready-to-eat meals and fresh produce.

**Increased Demand for Functional Foods:** The rising demand for functional foods products that offer health benefits beyond basic nutrition is driving innovation in the food-grade gases market. Gases are used to protect and stabilize sensitive functional ingredients, such as probiotics and antioxidants, during processing and packaging. Encapsulation technologies and advanced gas handling techniques are helping to ensure the efficacy and longevity of these health-promoting ingredients. This trend aligns with consumer interest in wellness and nutrition, driving growth in sectors like dietary supplements and fortified foods.

**Growth in the Beverage Industry:** The beverage industry is experiencing

significant growth, with an increased reliance on food-grade gases for carbonation, preservation, and quality control. Innovations in gas technology are enhancing the production of carbonated drinks, craft beers, and sparkling waters by improving carbonation levels and ensuring consistent product quality. The trend also includes advancements in gas purification and control systems to meet the high standards of the beverage industry. As consumer preferences shift towards diverse and premium beverage options, the demand for high-quality food-grade gases continues to rise.

**Stringent Food Safety Regulations:** Food safety regulations are becoming increasingly stringent, driving advancements in the food-grade gases market. Regulations require higher standards for gas purity, handling, and usage to ensure that food products are safe and free from contamination. This trend is prompting companies to invest in state-of-the-art gas analysis and monitoring systems that comply with regulatory standards. Enhanced regulatory scrutiny also leads to innovations in gas purification technologies and traceability, ensuring that food-grade gases meet the required safety and quality benchmarks.

The food-grade gases market is undergoing significant transformation driven by emerging trends in sustainability, advanced packaging technologies, and evolving consumer demands. As companies adapt to new environmental and regulatory challenges, innovations such as green technologies, Modified atmosphere packaging advancements, and improvements in beverage production are shaping the future of the market. The increasing focus on functional foods and stringent safety regulations further highlights the industry's response to changing consumer preferences and regulatory landscapes. These trends collectively contribute to a more dynamic, efficient, and responsible food-grade gases market.

### Recent Developments in the Food Grade Gases Market

The food-grade gases market has been experiencing dynamic changes driven by advancements in technology, evolving consumer preferences, and stricter regulatory standards. These developments are reshaping how food-grade gases, such as carbon dioxide (CO<sub>2</sub>), nitrogen (N<sub>2</sub>), and oxygen (O<sub>2</sub>), are produced and utilized in the food industry. Recent trends reflect a strong emphasis on sustainability, innovation in packaging solutions, and improvements in food safety. Understanding these key developments is crucial for stakeholders aiming to stay ahead in the rapidly evolving

food-grade gases market.

**Advancements in CO<sub>2</sub> Recovery Technologies:** Recent developments in CO<sub>2</sub> recovery technologies have significantly impacted the food-grade gases market. Companies are investing in systems that capture and reuse CO<sub>2</sub> from industrial processes, reducing the carbon footprint and enhancing sustainability. These technologies involve capturing CO<sub>2</sub> emissions, purifying the gas, and reintegrating it into food and beverage production. The advancements not only help in meeting environmental regulations but also lower operational costs associated with purchasing new CO<sub>2</sub>. The increased adoption of CO<sub>2</sub> recovery aligns with the global push towards greener practices and resource efficiency in the food industry.

**Enhanced Modified Atmosphere Packaging :** The evolution of modified atmosphere packaging technology is a notable development in the food-grade gases market. Innovations in modified atmosphere packaging involve more precise control of gas mixtures, allowing for better preservation of food quality and extended shelf life. New techniques in gas blending and monitoring ensure optimal conditions for various food products, from fresh produce to processed foods. These advancements help maintain freshness, reduce spoilage, and improve overall food safety. As consumer demand for longer-lasting and higher-quality food products grows, modified atmosphere packaging technology continues to play a crucial role in meeting these needs.

**Increased Focus on Sustainable Packaging Solutions:** Sustainability is becoming a central theme in the food-grade gases market, leading to a rise in the use of eco-friendly packaging solutions. Companies are developing biodegradable and recyclable packaging materials that reduce environmental impact. Innovations include integrating food-grade gases with sustainable materials to enhance shelf life while minimizing waste. The trend towards sustainable packaging reflects broader consumer and regulatory demands for environmentally responsible practices. By adopting these solutions, manufacturers not only meet regulatory requirements but also cater to the growing consumer preference for greener and more sustainable food options.

**Technological Advancements in Gas Purification:** Advancements in gas purification technologies are improving the quality and safety of food-grade gases. New filtration and purification systems ensure that gases used in food processing and packaging meet high standards of purity and safety. Innovations

in this area include more efficient purification methods that remove contaminants and ensure consistent gas quality. These developments are critical for maintaining the safety and quality of food products, as impurities in food-grade gases can affect product quality and safety. Enhanced gas purification also supports compliance with stringent food safety regulations.

**Growth in Beverage Industry Applications:** The beverage industry is driving significant demand for food-grade gases, particularly for carbonation and preservation. Recent developments include improved carbonation technologies and advanced gas control systems that enhance the production of carbonated drinks, beers, and sparkling waters. Innovations in this sector focus on optimizing gas usage for better carbonation levels and flavor consistency. The growth of premium and craft beverages has further fueled the demand for high-quality food-grade gases. This trend highlights the importance of gas technologies in maintaining the quality and appeal of a diverse range of beverage products.

Recent developments in the food-grade gases market highlight a shift towards more sustainable, innovative, and efficient practices. Advancements in CO<sub>2</sub> recovery, modified atmosphere packaging technology, and sustainable packaging solutions reflect a growing emphasis on environmental responsibility and product quality. Technological improvements in gas purification and the expanding role of food-grade gases in the beverage industry further underscore the market's dynamic nature.

### Strategic Growth Opportunities for Food Grade Gases Market

The food-grade gases market is witnessing significant growth driven by advances in technology and evolving consumer preferences. Food-grade gases, including carbon dioxide (CO<sub>2</sub>), nitrogen (N<sub>2</sub>), and oxygen (O<sub>2</sub>), are vital for a range of applications such as food preservation, packaging, and processing. As industries adapt to new trends and demands, several strategic growth opportunities are emerging. These opportunities reflect the market's response to increasing needs for sustainability, enhanced food safety, and innovative packaging solutions, presenting valuable prospects for growth across different sectors.

**Expansion in Modified Atmosphere Packaging :** Modified atmosphere packaging represents a substantial growth opportunity in the food-grade gases market. Modified atmosphere packaging technologies use specific gas mixtures to

extend the shelf life and maintain the quality of perishable foods. As consumer demand for fresh and minimally processed foods rises, the need for advanced modified atmosphere packaging solutions increases. Innovations in gas mixtures and packaging materials are enhancing modified atmosphere packaging efficiency, making it a critical tool for food manufacturers.

**Rising Demand for Carbonated Beverages:** The increasing popularity of carbonated beverages, including sodas, sparkling waters, and craft beers, is a key growth driver for CO<sub>2</sub> in the food-grade gases market. Innovations in carbonation technology and gas control systems are enhancing the production and quality of these beverages. As consumers seek diverse and premium beverage options, the demand for high-quality CO<sub>2</sub> solutions is growing.

**Advancements in Food Preservation Technologies:** Food preservation technologies are evolving with the integration of food-grade gases, offering growth opportunities in the market. Nitrogen and CO<sub>2</sub> are increasingly used in processes such as cryogenic freezing and controlled atmosphere storage to enhance food safety and extend shelf life. Innovations in these technologies are improving the preservation of a wide range of food products, from frozen foods to snacks. As the demand for preserved and convenience foods rises, there are opportunities for growth in developing new preservation methods that leverage advanced gas technologies to meet consumer expectations for freshness and quality.

**Development of Sustainable Packaging Solutions:** The drive towards sustainability is creating significant growth opportunities in the food-grade gases market, particularly in the development of eco-friendly packaging solutions. Companies are investing in biodegradable and recyclable packaging materials that integrate food-grade gases to maintain product freshness. The focus on reducing environmental impact and meeting regulatory standards is pushing innovation in sustainable packaging technologies. This trend aligns with increasing consumer awareness and demand for environmentally responsible products, presenting opportunities for growth in creating packaging solutions that support sustainability goals while preserving food quality.

**Growth in the Health and Wellness Sector:** The health and wellness sector is driving demand for food-grade gases used in the production of functional foods and dietary supplements. Gases such as CO<sub>2</sub> and N<sub>2</sub> are utilized to preserve the potency and effectiveness of sensitive ingredients like probiotics, vitamins,



and antioxidants. Innovations in encapsulation and stabilization technologies are enhancing the delivery of these functional ingredients. As consumers seek health-enhancing products, there are growth opportunities for food-grade gas suppliers to develop solutions that support the production of high-quality, effective health and wellness products, catering to this expanding market segment.

Strategic growth opportunities in the food-grade gases market are emerging across various applications driven by technological advancements and evolving consumer preferences. Modified atmosphere packaging, carbonated beverage production, food preservation technologies, sustainable packaging solutions, and the health and wellness sector are key areas of growth.

### Food Grade Gases Market Driver and Challenges

The food-grade gases market is influenced by a range of technological, economic, and regulatory factors that drive its growth and present challenges. Major drivers include advancements in technology, increasing consumer demand for fresh and packaged foods, and evolving sustainability practices. Conversely, the market faces challenges related to regulatory compliance, cost fluctuations, and environmental concerns. Understanding these drivers and challenges is essential for stakeholders seeking to navigate the complexities of the food-grade gases market and capitalize on emerging opportunities while addressing potential obstacles.

The factors responsible for driving the food grade gases market include:

1. **Technological Innovations:** Technological advancements are a key driver in the food-grade gases market. Innovations in gas purification, monitoring systems, and packaging technologies have improved the efficiency and safety of food-grade gases. For example, enhanced modified atmosphere packaging technologies use precise gas mixtures to extend shelf life and maintain food quality. Advances in carbonation systems and cryogenic freezing technologies also support the growing demand for high-quality beverages and preserved foods. These technological improvements enable better control, higher efficiency, and reduced waste, meeting the evolving needs of the food industry.

2. **Rising Consumer Demand for Fresh and Packaged Foods:** The increasing consumer preference for fresh, convenient, and packaged foods is driving demand for food-grade

gases. Gases like CO<sub>2</sub> and N<sub>2</sub> are essential for maintaining the quality and extending the shelf life of perishable products. As consumers seek products that offer both convenience and freshness, food manufacturers are investing in technologies that utilize food-grade gases to preserve and package products effectively. This trend supports the growth of sectors such as ready-to-eat meals, snacks, and beverages, reflecting the broader shift towards convenience and quality in food consumption.

3. Growth in the Beverage Industry: The expanding beverage industry, including carbonated drinks, craft beers, and sparkling waters, significantly drives the demand for food-grade gases. Carbon dioxide (CO<sub>2</sub>) is crucial for carbonation, while nitrogen (N<sub>2</sub>) and oxygen (O<sub>2</sub>) play roles in preserving and packaging beverages. Innovations in carbonation technology and improved gas control systems are enhancing product quality and consistency. As consumer preferences diversify and premium beverage options gain popularity, the need for advanced gas solutions continues to grow, presenting opportunities for suppliers to meet the evolving demands of the beverage sector.

4. Focus on Sustainability and Environmental Responsibility: The emphasis on sustainability and environmental responsibility is reshaping the food-grade gases market. Companies are investing in green technologies, such as CO<sub>2</sub> recovery and recycling systems, to reduce their carbon footprint and comply with environmental regulations. Sustainable practices include using eco-friendly packaging materials and minimizing waste through efficient gas utilization. As consumers and regulators increasingly prioritize environmental impact, the adoption of sustainable solutions is becoming a significant driver. This trend not only aligns with global sustainability goals but also enhances the market position of companies adopting eco-friendly practices.

5. Regulatory Compliance and Safety Standards: Compliance with stringent regulatory standards and food safety regulations drives advancements in the food-grade gases market. Regulations mandate high standards for gas purity, handling, and usage to ensure food safety and quality. Innovations in gas purification and monitoring technologies are crucial for meeting these requirements. Adhering to regulatory standards helps prevent contamination and ensures the safety of food products. The need for compliance drives continuous improvements in gas technology and safety practices, supporting the growth of the market while addressing regulatory challenges.

Challenges in the food grade gases market are:

1. Fluctuating Raw Material Costs: Fluctuations in the cost of raw materials, such as



natural gas and other feedstocks used in the production of food-grade gases, pose a significant challenge. Price volatility can affect the overall cost of producing and supplying food-grade gases, impacting profit margins and pricing strategies. Companies must navigate these cost fluctuations while maintaining competitive pricing and quality. Managing raw material costs involves strategic sourcing, operational efficiency, and possibly investing in alternative materials or technologies to mitigate the impact of price volatility on the market.

2. Stringent Regulatory Requirements: The food-grade gases market faces challenges related to stringent regulatory requirements and safety standards. Compliance with varying regulations across different regions can be complex and costly. Regulations govern aspects such as gas purity, handling, and labeling, requiring continuous monitoring and adaptation. Companies must invest in technologies and processes to meet these regulations and avoid penalties or product recalls. Navigating the regulatory landscape involves staying updated on changes, implementing rigorous quality control measures, and ensuring that all aspects of gas production and use comply with applicable standards.

3. Environmental Impact and Sustainability Concerns: Addressing environmental impact and sustainability concerns is a significant challenge in the food-grade gases market. The production and use of food-grade gases can contribute to environmental issues, such as greenhouse gas emissions and waste. Companies are under pressure to adopt sustainable practices, including reducing carbon footprints and managing waste effectively. While there is growing interest in green technologies and eco-friendly solutions, transitioning to more sustainable practices can involve substantial investments and operational changes. Balancing environmental responsibility with business objectives remains a key challenge for industry players.

The food-grade gases market is influenced by several drivers and challenges that shape its dynamics. Technological advancements, rising consumer demand, growth in the beverage industry, and a focus on sustainability are key drivers pushing the market forward. Conversely, challenges such as fluctuating raw material costs, stringent regulatory requirements, and environmental impact need to be addressed. By navigating these drivers and challenges effectively, industry stakeholders can seize growth opportunities and adapt to the evolving landscape of the food-grade gases market, ensuring continued success and resilience in a competitive environment.

## List of Food Grade Gases Companies

Companies in the market compete on the basis of product quality offered. Major players in this market focus on expanding their manufacturing facilities, R&D investments, infrastructural development, and leverage integration opportunities across the value chain. With these strategies food grade gases companies cater increasing demand, ensure competitive effectiveness, develop innovative products & technologies, reduce production costs, and expand their customer base. Some of the food grade gases companies profiled in this report include-

Linde

Air Products & Chemical

Air Liquide

The Messer Group

Taiyo Nippon Sanso

Wesfarmers

PT Aneka Gas Industri

Massy Group

Air Water

## Food Grade Gases by Segment

The study includes a forecast for the global food grade gases by type, mode of supply, application, end use, and region.

## Food Grade Gases Market by Type [Analysis by Value from 2018 to 2030]:

Carbon Dioxide

Nitrogen

Oxygen

Others

Food Grade Gases Market by Mode of Supply [Analysis by Value from 2018 to 2030]:

Bulk

Cylinder

Food Grade Gases Market by Application [Analysis by Value from 2018 to 2030]:

Freezing And Chilling

Packaging

Carbonation

Others

Food Grade Gases Market by End Use [Analysis by Value from 2018 to 2030]:

Meat, Poultry & Seafood Industry

Dairy & Frozen Products Industry

Beverages Industry

Fruits & Vegetables Industry

Convenience Food Products Industry

Bakery & Confectionery Products Industry

Others

## Food Grade Gases Market by Region [Shipment Analysis by Value from 2018 to 2030]:

North America

Europe

Asia Pacific

The Rest of the World

## Country Wise Outlook for the Food Grade Gases Market

The food-grade gases market is experiencing notable advancements driven by innovations in technology, evolving consumer preferences, and regulatory changes. Food-grade gases, including carbon dioxide (CO<sub>2</sub>), nitrogen (N<sub>2</sub>), and oxygen (O<sub>2</sub>), play a crucial role in food preservation, packaging, and processing. Recent developments across key global markets reflect a growing emphasis on enhancing food safety, extending shelf life, and meeting sustainability goals. Each country is seeing unique trends and innovations, influenced by local market needs and regulatory landscapes.

**United States:** In the United States, the food-grade gases market has seen significant growth due to increased demand for convenience foods and advanced packaging solutions. Innovations include the development of high-purity gases and advanced gas mixture technologies that enhance food preservation and shelf life. The rise of sustainable packaging solutions has also led to greater use of gases in modified atmosphere packaging (MAP) to reduce food waste. Regulatory changes and advancements in technology are pushing the market towards more efficient and eco-friendly practices, aligning with consumer demands for both convenience and sustainability.

**China:** China food-grade gases market is expanding rapidly, driven by the country's growing food processing industry and rising consumer demand for packaged foods. Recent developments include the adoption of advanced CO<sub>2</sub> and N<sub>2</sub> technologies for food preservation and safety. The Chinese government has also introduced stricter regulations on food safety, prompting investments in high-quality, food-grade gases. Additionally, the market is seeing increased use of gases in emerging applications, such as in the production of ready-to-eat

meals and beverages, reflecting the country's evolving food industry and consumer preferences.

**Germany:** Germany is at the forefront of adopting sustainable practices in the food-grade gases market. The country has made significant strides in reducing carbon emissions by investing in technologies that optimize gas usage and improve energy efficiency. Recent developments include the use of CO<sub>2</sub> recovery systems and advancements in gas mixture technologies that support both food preservation and environmental goals. Germany's strong focus on food safety and quality assurance, combined with its commitment to sustainability, is driving innovations in food-grade gas applications and reinforcing its position as a leader in the European market.

**India:** In India, the food-grade gases market is growing rapidly due to increasing urbanization and a rising middle class with changing dietary preferences. Key developments include the expansion of the food and beverage sector, which is driving demand for gases used in packaging and preservation. Innovations in gas technology are improving food safety and extending shelf life, while the market is also witnessing a rise in the adoption of CO<sub>2</sub> and N<sub>2</sub> for use in the production of processed and packaged foods. The Indian government's focus on food security and modernization is further fueling market growth and technological advancements.

**Japan:** Japan food-grade gases market is characterized by advanced technology and a strong emphasis on food safety and quality. Recent developments include the introduction of cutting-edge gas technologies that enhance food preservation and extend shelf life. The Japanese market is also seeing growth in the use of food-grade gases for innovative applications, such as in high-pressure processing (HPP) and modified atmosphere packaging (MAP). With a strong regulatory framework and a focus on maintaining high food safety standards, Japan continues to drive advancements in gas technologies that align with both local and global market demands.

## Features of the Global Food Grade Gases Market

**Market Size Estimates:** Food grade gases market size estimation in terms of value (\$B).

**Trend and Forecast Analysis:** Market trends (2018 to 2023) and forecast (2024 to 2030)

by various segments and regions.

**Segmentation Analysis:** Food grade gases market size by type, mode of supply, application, and region in terms of value (\$B).

**Regional Analysis:** Food grade gases market breakdown by North America, Europe, Asia Pacific, and Rest of the World.

**Growth Opportunities:** Analysis of growth opportunities in different type, mode of supply, application, and regions for the food grade gases market.

**Strategic Analysis:** This includes M&A, new product development, and competitive landscape of the food grade gases market.

Analysis of competitive intensity of the industry based on Porter's Five Forces model.

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## FAQ

**Q.1** What is the food grade gases market size?

**Answer:** The global food grade gases market is expected to reach an estimated \$11.5 billion by 2030.

**Q.2** What is the growth forecast for food grade gases market?

**Answer:** The global food grade gases market is expected to grow with a CAGR of 6.5% from 2024 to 2030.

**Q.3** What are the major drivers influencing the growth of the food grade gases market?

**Answer:** The major drivers for this market are significant growth in the food and beverage industry, growing demand for premium-quality meat and seafood products among health-conscious consumers, and growing expenditure capacities of the consumers globally.



Q4. What are the major segments for food grade gases market?

Answer: The future of the global food grade gases market looks promising with opportunities in the meat, poultry & seafood industry, dairy & frozen products industry, beverages industry, fruits & vegetables industry, convenience food products industry, and bakery & confectionery products industry markets.

Q5. Who are the key food grade gases market companies?

Answer: Some of the key food grade gases companies are as follows:

Linde

Air Products & Chemical

Air Liquide

The Messer Group

Taiyo Nippon Sanso

Wesfarmers

PT Aneka Gas Industri

Massy Group

Air Water

Q6. Which food grade gases market segment will be the largest in future?

Answer: Lucintel forecasts that freezing and chilling will remain the largest segment over the forecast period due to growing use of freezing & chilling products to handle various harmful microorganisms effectively, as well as, freezing helps to slow down enzymatic activities and enhance the shelf-life of food products.

Q7. In food grade gases market, which region is expected to be the largest in next 5 years?

Answer: North America will remain the largest region over the forecast period due to consumption of frozen food, rising consumer spending capacity in countries like the United States and Canada, as well as, growing demand for food grade gases for seafood, poultry, frozen meat, and others in this region.

Q.8 Do we receive customization in this report?

Answer: Yes, Lucintel provides 10% customization without any additional cost.

This report answers following 11 key questions:

Q.1. What are some of the most promising, high-growth opportunities for the food grade gases market by type (carbon dioxide, nitrogen, oxygen, and others), mode of supply (bulk and cylinder), application (freezing and chilling, packaging, carbonation, and others), end use (meat, poultry & seafood industry, dairy & frozen products industry, beverages industry, fruits & vegetables industry, convenience food products industry, bakery & confectionery products industry, and others), and region (North America, Europe, Asia Pacific, and the Rest of the World)?

Q.2. Which segments will grow at a faster pace and why?

Q.3. Which region will grow at a faster pace and why?

Q.4. What are the key factors affecting market dynamics? What are the key challenges and business risks in this market?

Q.5. What are the business risks and competitive threats in this market?

Q.6. What are the emerging trends in this market and the reasons behind them?

Q.7. What are some of the changing demands of customers in the market?

Q.8. What are the new developments in the market? Which companies are leading these developments?

Q.9. Who are the major players in this market? What strategic initiatives are key players pursuing for business growth?

Q.10. What are some of the competing products in this market and how big of a threat do they pose for loss of market share by material or product subst

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