Food Packaging Films

Market Scenario and Competitive Landscape

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Context

This report provides in **Chapter 1** an overview of the **food packaging films market**, with reference to the market values, trends and dynamics in the period 2022 – 2027 and the market segmentations by type, material, application and region.

The report also includes **Chapter 2** focused on the **emerging technology options in food packaging** to address better the ongoing technological trends which are entering the market. The chapter concentrates explicitly on active packaging and bio-based replacement for PET.

1 Food Packaging Films Market

The **packaging for food products** features a thin plastic coating known as packaging film, which prevents the loss of nutrients, color, fragrance, and flavor, helps preserve the food's functional qualities, and shields it from the damaging effects of microbes. Packaging film is primarily made of polypropylene, though the use of polypropylene is increasing quickly. The food packaging sector, which is expanding at a rapid pace, has shown a preference for plastic films.

Food packaging is one of the largest segments of the packaging industry. Packaging plays a vital role in keeping the product fresh, damage-proof and acts as an efficient marketing tool. The food packaging films market has been growing in tandem with the growth of the food packaging industry.

1.1 Global Market and Market Dynamics

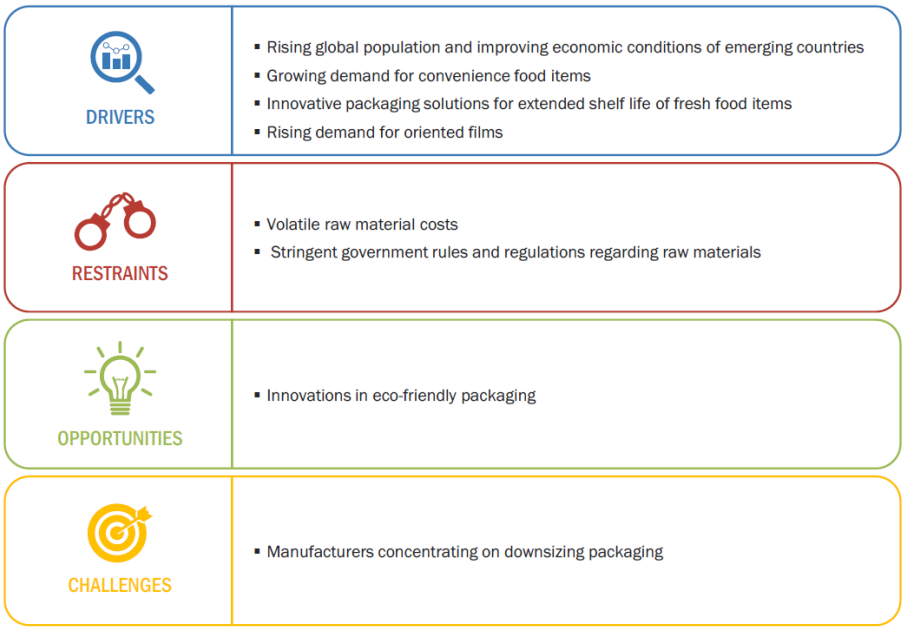
The **global food packaging films market** size was USD 49.8 billion in 2021 and is projected to reach USD 72.3 billion by 2027, at a Compound Annual Growth Rate (CAGR) of 6.4%. The following figure describes the growth of the global food packaging films market in Kilotons in the period 2022 – 2027.

Figure 1. Global Food Packaging Films Market, in the Period 2022 – 2027 (Kilotons)

Food packaging films has been one of the fastest-growing segments of the packaging industry over the past few years. The key **driver** for the food packaging films market is the increase in the demand for convenience food items. The growth of the food packaging films market is estimated to be driven by the **growing** demand for convenience food items and innovative packaging solutions that ensure extended shelf life of food items. However, stringent regulations related to raw materials used for packaging are **restraining** market growth (Figure 2).

However, the growth of the market is **restrained** by issues related to the rising raw material prices. The basic raw material used for food packaging films is plastic, which is made from crude oil. As the supply of crude oil keeps fluctuating, plastic manufacturing is affected. Other factors directly or indirectly affecting the growth of the food packaging films market are related to environmental regulations and market competition.

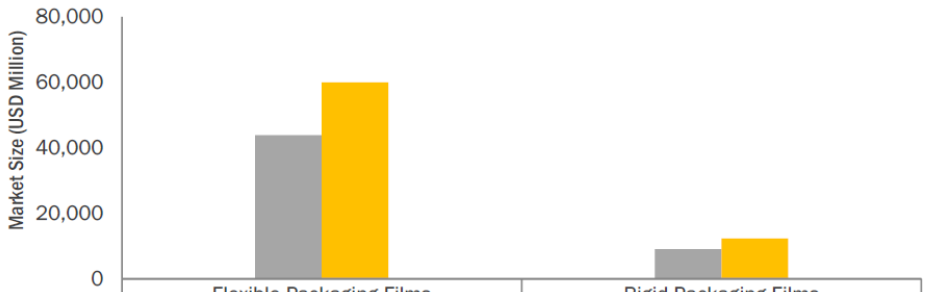
Figure 2. Drivers, Restraints, Opportunities and Challenges in the Food Packaging Films Market



1.2 Market by Type

The food packaging films market is segmented on the basis of type into: **rigid packaging films and flexible packaging films** (Figure 3). The **flexible packaging films segment** had the larger market share in terms of value in 2022 and it is projected to reach USD 60.0 billion by 2027, at a CAGR of 6.5% between 2022 and 2027. Changing lifestyles and the increasing dependence of consumers on packaged foods is increasing the demand for flexible packaging films.

Figure 3. Food Packaging Films Market, by Type, in the Period 2022 - 2027



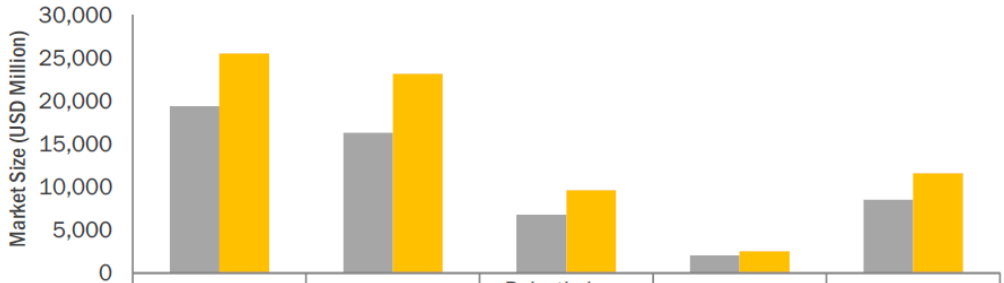
	Flexible Packaging Films	Rigid Packaging Films
2022	43,840	9,096
2027	60,021	12,326
CAGR (2022–2027)	6.5%	6.3%

1.3 Market by Material

The food packaging films market is segmented by material into five types: **polyethylene, polypropylene, polyethylene terephthalate, polyamide and others (PVC, PS, EVOH and others)** (Figure 4). Polyethylene holds the major market share, followed by polypropylene, in terms of value and volume. This is because polyethylene offers innovative product solutions that have broad applicability, such as in the packaging of various fruits, vegetables, meat, and seafood. The market size of the **polyethylene** segment was USD 19.3 billion in 2022 and is projected to reach USD 25.5 billion by 2027, at a CAGR of 5.7% between 2022 and 2027.

The **polypropylene segment** is expected to have the highest growth (CAGR) in the period 2022 – 2027. In the food packaging industry, polypropylene is the fastest-growing packaging material. It is used in fruit & vegetable packaging, seafood packaging, and other agriculture product packaging,

Figure 4. Food Packaging Films Market, by Material, in the Period 2022 - 2027



	Polyethylene	Polypropylene	Polyethylene Terephthalate	Polyamide	Others
2022	19,365	16,287	6,774	2,019	8,491
2027	25,499	23,129	9,604	2,524	11,592
CAGR (2022–2027)	5.7%	7.3%	7.2%	4.6%	6.4%

Polyethylene (PE), often called polythene, is the most widely used plastic. PE accounts for one-third of the overall plastic consumption. A long chain hydrocarbon polymer derived from ethylene gas, PE can be classified into high-density polyethylene (HDPE), low-density polyethylene (LDPE), and linear low-density polyethylene (LLDPE).

Polyethylene is the second-most favored material for food packaging films globally due to its low weight, malleability, strength, stability, processability, reusability, and resistance to chemicals and moisture. It provides leakage proof packaging, which means it does not allow water vapor to pass through it. The recent technological advancements in PE food packaging films show that food has a significantly longer shelf life in such packages. The high barrier properties of polyethylene packaging films are crucial to maintaining product quality, texture, freshness, as well as nutrients. Milk, juice, grocery, and meat products are some of the major food items for which polyethylene packaging is used.

The major applications of HDPE films include retail grocery sacks and merchandise bags. HDPE has high resistance to most solvents and is widely used in margarine tubs, and cereal box liners. LDPE is generally used in heat sealing applications, and squeezable food bottles, bags for bread and frozen food, and flexible lids. LLDPE is replacing conventional LDPE films in many areas primarily due to the combination of favorable production costing and product performance. In the food packaging industry LLDPE films are used in ice bags and retail merchandise bags.

Polypropylene (PP) is a clear, glossy film with high strength and puncture resistance. This material is not affected by changes in humidity. It has moderate permeability to gases and odors and a higher barrier to water vapor. These

properties enable the use of polypropylene in the production of a wide variety of food packaging solutions like salad dressing bottles, margarine tubs, and yoghurt containers. PP generally has a high melting point, making it particularly suitable for food packaging products that are used in microwaves or cleaned in dishwashers.

The polyester family of polymers includes the strong, stiff synthetic fiber and resin known as polyethylene terephthalate (**PET** or **PETE**). PET is blow-molded into disposable drinking bottles and spun into fibers for permanent-press fabrics. Polyethylene terephthalate can be made into a plastic film, which is utilized to construct various plastic bottles that are used for packaging liquids like water and sodas, or it is combined with other materials to produce bottles that are particularly suited for beer. BOPET (biaxially-oriented polyethylene terephthalate) is a polyester film made of polyethylene terephthalate. It is used successfully in a wide range of applications due to its excellent combination of optical, physical, mechanical, thermal, and chemical properties. BOPET offers superior resistance to heat, oil, solvents, and acids, and has good ductility, strength, and hardness. It also provides low weight, impermeability to gas, transparency, and resistance to breaking. It is mostly used in trays, blisters, bags, and wrappers. The largest end-use market for BOPET packaging films is food, specifically fresh fruit, meat, confectionery, and dairy goods.

Polyamide (PA), popularly known as nylon, is a transparent, printable thermoplastic with excellent strength and toughness as well as good **oxygen barrier** qualities. It is resistant to scratches, punctures, and flex-cracks and does not absorb or dissolve grease, oil, or acidic foods; this makes PA perfect for use in both traditional and microwave cooking applications. As a carbon dioxide (CO_2) permeable material with excellent **oxygen barrier** qualities, nylon is perfect for cheese packaging since it prevents stored CO_2 from forming during storage. Processed meat (sausage, bacon), smoked salmon, cheddar and other dairy goods, and partially prepared microwaveable meals are a few examples of food packaging applications of PA.

Other packaging materials include PVC, PS, EVOH and others. Polyvinyl chloride, commonly known as PVC, is one of the first polymers used in food packaging applications; it replaced many traditional materials, including glass and various forms of card and paper. PVC is available in two basic forms: rigid and flexible. It has outstanding barrier properties for the preservation of food and is extensively used for specialized tamper-proof packaging. It is fully approved for use in food contact applications throughout the world.

Polystyrene (PS) is a strong, affordable thermoplastic that is transparent, sturdy, and durable. This material produces films with exceptional opacity, sparkle, and gloss. Polystyrene films have very high rates of **oxygen**, CO_2, and moisture vapor transmission, making them ideal for packaging food products.

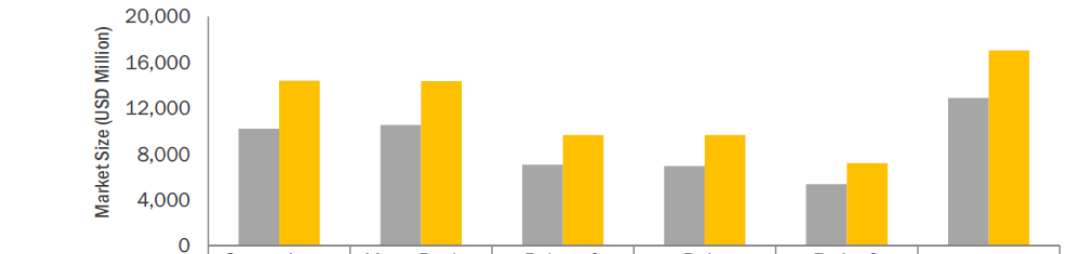
Ethylene-vinyl alcohol copolymer, also known as **EVOH**, is a malleable, brilliantly clear, glossy thermoplastic copolymer. This material shows excellent resistance to hydrocarbons, oils, and organic solvents and has exceptional flex-crack resistance. EVOH is especially suited for food packaging since it has superior barrier resistance to gases like **oxygen**, nitrogen, and carbon dioxide. When a specific environment is required inside the package to lengthen the shelf life of food products, EVOH is frequently utilized.

1.4 Market by Application

The food packaging films market, by application, is segmented into: **fruits & vegetables, bakery & confectionery, meat, poultry & seafood, convenience foods, dairy products, and others** (Figure 5). The **meat, poultry & seafood segment** held the largest market share in terms of value in 2022. The market size of the meat, poultry & seafood products segment is projected to reach USD 14.4 billion by 2027, at a CAGR of 6.4%, between 2022 and 2027. Growing disposable incomes have fueled the demand for convenience food items, which is, in turn, driving the food packaging films market. The increasing awareness regarding the nutritional value of meat products and changing eating habits are also boosting the demand for food packaging films.

Convenience food is the fastest-growing segment in the food packaging films market due to changing food consumption patterns, and increasing urbanization. In the convenience food industry, flow wrap, and form-fill-seal (FFS) films are commonly utilized. Convenience meals are increasingly using pre-made pouches or doypacks as a product distinction.

Figure 5. Food Packaging Films Market, by Application, in the Period 2022 - 2027



	Convenience Foods	Meat, Poultry & Seafood	Bakery & Confectionery	Dairy Products	Fruits & Vegetables	Others
2022	10,195	10,528	7,047	6,928	5,340	12,899
2027	14,404	14,363	9,668	9,668	7,202	17,042
CAGR (2022–2027)	7.2%	6.4%	6.5%	6.9%	6.2%	5.7%

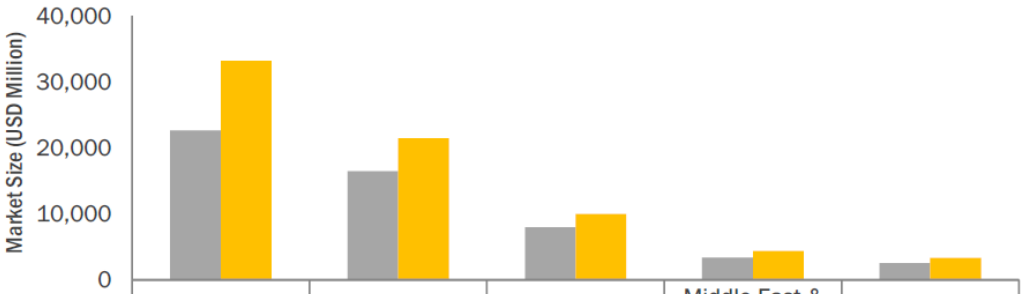
1.5 Market by Region

The global food packaging films market is segmented region-wise into: **Asia Pacific, North America, Europe, Middle East & Africa and South America** (Figure 6). The global market for food packaging films has been experiencing steady growth since the last decade. Growth in the food packaging films market is primarily driven by factors such as the rising consumption of packed food products, increasing demand from the food industry, rising disposable income, and manufacturer focus on developing low-cost packaging options.

Asia Pacific accounted for the largest share of the overall food packaging films market in terms of value in 2022. Emerging economies in the Asia Pacific region, such as India and China, provide immense opportunities in the food packaging films market.

North America was the second-largest food packaging films market in 2022. Its market size is projected to reach USD 21.5 billion by 2027, at a CAGR of 5.4% between 2022 and 2027.

Figure 6. Food Packaging Films Market, by Region, in the Period 2022 - 2027



	Asia Pacific	North America	Europe	Middle East & Africa	South America
2022	22,613	16,475	7,929	3,409	2,510
2027	33,158	21,467	9,978	4,407	3,337
CAGR (2022–2027)	8.0%	5.4%	4.7%	5.3%	5.9%

1.5.1 Focus on Europe

Europe has a large and mature market for fresh fruits and vegetables with stable demand. The need for year-round availability and interest in exotic produce maintain Europe's continuous dependence on external suppliers. The fruit & vegetable sector is well-organized in European countries. The region has several regulating bodies, such as the Association of Producer Organization, Fruit and Vegetable Organization (FVPO), and Producer Groups, that make huge investments in various fresh produce sectors. Germany holds the major share of the European food packaging films market.

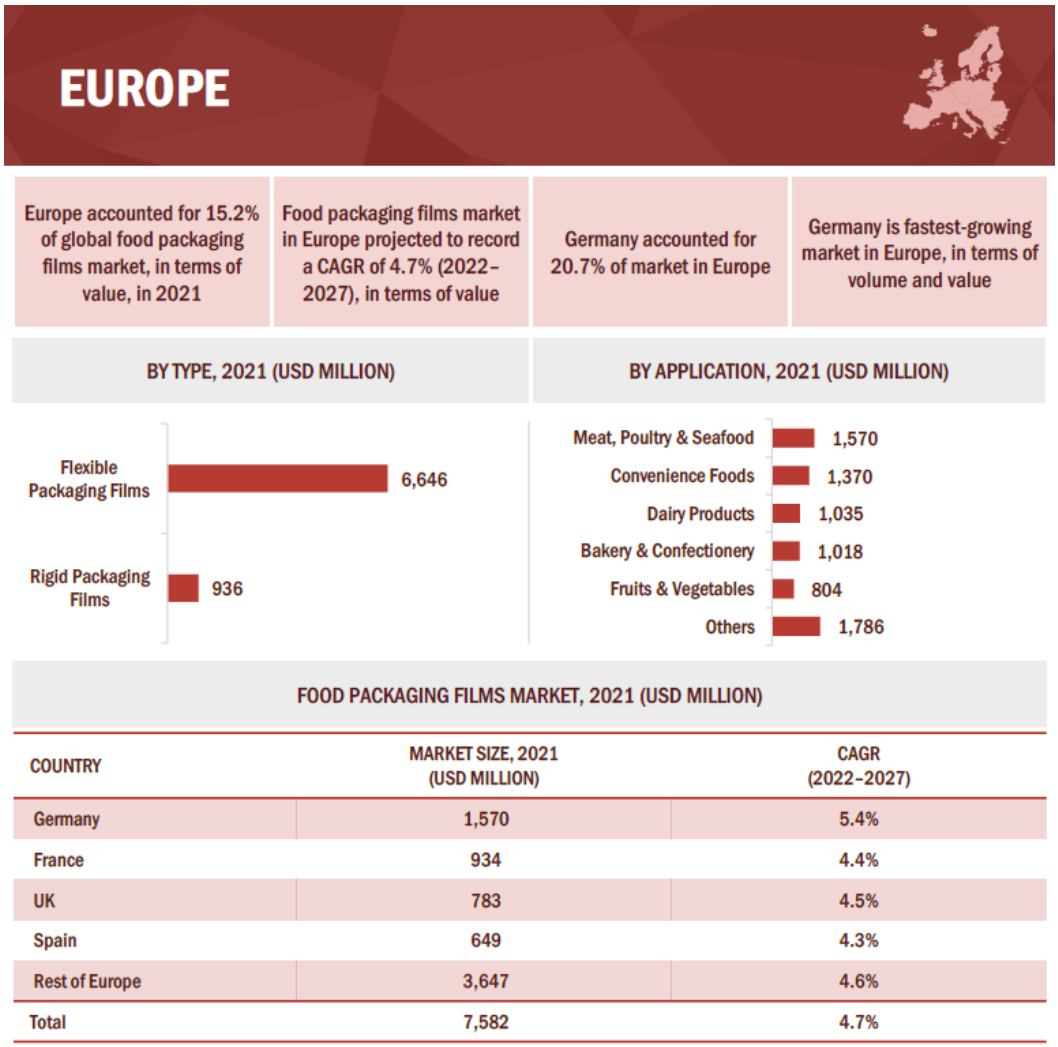
The competition is often fierce in these products, and the strict requirements, especially in Northern Europe, put pressure on exporters. According to the Centre for the Promotion of Imports from Developing Countries (CBI), a major reason for exporters to target the European market is its sheer size and purchasing power. With a population of more than 500 million consumers, Europe is responsible for 45% of the global trade value of fresh fruits and vegetables.

Europe is a **well-established market** for food packaging films. Owing to industrial expansion and technological developments, the food packaging films market is projected to grow during the forecast period. The region has moderate growth opportunities in the global food packaging films market. Stringent environment regulations fuel the growth of the market in the region, as they will encourage manufacturers to innovate new products that adhere to the regulations. The investments in R&D and the technological developments to develop sustainable and high-quality flexible packaging solutions are opening up new growth avenues for the market in Europe.

The growth in the food packaging films market will be supported by the improving global economy, rising domestic demand for food products & exports, and increasing consumption of packed food products during the COVID-19 pandemic and after. The focus on reducing packaging waste and food waste will also drive the market for food packaging films.

PP metalized films are employed in packaging owing to their inherent advantages such as ease of printing, low cost, inertness to food, and low moisture transmission. The growing demand for ready-to-eat food and rising awareness about packaged food support the development of the packaging sector. This, in turn, drives the demand for food packaging films in the region.

Figure 7. Europe: Food Packaging Films Market Snapshot



FOOD PACKAGING FILMS MARKET, 2021 (USD MILLION)

COUNTRY	MARKET SIZE, 2021 (USD MILLION)	CAGR (2022–2027)
Germany	1,570	5.4%
France	934	4.4%
UK	783	4.5%
Spain	649	4.3%
Rest of Europe	3,647	4.6%
Total	7,582	4.7%

Rest of Europe includes Belgium, Austria, Poland, Sweden, Italy and Switzerland

The **European market for food packaging films by material** is reported in the following Table.

Table 1. Europe: Food Packaging Films Market, by Material, 2020–2027 (USD Million)

Material	2020	2021	2022	2027	CAGR (2022–2027)
Polyethylene	2,268	2,819	2,931	3,584	4.1%
Polypropylene	1,533	1,933	2,039	2,677	5.6%
Polyethylene Terephthalate	967	1,216	1,280	1,662	5.4%
Polyamide	539	666	688	817	3.5%
Others	758	948	992	1,238	4.5%
Total	6,064	7,582	7,929	9,978	4.7%

1.6 Competitive Landscape

The food packaging films market is highly competitive, comprising many global and local market players. The **top 5 companies** in the market can be considered: Amcor plc (Australia), Coveris (US), DS Smith (UK), Berry Global (US) and Charter Next Generation (US).

Other key players in the market are: Smurfit Kappa Group (Ireland), Mondi PLC (South Africa), International Paper Company (US), Silgan Holdings Inc. (US), WestRock Company (US), and Sealed Air Corporation (US). These companies have undertaken strategies such as acquisitions, expansion, and new product launches to strengthen their position in the market.

1.6.1 Company Evaluation Quadrant Matrix

The company evaluation quadrant provides information about the key players active in the food packaging films market. Vendor evaluations are based on two parameters: strength of product portfolio and business strategy excellence and are categorized into: stars, emerging leaders, pervasive players and participants (Figure 8).

Star companies are the leading market players in terms of both the strength of their service portfolios and business strategies. Amcor plc, Berry Plastics Group, Inc, Coveris, DS Smith, Sealed Air Corporation, Graphic Packaging Holding Company, and Charter Next Films Inc. are the star players in the food packaging films market.

Emerging leaders are players in the food packaging films market with a strong focus on innovation; they make significant investments in their R&D endeavors to gain a competitive edge in the market. Mondi Group, Taghleef Industries Group, Wipak OY, Westrock, and The Dow Chemical Company are recognized as emerging leaders in the food packaging films market.

The food packaging films market also includes some **participants** who have either recently included food packaging films related products and services in their portfolios, have a limited-service portfolio catering to the food packaging films market, or are comparatively smaller in terms of the scale of operations. Innovia Films Ltd, Novolex, Clearwater Paper Corporation, Georgia-Pacific LLC, Novamont S.P.A, Constantia Flexibles Group GmbH, Plastipak, Tetra Pak International S.A., Printpack Inc., Huhtamaki Oyj., Jindal Poly Films Ltd., and RKW SE are recognized as participants in the food packaging films market.

Figure 8. Food Packaging Films Market: Competitive Leadership Mapping

2 Packaging – emerging technology options

As far as today, the main emerging technologies regarding food packaging are:

- **Modified atmospheric packaging (MAP)** - Adjusts atmospheric gas content, including carbon dioxide, oxygen, and nitrogen levels, to optimize product shelf life;
- **Active Packaging** - Packaging materials containing agents that promote shelf life extension by absorbing or emitting certain volatiles, controlling moisture levels, or reducing microbial activity;
- **Smart packaging** – Sensor enabled intelligent packaging enables continuous tracking and monitoring of products.

While technologies like **MAP** have been used to help extend shelf life and prevent spoilage, developers are looking beyond **passive MAP**, including adopting active packaging methods, which are more advantageous to control respiratory metabolism of fruits and vegetables. Promising developments include academic research projects like EU funded NanoPack, which has focused on flexible plastic food film with antioxidants and antimicrobial properties to delay food spoilage. Sensor enabled smart packaging solutions are gaining importance for tracking the quality of perishable food products, with digital connectivity as a catalyst for the growth of these solutions. Mainly dominated by large companies and SMEs, active packaging solutions are relatively mature, with limited startup activity to consider for open innovation efforts. Startup activity in sensor-enabled smart packaging is gaining momentum, with startups focusing on incorporating freshness indicators and time-temperature indicators to track perishable food products.

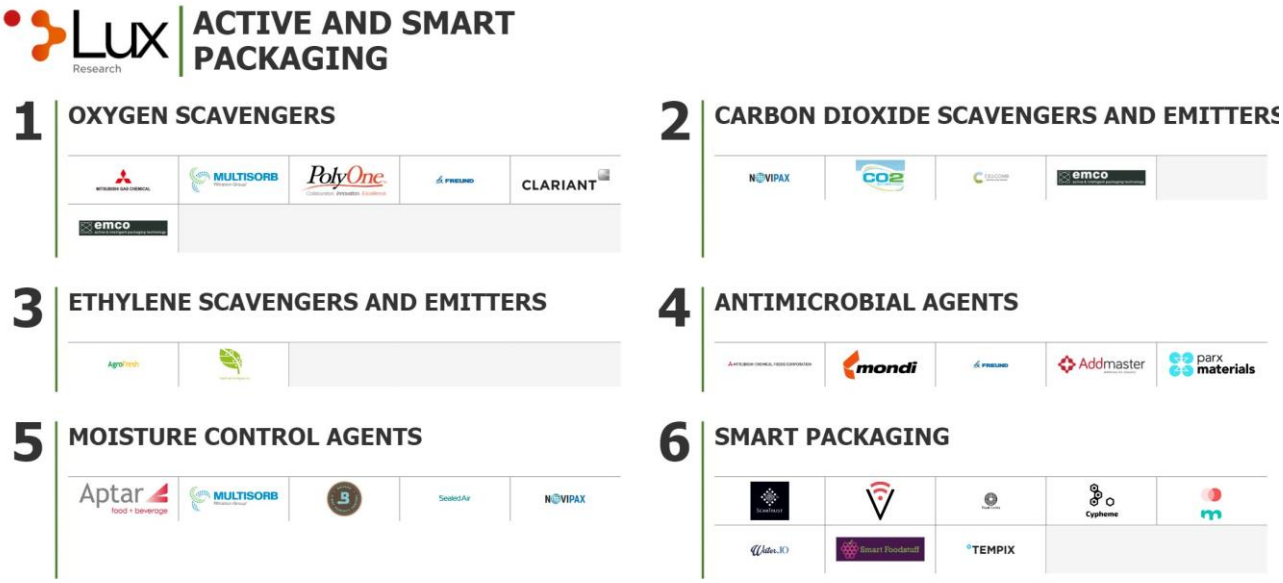
2.1 Active packaging

Active packaging are defined as packaging materials containing agents that promote shelf-life extension by absorbing or emitting certain volatiles, controlling moisture levels, or reducing microbial activity. The type of active packaging considered in the analyses are: oxygen scavengers, CO scavengers and emitters, ethylene scavengers and emitters, antimicrobial agents, and moisture-control agents.

2.1.1 Key players

Active packaging solutions are relatively mature, with a handful of well-established large companies and small to medium-size enterprises (SMEs) operating in this space for decades. These companies largely hail from Japan, the EU, or the U.S. PolyOne, Mitsubishi Chemical Holdings, Freund, and Mondi possess some of the most dominant active packaging solutions in the field. Not all these solely employ one approach; some even combine multiple methods to produce a single product. For example, Freund's product Negamold simultaneously utilizes ethanol and iron to control microbial growth and oxidation, respectively. More recent emerging technologies look to embed active packaging or sensor properties within existing pack materials and biodegradable packaging, with the capability to assess and analyse the product's headspace. Some advancements include Aptar's InvisiShield; Nanyang Technological University, Singapore, and Harvard University's smart and biodegradable packaging; and MIT's microneedle smart food sensors. All of these technologies remain at pilot scale as cost implications for consumers continue to outweigh benefits.

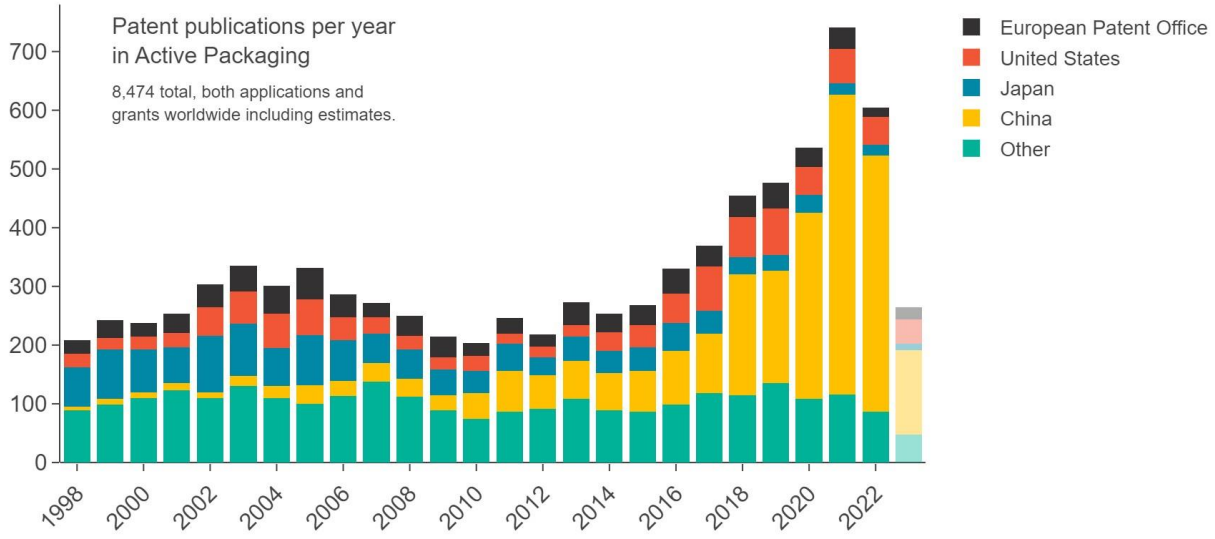
Figure 9. Active and Smart Packaging – Key Players



2.1.2 Patents and Papers

While some consumer-packaged goods companies are developing their own active packaging technologies, packaging companies themselves are mainly driving patent activity. IP output has picked up pace since hitting a low point in 2009, significantly increasing year after year and reaching an all-time high of 723 publications in 2021. The rate of academic papers is growing faster, however, intersecting at the IP low point in 2009.

Figure 10. Active Packaging – Geographic Patent Trend



2.1.3 Challenges to overcome

While active packaging has proven utility for perishable foods, it has not been able to demonstrate effectiveness for shelf-stable, processed foods. Even in the case of perishable foods, it is fighting against edible biobased coatings.

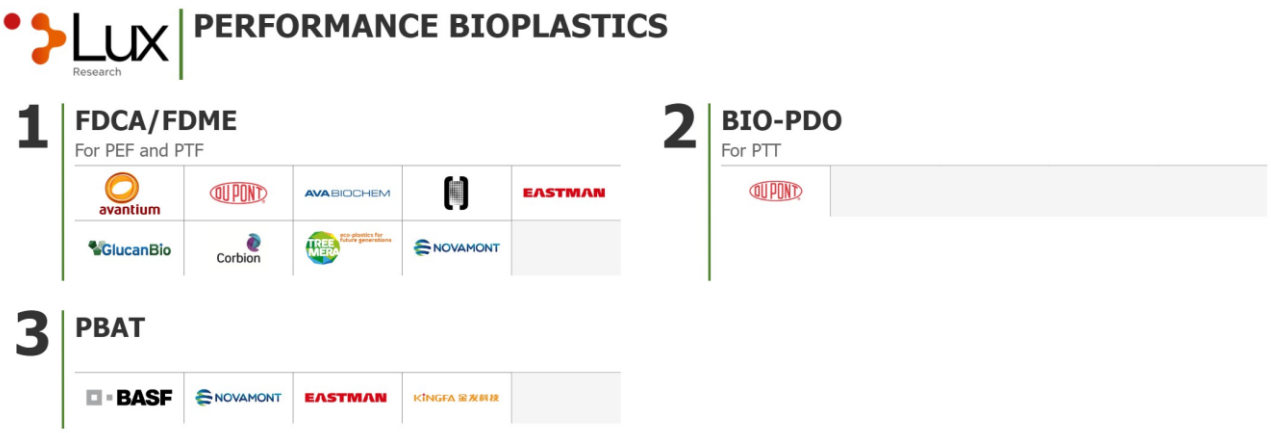
2.2 Bio-based Replacements for PET

Food and beverage companies face substantial pressure from consumers to offer sustainable packaging and bottles. This demand has opened up opportunities for bio-based materials and precursors to disrupt the incumbent PET market. Material and chemical companies are racing to develop **bio-PET** and **novel bio-based polymers** in an effort to replace PET. Specifically, developers are producing drop-in precursors purified terephthalic acid (PTA) and monethylene glycol (MEG) for PET and novel precursors furan-2,5-dicarboxylic acid (FDCA) and 1,3-propanediol (PDO) for PET alternatives PEF and PTF. PEF is produced from FDCA and MEG, and PTF is produced from furandicarboxylic methyl ester (FDME) and PDO.

2.2.1 Key players

Most groups are developing either drop-in bioPET or novel furan-based materials. The recent negative momentum for furan-based materials and the appeal of the well-established PET market and recycling stream has made Lux more positive toward bio-PET. Furthermore, there has been new activity within bio-PET, as Virent has recently announced its partnership with BP to continue PTA development. PTA developer Anellotech is scaling its production this year to industrial scale with support from Suntory and Toyota Tsusho. Momentum for furan-based materials has slowed significantly in the past several years. Avantium has delayed its FDCA pilot facility to 2024 as BASF pulled out of JV Synvina and has switched its focus to smaller-volume applications. DuPont/ADM is considering selling its sustainable business, leaving the fate of PTF and its supply chain unclear. While Origin Materials has licensed HMF-to-FDCA technology from Eastman Chemical, the company is prioritizing PTA for bio-PET.

Figure 11. Bio-based Replacement for PET – Key Players

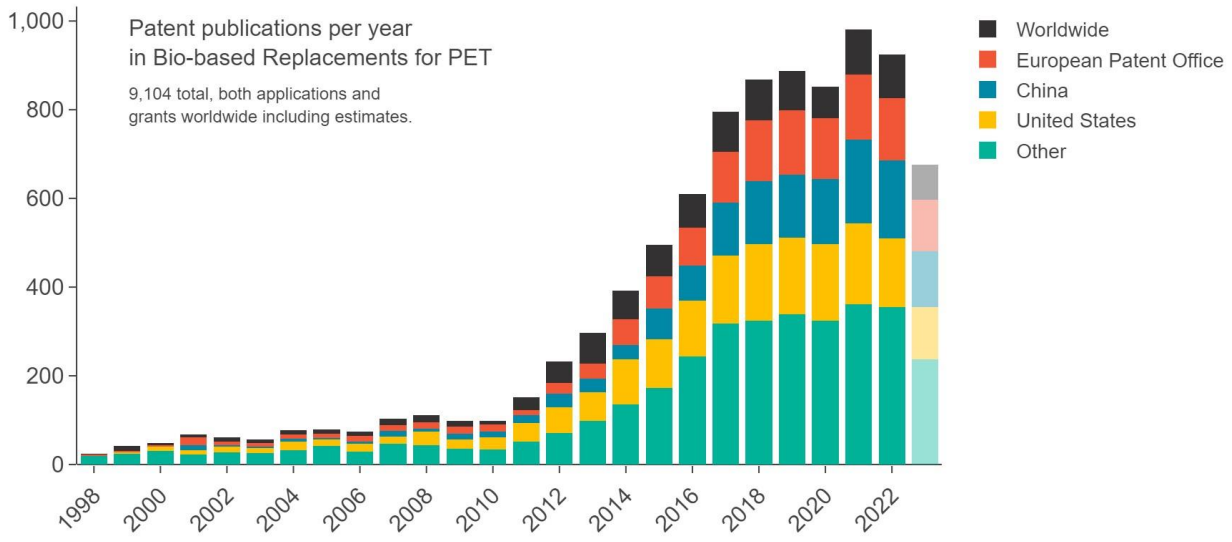


2.2.2 Patents and Papers

The accelerated patent growth in 2011 corresponds to The Coca-Cola Company's partnership announcement with Avantium, Virent, and Gevo to develop 100% plant-based bottles. This announcement jump-started the research and development of bio-based bottle alternatives, leading to significant growth in patent activity as additional startups enter the space. In 2018, patent activity flattened as more companies slowly shifted from research and development stages to scale and commercialization stages. In particular, Avantium is in the process of constructing its FDCA pilot facility, while

Anellotech and Origin Materials are completing their demonstration facilities. In the future, Lux expects a slowed trend in annual patent activity as more companies shift into the commercialization stage.

Figure 12. Bio-based Replacement for PET – Geographic Patent Trends



2.2.3 Challenges to overcome

No player in this space will achieve cost parity, even at scale with incumbent PET, which greatly reduces the chance of wide-scale adoption. Bio-MEG is already at scale yet still costly, and therefore, bioPTA and novel furan-based materials will be nearly cost-prohibitive to adopt as developers struggle to scale.

3 Conclusions

Food packaging is one of the largest segments of the packaging industry. Packaging plays a vital role in keeping the product fresh, damage-proof and acts as an efficient marketing tool. The **food packaging films market** size was USD 49.8 billion in 2021 and is projected to reach USD 72.3 billion by 2027, at a CAGR of 6.4%. The growth of the food packaging films market is estimated to be driven by the growing demand for convenience food items and innovative packaging solutions that ensure extended shelf life of food items. However, stringent regulations related to raw materials used for packaging are restraining market growth.

Meat, poultry & seafood products are the largest application of food packaging films. Increasing health concerns and the rising awareness regarding the nutritional values of meat products are boosting the demand for food packaging in this segment.

The **flexible packaging films segment** is projected to be lead the food packaging films market, by type. In flexible packaging applications, aluminum foils are employed to ensure outstanding moisture, **oxygen**, and aroma barrier properties; however, a major problem with foils, is the inability to view the contents of the package prior to opening. Flexible pouches made from PET and PE as monolayers are fully and easily recyclable. Changing lifestyles and the increasing dependence of consumers on packaged foods is increasing the demand for flexible packaging films.

Polyethylene is projected to be the largest material segment of the food packaging films market. It is extensively used due to its malleability, strength, stability, processability, reusability, and resistance to chemicals and moisture. The recent technological advancements in PE food packaging films show that food in such packages has a significantly longer shelf life.

Finally, the field of food packaging is expecting a transformation driven by **emerging technologies** following the increasing demand for more sustainable products. Specifically, active packaging and bio-based replacement are gaining momentum because they offer the ability to extend shelf life without altering the existing product or manufacturing process.

4 Sources

MarketsandMarkets Knowledge Store - Multisectoral database that collects market research reports in various technological fields and designed to process some information interactively. More than 1,200 market reports are published each year (https://www.mnmks.com/).

The information presented are contained in the report "*Food Packaging Films Market – Global Forecast to 2027*", published in July 2022.

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The information presented are contained in the reports:

- Lux Research "*Preserving the Food Chain*" published in May 2020;
- Lux Research "*Active Packaging*" published in June 2022;
- Lux Research "*Bio-based Replacements for PET*" published in December 2019.