

## Section II: Executive Summary

---

The global flexible packaging market reached revenues of US\$82 billion in 2015. Barrier materials are a key component in nearly half of the flexible packaging manufactured for this market. The large size of the barrier flexible packaging market explains and justifies the tremendous efforts that are expended throughout the packaging industry to develop, manufacture, and utilize barrier materials in the most effective way. This study examines the technology, environmental impact, economics, market drivers, market statistics, market forecast, and important participants in this industry.

The materials included in this study were selected primarily by their barrier properties; specifically, the barrier to oxygen and/or moisture vapor provided by each material. A material is included in this study if it meets specific barrier targets:

- an oxygen transmission rate less than 77.5 cc/m<sup>2</sup>-day-atm
- or a moisture vapor transmission rate less than 1.55 gm/m<sup>2</sup>-day-atm

An additional criterion was used to organize the analysis. Commercial materials were separated from emerging materials and concepts. For this study, a barrier material had to generate at least 1,000 metric tons of volume, on a global basis, to be considered a commercial material.

## A. Drivers and trends

Barrier packaging is a complex science, and the barrier flexible packaging industry is shaped by a complex set of drivers that emerge from various positions in the value chain.

Our analysis of market drivers is organized into the macro environment, consumer drivers, and packaging industry drivers.

### 1. Macro environment

Barrier materials are used so broadly in the flexible packaging industry that they cannot escape the impacts of macro environmental factors. Fundamental macro environment factors such as population, demographics, and other macroeconomic trends impact the consumption of flexible packaging and, logically, the barrier materials that are used in the flexible packaging industry.

It is also important to note that food applications dominate consumption of barrier flexible packaging. An awareness of this concentration in the food market helps to understand the important drivers of barrier flexible packaging consumption.

#### Population

Generally, population growth drives consumption of barrier materials higher. Developed regions such as North America, Europe, and Japan have relatively low population growth rates. Developing countries such as China and India have high population growth rates.

The correlation of barrier material consumption to population varies greatly on a per capita basis. Barrier material consumption on a per capita basis is much higher in North America, Europe, and Japan than it is in China and India.

The difference in per capita consumption is primarily due to the way in which food is delivered to consumers. Packaged foods are used for almost every food product in developed regions. In developing regions,

## A. Barrier principles

This first sub-section identifies and examines key principles that control barrier performance. Critical variables include:

- temperature
- humidity
- barrier material thickness

### 1. Temperature dependence

Temperature has a strong impact on barrier performance. For example, Figure 15 illustrates the impact of temperature on oxygen permeation for ethylene vinyl alcohol (EVOH) resin.

