

Avoiding Greenhouse Gas Emissions The Essential Role of Chemicals



Multilayer Polyethylene packaging films A SABIC case study



Efficient packaging solutions through material effectiveness can help reduce greenhouse gas (GHG) emissions throughout the entire life cycle of packaging solutions. A study was conducted to calculate the reduction in greenhouse gas (GHG) emissions during the life cycle of 2 types of packaging: a five layered packaging film compared to a conventional three layered packaging film for collation shrink film application.

The primary role of packaging is to prevent packaged products from getting damaged during transporting, storing, handling, shelving, preservation, opening and usage. Multilayer PE packaging films are used for applications such as bottle water packs, beer cans pack, beverage collation shrink film. SABIC has developed a recipe for multilayer PE packaging film, which enhances material properties of the film and improves its effectiveness allowing 22% reduction in film thickness. SABIC's five layer packaging film matches the three layer reference film specification with respect to shrink force, optical and tensile properties. However it is 22% lighter in weight for equivalent functional unit basis i.e. 1000 m² of film area.

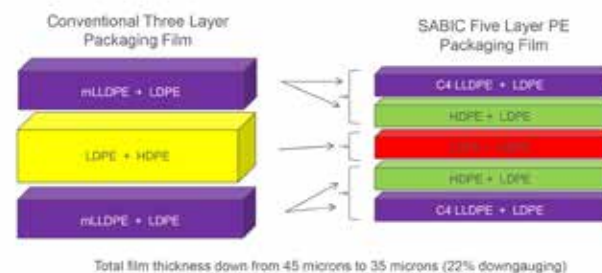
The study shows that 22% reduction in film thickness of the packaging film results in close to 22% reduction in lifecycle greenhouse gas emissions. Every 1000 m² of five layer PE film results in 40 kg of avoided GHG emissions compared to conventional three layer film. The study demonstrates that increase in material effectiveness through product innovations has a strong and linear impact in reducing the lifecycle environmental footprint of plastic packaging.

Full study available at: www.icca-chem.org/energy-climate

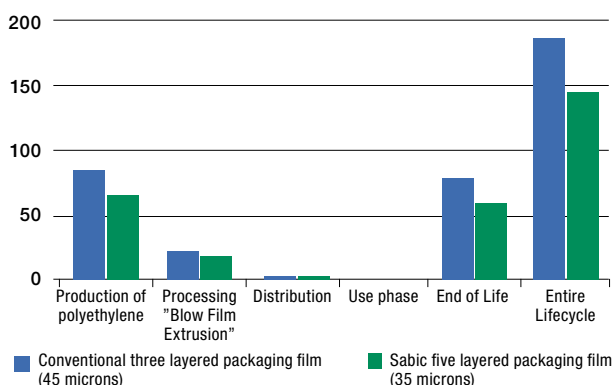
Multilayer polyethylene packaging film (a) and Packaging of pack of six beverage bottle with multilayer PE packaging film (b).



Conventional three layer packaging film (45 µm) and SABIC five layer packaging film (35 µm)



Avoided Greenhouse Gas Emissions over the lifecycle of five layer PE packaging film versus conventional three layer packaging film



The avoided CO₂e emissions per 1000 m² of packaging film

Emissions per life cycle phase (kg CO ₂ e)	SABIC five layer packaging film (35 microns)	Conventional three layer packaging film (45 microns)	Avoided Emissions kg CO ₂ eq./functional unit
Production of Polyethylene	66	85	19
Processing- «Blow Film Extrusion»	18	22	4
Distribution	1	1	0
Use phase	-	-	
End of Life	60	78	18
Entire Lifecycle	145	185	40
Avoided Emissions	40		



This case study illustrates how the reduction of greenhouse gas (GHG) emissions can be enabled by chemical products, as part of a series of case studies brought to you by ICCA. Chemical industry members offered Life Cycle Assessment [LCA] case studies for the purpose of showing illustrative examples on how to calculate avoided greenhouse gas emissions. The avoided emission calculations were based on the guidelines developed by ICCA and WBSCD (World Business Council for Sustainable Development) - Chemical Sector, with the support of Arthur D. Little and Ecofys. Other life cycle environmental impacts such as water and land use change were outside the scope and usually not considered.

