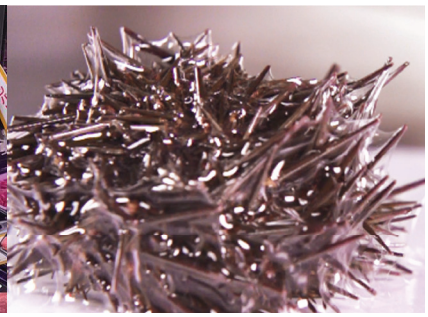
DOW®

SUSTAINABLE FUTURE PROGRAM

TECHNOLOGY HIGHLIGHT

Reducing greenhouse gas emissions through better food packaging

Vacuum skin technology extends shelf life and reduces food waste



Project Name: Food loss reduction through better packaging

Project Description: This project reduces greenhouse gas (GHG) emissions associated with food waste through improved food packaging, enabled by the next-generation vacuum skin technology.

Project Start: November 2019

Partner: AEON group

Location: Japan

Carbon Emission Crediting Period: 2019 to 2026

Why Beyond Business as Usual? Significant GHG emission reductions are expected to be achieved by driving the adoption and increasing the utilization of next-generation packaging technology for fresh meat. In addition, the improved packaging helps increase the shelf life of fresh meat by 13 days without compromising product safety and appearance, thereby reducing waste.

The challenge: The role of food packaging in tackling climate change

With an estimated 28-35%[1] of global GHG emissions coming from food-related activities, the food industry has a critical role in tackling climate change. The environmental impact of food production and consumption is increased when food is wasted and not consumed. For example, meat production is considered as the most environmentally impacting product responsible for more than 20% of the total GHG emissions related to food waste, according to the United Nations and the Food and Agriculture Organization (FAO)[2]. Only avoiding food losses and waste can reduce an overall carbon footprint by up to 8%[3].

Optimized food packaging is one of the critical solutions for food waste prevention. Proper protection pays off for food products with carbon-intensive production like meat. According to life cycle assessments (LCAs), the environmental benefit of avoided waste is typically 5 to 10 times higher than the environmental cost of the packaging[4] while the benefit is expected to be much larger when it comes to carbon-intensive food (e.g., red meat at 20-60 kg CO_2e/kg)[5].

In many cases, retailers have the most significant influence on the packaging, but consumers' acceptance also drives their criteria. The challenge is to partner with retailers to develop optimized packaging that significantly prolongs the shelf life of carbon-intensive food products while ensuring consumer acceptance, stringent hygiene and safety standards, and cost-effectiveness.

The solution

Vacuum Skin Packaging (VSP) is a multi-layered packaging solution with high oxygen and moisture barriers developed to protect fresh products like meat, seafood and cheese. VSP encloses the product tightly with specialty polyethylene (PE) films by removing the residual oxygen from the package, like a second skin, preserving shape, texture and product integrity for a premium retail presentation. VSP responds to the new expectations of consumers in terms of shelf appeal, perceived transparency, quality, safety and authenticity, convenience and sustainability efforts.

Enabled by Dow's SURLYN™ Ionomer and other packaging resins and technologies, VSP removes all residual oxygen from the package and prevents air from re-entering after the vacuum seal process, therefore notably enhancing the packaging performance and sustainability advantages compared to conventional packages. According to a 2015 study conducted by Austrian-based research institution Denkstatt, the key sustainability advantages of VSP are as follows:

- **Less food waste and loss due to better protection during shipment and extended shelf life**
  The ionomer technology's unique properties, including toughness (reducing the risk of punctures) and elasticity (to fit tightly around the contents), result in a packaging system that eliminates leakage risk and allows for better protection during shipment. According to the AEON Group, enabled by Dow's ionomer technology, VSP removes nearly all residual oxygen from the package, leading to an extended shelf life of products, including up to by 10 days for beef.

[1]https://quantis-intl.com/report/dig-in-food-report/
[2]http://www.fao.org/ag/againfo/resources/en/publications/tackling_climate_change/index.htm
[3]https://kunststoff.swiss/Downloads/Nachhaltigkeit/Stop-Waste---Save-Food-Guideline-(EN)
[4]https://kunststoff.swiss/Downloads/Nachhaltigkeit/Stop-Waste---Save-Food-Guideline-(EN), page 5
[5]Poore, J., & Nemecek, T. (2018) Science, 360(6392), 987-992

The results

Dow and AEON Co. Ltd (AEON), the largest retailer group in APAC, partnered to reduce GHG emissions and food loss using Dow's technologies in food packaging solutions. The purpose of our collaboration is to reduce food waste at the retailer level through improved food packaging by accelerating the market penetration of VSP. The project takes place in Japan, where the VSP packaging has been rolled out to various meat products in Daiei Supermarkets, an AEON group.

Together, Dow, Dow-Mitsui Polychemicals, AEON and Daiei set out to accomplish a two-fold goal:

1. Integrate packaging technologies that preserve food freshness.
2. Deliver environmental impacts while raising awareness among consumers on the issue of food loss and its importance.

As a result, Dow hopes that VSP will be accepted by consumers as the new norm in Japan, thereby resulting in accelerated adoption by retailers in other countries in the region.

Dow, AEON and Daiei are launching multiple in-store promotions, as well as creating videos[6] and magazine and T.V. features to raise awareness for VSP and build acceptance among consumers. For example, one of the suspected reasons for a slow market adoption was the color of the meat packed in VSP. Due to the exclusion of oxygen, packaged beef appeared to be slightly dark or purple-red, which was not well-received by consumers. The visual campaign demonstrates how the beef becomes bright red again once the package is opened.

Together, with an independent third-party auditor, Dow and AEON are verifying GHG reductions achieved through the adoption of VSP technology. GHG emissions reductions are calculated based on the reduced food loss compared to those using conventional meat packaging, like modified atmosphere packaging (MAP) in Japan. AEON recognizes its potential for influence, and is committed to contributing to the U.N.'s Sustainable Development Goals by setting a target of cutting its food waste in half by 2025. As an expert in materials science, Dow understands its unique role in curbing climate change and is constantly looking for collaboration with like-minded value chain partners.

Dow's solutions for food packaging

Dow Packaging and Specialty Plastics has a broad portfolio of materials that enable them to achieve the required properties while allowing for easier processing, reducing waste and overall cost – across various packaging types. Dow's portfolio of packaging resins, such as SURLYN™ Ionomers, AFFINITY™ Plastomers, BYNEL™ Coextruded Adhesives and a broad offering of laminating adhesives and coatings, have been developed to meet the increasing demands of consumers and businesses. Our ultimate goal is to ensure that all food and beverages arrive "fresh to the table."

For more information on Dow's solutions for better, more sustainable packaging how it can benefit your business, visit:

https://www.dow.com/en-us/market/mkt-packaging.html

http://dpsp-solutions.com/wp-content/uploads/Packaging-for-meat-cheese-and-seafood-1.pdf

About Dow

Dow (NYSE: DOW) combines global breadth, asset integration and scale, focused innovation and leading business positions to achieve profitable growth. The Company's ambition is to become the most innovative, customer centric, inclusive and sustainable materials science company, with a purpose to deliver a sustainable future for the world through our materials science expertise and collaboration with our partners. Dow's portfolio of plastics, industrial intermediates, coatings and silicones businesses delivers a broad range of differentiated science-based products and solutions for its customers in high-growth market segments, such as packaging, infrastructure, mobility and consumer care. Dow operates 106 manufacturing sites in 31 countries and employs approximately 35,700 people. Dow delivered sales of approximately $39 billion in 2020.

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[6]https://www.youtube.com/watch?v=18A_pN_Z3LY

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