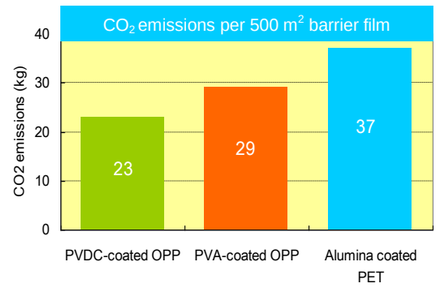
PVDC COATED FILM

PVDC is a material known to have a low environmental impact.

Against a background of global warming caused by carbon dioxide emissions and increased energy use, we believe that PVDC-coated films can be regarded as low-impact materials based on the results of LCA*.

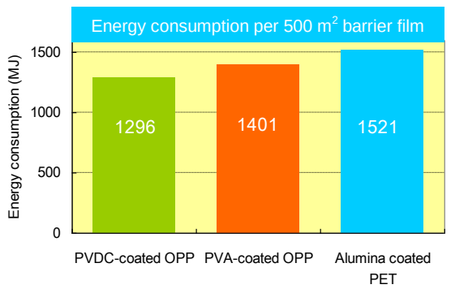
1. Contribution to the prevention of global warming

The amount of carbon dioxide emitted in the manufacture of 500 m^2 of barrier film is lower for PVDC-coated films than for other materials. Thus, PVDC contributes to global warming prevention.



2. Contribution to energy conservation

The energy consumed in the manufacture of 500 m^2 of barrier film is lower for PVDC-coated films than for other materials. Thus, PVDC contributes to energy conservation.



*LCA: life cycle assessment

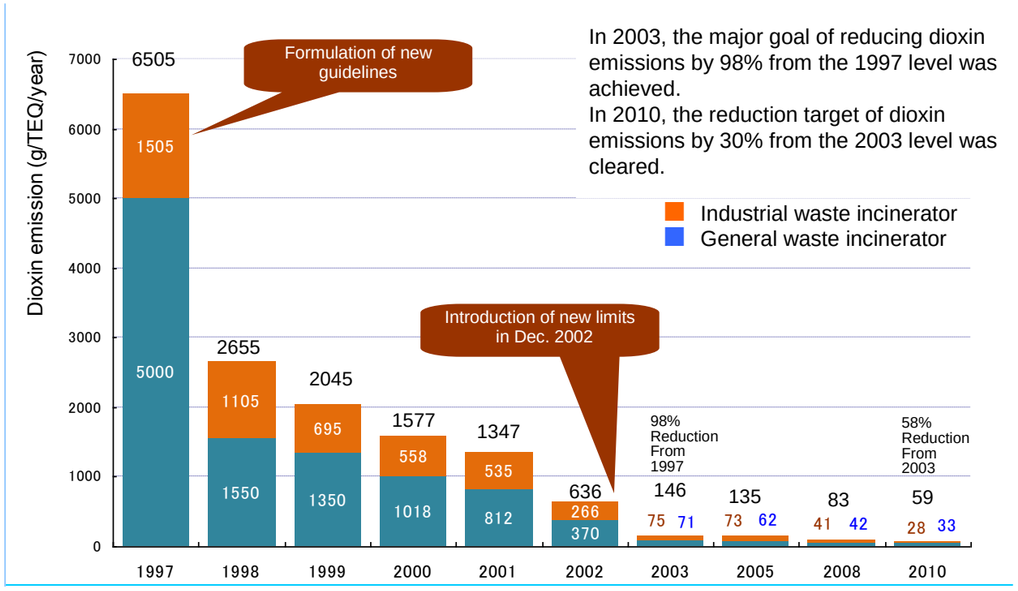
2. Contribution to petroleum resource conservation

PVDC consists of approximately 70% sodium chloride – a compound found on the earth in almost unlimited amounts. It therefore contributes more to petroleum resource conservation than other materials.

Reference data: changes in dioxin emissions

All types of waste may generate dioxins if they are incinerated improperly. As the best option for dealing with this problem, waste incinerators themselves and incineration processes have both been optimized. Now, waste is incinerated at high temperatures (over 800˚C), which generates almost no dioxins.

Changes in dioxin emissions from waste incinerators



In 2003, the major goal of reducing dioxin emissions by 98% from the 1997 level was achieved.
In 2010, the reduction target of dioxin emissions by 30% from the 2003 level was cleared.

Source: Ministry of the Environment website Mar. 2012

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Japan Hygienic Association of Vinylidene Chloride

http://vdkyo.jp

What is PVDC?

Polyvinylidene chloride is made from ethylene and chlorine, and approximately 70% of the chlorine used is derived from sodium chloride. In this sense, it can be said that PVDC is an ideal plastic for petroleum resource conservation. As PVDC resins are high-density hydrophobic polymers, they provide an excellent barrier to oxygen, water vapor and aromas. They also have heat-sealing and flame-retardant properties, oil and chemical resistance, and a variety of other features. No other resin has such effective barrier properties to both oxygen and water vapor. In addition, these properties are unaffected by humidity.

Applications of PVDC resins

PVDC resins are used in a wide range of applications. The table below lists just a few products that make use of their outstanding properties.

Fibers	Used in curtains (flame retardancy), scrubbers (water resistance), shoe insoles (elasticity recovery), doll hair (gloss), etc.
Kitchen wrap	Superior to vinyl chloride wrap, polyethylene wrap, etc. in terms of barrier properties, adhesiveness, transparency, gloss, tensile strength, ease of cutting, and microwavability
Packaging films	Widely used as packaging materials for ham, sausages, cheese, etc. as barrier films unaffected by humidity
Coating agents	Polypropylene, nylon, PET and other packaging films excel in strength and heat resistance, but lack sufficient barrier properties. PVDC coating for such substrate films adds barrier properties to their advantages.

What are PVDC-coated films?

"PVDC-coated films" is a general term for films coated with a thin layer (1 – 3 μm) of PVDC. They are used in a variety of applications as packaging materials that provide gas barrier properties in addition to the properties of their base films.

1. Gas barrier properties unaffected by humidity

PVDC-coated films maintain stable gas barrier properties in varying conditions of humidity.

2. Water vapor barrier properties

In addition to inhibiting the oxidation of food, PVDC-coated films help to retain moisture content and prevent absorption of moisture from the outside.

3. Superior aroma barrier properties

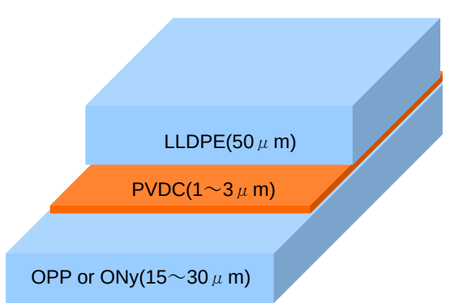
PVDC-coated films provide outstanding aroma barrier properties, making them especially useful for food products containing vinegar and soy sauce.

4. Favorable pinhole resistance (PVDC-coated nylon)

PVDC-coated films have superior resistance to abrasion and flexing, and are particularly resistant to pinhole formation.

Typical composition of PVDC-coated film used as a packaging material

Coating a packaging material with a thin layer of PVDC gives it superior gas barrier properties.



Applications of PVDC-coated films

The table below shows the applicability and range of use of PVDC-coated OPP and PVDC-coated nylon. OPP is used mainly in lightweight packaging, and nylon is used for applications that require resistance to pinholes and tearing.

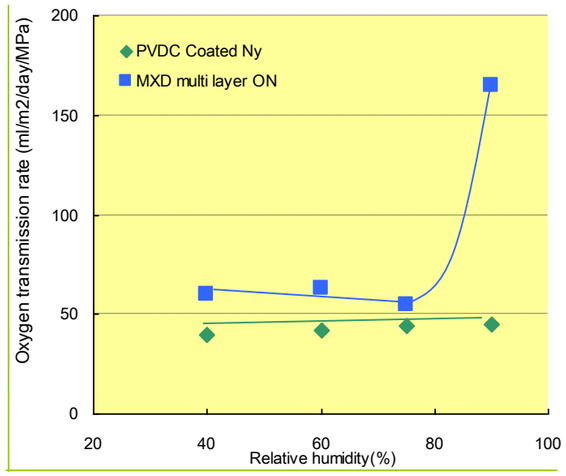
Applicability	High moisture proofing	Packaging of products with high moisture content	Boiling applications	Pinhole resistance	Liquid Container	Puncture resistance
Range of use	PVDC-coated OPP					
	PVDC-coated nylon					
Examples	Biscuits	Sliced cheese	Pickles Boiled/ precooked food	Processed meat (Vienna sausages) Rice cakes Japanese/Western confections	Liquid soups Seasonings (packed in bags)	Miso paste bags Rice bags Liquid packages for industrial use

Gas barrier properties of PVDC-coated films

1. Humidity dependency of oxygen permeability

KONy	Nylon (15 μm) PVDC coating (2 μm) / LLDPE (50 μm)
MXD-multi layer ONy	MXD-Ny6 (15 μm) / LLDPE (50 μm)
Measurement method	20˚C, measured in accordance with the MOCON method

PVDC-coated nylon provides oxygen barrier properties that are more consistently unaffected by variations in humidity than MXD-multilayer nylon.



2. Evaluation of moisture-proofing properties

KONy	Nylon (15 μm) PVDC coating (2 μm) / LLDPE (50 μm)
MXD-multi layer ONy	MXD-Ny6 (15 μm) / LLDPE (50 μm)
ONy (uncoated)	Nylon (15 μm) / LLDPE (50 μm)
Measurement method	After storing three side-sealed bags filled with water in an environment maintained at 30˚C and 40% RH, evaluate the reduction (%) in weight.

PVDC-coated nylon provides better moisture-proofing properties than ordinary nylon or MXD-multi layer nylon.