



WWF®

WWF-  
HONG KONG

35 YEARS  
OF CONSERVATION

REPORT

2017

# Climate Change and Energy Efficiency

# MISSING THE DOORS

Fridge Doors Save the Climate  
Best Practice Guide

## ABOUT WWF

WWF is one of the world's most respected conservation organizations, with a network active in more than 100 countries. WWF's mission is to build a future in which humans live in harmony with nature, by:

- conserving the world's biological diversity
- ensuring that the use of renewable natural resources is sustainable
- promoting the reduction of pollution and wasteful consumption.

WWF-Hong Kong was established in 1981. In support of our global mission, WWF-Hong Kong's vision is to transform Hong Kong into Asia's most sustainable city where nature is conserved, carbon pollution is reduced, and consumption is environmentally responsible.

Publisher: WWF-Hong Kong

Author: Olivia To

Editor: Saul Symonds

Photo: Olivia To/WWF-Hong Kong

Design: ConceptMIC

Printing: ConceptMIC

## ACKNOWLEDGEMENT

Special thanks to Gavin Edwards, CW Cheung, Prashant Vaze for providing valuable advice on the report; WWF- Hong Kong wishes to acknowledge the efforts of Prentice Koo for working on the project, and Ir. Tony Ho for providing technical information and advice. We also thank Shita Cheung, Kevin Khan, Roy Fok and Sara Chan for the valuable input, and express appreciation for the enthusiasm of Eric Chan, Carson Tang as interns and other citizen scientists for their great support on conducting the study.

© September 2017 WWF-Hong Kong. All rights reserved.

# FOREWORD

The Paris Agreement on climate change agreed by world governments is a turning point in international efforts to mitigate climate change. It signals the near-universal determination to work together to avoid dangerous global warming. Now that the international community has set self-determined targets it must implement policies to bring about the change.

Time is against us. The World Meteorological Organization determined that 2016 was the hottest year on record. Here in Hong Kong the annual mean temperature of 23.6 degrees Centigrade was 0.3 degrees higher than normal and the annual total rainfall was 3,027 mm, 26 per cent above normal. If we continue as we are, such extreme weather will become, more common.

Electricity is Hong Kong's largest source of greenhouse gas emissions. Two-thirds of electricity is used by the commercial sector principally for air-conditioning, lighting and refrigeration.

Grocery retailers in Hong Kong often display their chilled food and drink in fridges without doors. This wastes energy. We set out to measure the size of this problem, and find solutions. We ran tests to see how much energy was wasted by fridges without a door. We conducted surveys to find out the prevalence of these wasteful fridges. Then we shared our results with retailers to initiate a positive dialogue and obtain concrete commitments from them to cut energy usage.

Some 18 months later, our "Missing the Doors" campaign achieved success by securing commitments from a number of retailers to take action. These best practices are outlined in this report as a reference for other grocery retailers who have not yet committed. The benefits of making a commitment include improved energy efficiency, reduced operating costs, cuts to carbon emissions and chilled products that are kept at a safe temperature for consumers.

Climate action can only succeed through the collaborative actions of the government, the business sector and the general public. Retrofitting doors on fridges is one of the many actions that are needed to cut our energy use. Together we can change climate change.



**Gavin Edwards**  
**Director of Conservation**  
**WWF-Hong Kong**

# CONTENTS

---

<b>1. EXECUTIVE SUMMARY</b>	<b>3</b>
<b>2. BACKGROUND – WHY COMMERCIAL REFRIGERATION MATTERS?</b>	<b>6</b>
<b>3. PHASE OUT OPEN DISPLAY CHILLERS AND FREEZERS</b>	<b>11</b>
3.1 Fridge Study	13
3.2 Fridge Census – Hong Kong’s Top 26 Grocery Retailers	15
3.2.1 Energy Efficiency & Doored Fridge Ratio	16
3.2.2 Annual Carbon Emission of Open Display Fridges	17
<b>4. RISKS ASSOCIATED WITH GROCERY RETAILERS</b>	<b>19</b>
4.1 Financial Cost	19
4.2 Food Safety and Legal Risks – Temperature Monitoring	24
4.3 Consumer Comfort	28
4.4 Sales Impact Myth	30
<b>5. CUSTOMERS’ POINT OF VIEW</b>	<b>31</b>
<b>6. BEST PRACTICES BY RETAILERS</b>	<b>33</b>
<b>7. RECOMMENDATIONS</b>	<b>35</b>
<b>8. END NOTES</b>	<b>39</b>

## DISCLAIMER

This report is a general guide to the factors and practices for consideration by end user who are evaluating energy efficiency on refrigeration systems or planning a retrofit programme. A qualified refrigeration engineer or firm should always be consulted to oversee any retrofit project.

The information contained in this report is compiled by WWF-Hong Kong for general information only. WWF-Hong Kong and/or its employees and/or its researchers makes no representation or warranty, express or implied, as to the accuracy or completeness of any information contained in this report. WWF-Hong Kong does not assume responsibility towards or accept liability to any other person for the contents hereof.

# 1. EXECUTIVE SUMMARY

---

The commercial refrigeration sector is one of the single largest consumers of electricity in Hong Kong - and growing. As such, the sector is one of the city's major contributors to carbon emissions. This problem is exasperated by the widespread use of commercial fridges with no doors, requiring up to 50 per cent more energy to run, increasing retailers' electricity bills by 25-32 per cent, wasting more than 90 million kWh of electricity and emitting an additional 51,000 tonnes of carbon into our atmosphere every year.

In short, fridge doors save the climate. More than this, open display fridges do not even perform their basic function of keeping perishable food items at a safe temperature to avoid spoiling and contamination.

In a variety of tests conducted by WWF-Hong Kong over 98 per cent of open display fridges were unable to maintain the safe temperature range recommended by the Food and Environmental Hygiene Department (FEHD).

## SO WHY DO RETAILERS USE OPEN DISPLAY FRIDGES?

Because of the perception that a fridge door creates a barrier between the customer and the product being sold, leading to a drop in sales. WWF-Hong Kong dispels this myth with consumer surveys and in-stores sales tests.

In one customer survey, over 80 per cent of interviewees indicated that fridge doors would not affect their shopping habits and in another survey over 75 per cent of interviewees believe that retailers should retrofit doors. These findings were backed up by an in-store product sales comparison test.

But this is not an issue that should be left to consumers alone. The Hong Kong government does not currently have legislation in place governing commercial refrigeration, in stark contrast to many other countries. WWF-Hong Kong calls on the government to rectify the issue by extending the city's Mandatory Energy Efficiency Labelling Scheme (MEELS) to commercial appliances and establishing a legal regulation for the storage temperature of perishable food items.

To highlight the findings of this report, a press conference was held with Legislative Councilor Dr Hon Helena Wong, highlighting the food safety and environmental risks of open display fridges.



The press conference with Dr Hon Helena Wong (right) and WWF-Hong Kong project leader Ms Olivia To.



## KEY FINDINGS

1. **Fridge doors save the climate – open display commercial fridges consume double the amount of electricity than a doored fridge.** Only 7 out of 26 grocery retail brands passed the “Fridge Census”, indicating that the doored fridge ratio is very low in Hong Kong. Every year, more than 90 million kWh of electricity (0.2 per cent of Hong Kong’s electricity demand) is wasted and 51,000 tonnes of carbon is unnecessarily emitted through this energy wastage.
2. **Food safety and legal risk – over 98 per cent of open display fridges which stored dairy products failed to maintain the standard temperature of 4°C suggested by the FEHD.** The doored fridges performed better and maintained a temperature 2.2-6.4°C lower than open display fridges, providing a safer and cooler storage environment.
3. **Customers support installing fridge doors – Out of 533 interviewees, over 75 per cent felt that retailers should retrofit doors on their existing open display fridges.** They also believed that doored fridges provide a better storage environment to keep products safe and fresh.
4. **No impact on sales – product sales did not fall after doors were retrofitted to an open display fridge.** In accordance to the customer survey, over 80 per cent of interviewees expressed that door-closed fridges would not affect their shopping habits.
5. **Financial burden – refrigeration accounts for 50-64 per cent of energy used by food stores.** Retrofitting doors on open display fridges can significantly reduce operating expenses, enabling retailers to reduce electricity bills by 25-32 per cent per year.

## RECOMMENDATIONS



### TO RETAILERS

1. **Seal all fridges with doors to reduce energy loss and save operating costs.** Equipping fridges with doors is the easiest and most efficient way to reduce electricity consumption and carbon emissions, which will directly reduce electricity bills and operating expenses.
2. **Develop a phase-out plan, with a concrete timeline, for retrofitting doors on existing open display fridges or adopt a step-by-step fridge replacement plan.** A comprehensive energy assessment and pilot study to compare and review the performance of different types of fridge in stores can provide insights to retailers to plan the phase-out operation.
3. **Establish and standardize a reliable temperature monitoring system in order to maintain a safe environment for storing perishable products.** Retailers have a duty to ensure that fridges' temperature is kept between 0-4°C, in accordance with the FEHD standards for food safety.
4. **Engage frontline staff.** It is recommended to set a clear guideline for frontline staffs on monitoring fridge temperature, energy consumption and reporting procedures. A regular recording and reporting practice is critical, while all the recorded data should remain transparent and opened for public supervision.

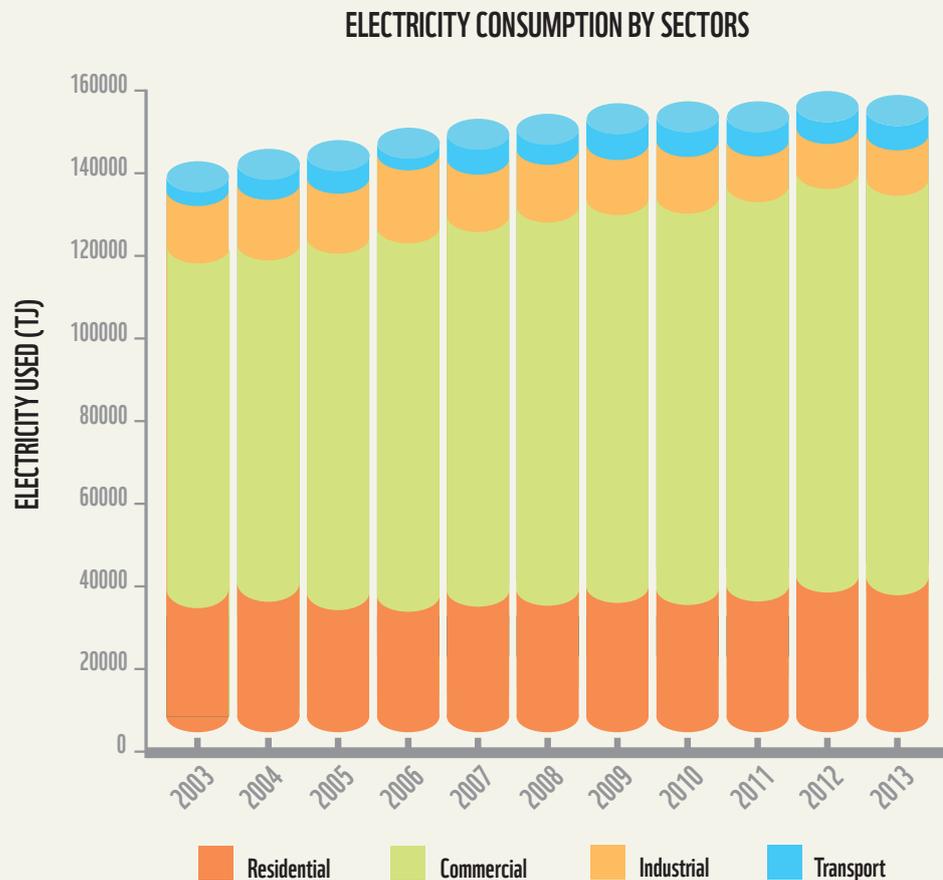


### TO GOVERNMENT

1. **Extend the Mandatory Energy Efficiency Labelling Scheme (MEELS) for commercial appliances.** The current MEELS only covers a few domestic appliances but not commercial appliances. However, commercial sectors consume 66 per cent of the city's electricity which demands a regulation to effectively improve energy efficiency and reduce carbon emission.
2. **Establish a legal regulation for perishable products to be kept within 4°C to ensure food safety.** Storage temperatures between 4°C and 60°C would increase the potential of multiplication of food poisoning, while the cooling temperature of open display fridges commonly breach this standard, posing threats to food safety.

## 2. BACKGROUND

In 2016, WWF-Hong Kong conducted the city's first-ever energy efficiency and temperature performance survey on commercial refrigeration, highlighting the problems and risks of door-less fridges. The aim of this practical guide is to encourage a market transformation towards climate-friendly, consumer-oriented refrigeration in the grocery retail sector by providing suggestions to both retailers and the government.



Hong Kong End-use Data 2015, EMSD



## WHY COMMERCIAL REFRIGERATION MATTERS?

Nearly 66 per cent of Hong Kong’s electricity consumption is from the commercial sectors [1], which recorded a 19 per cent increase in electricity usage over the last decade. In addition to this, the number of grocery chain retail outlets, comprising supermarkets, convenience stores, frozen food markets and department stores, grew by 74 per cent to over 2,200 outlets in 2013 [2]. Grocery retailers can play a significant role in reducing energy consumption by increasing energy efficiency in stores.

### NUMBER OF RETAIL OUTLET IN HONG KONG

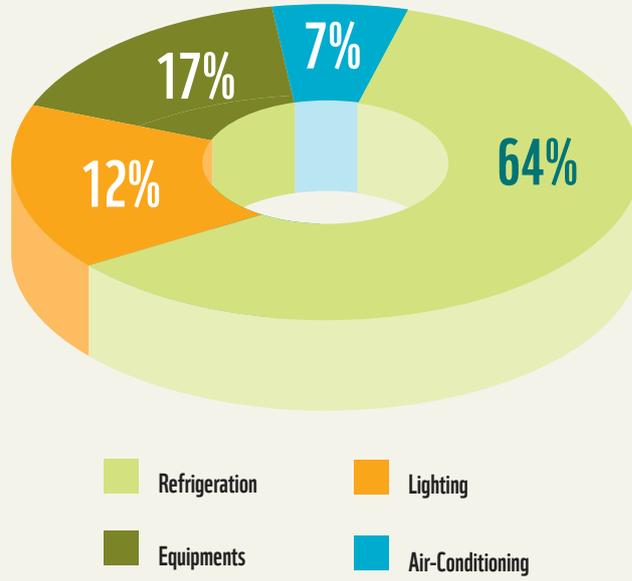


YEAR	LARGE SUPERMARKET	FROZEN FOOD MARKET	CONVENIENCE STORE	TOTAL (No. OF OUTLET)
2003	567	43	661	1271
2013	673	212	1322	2207

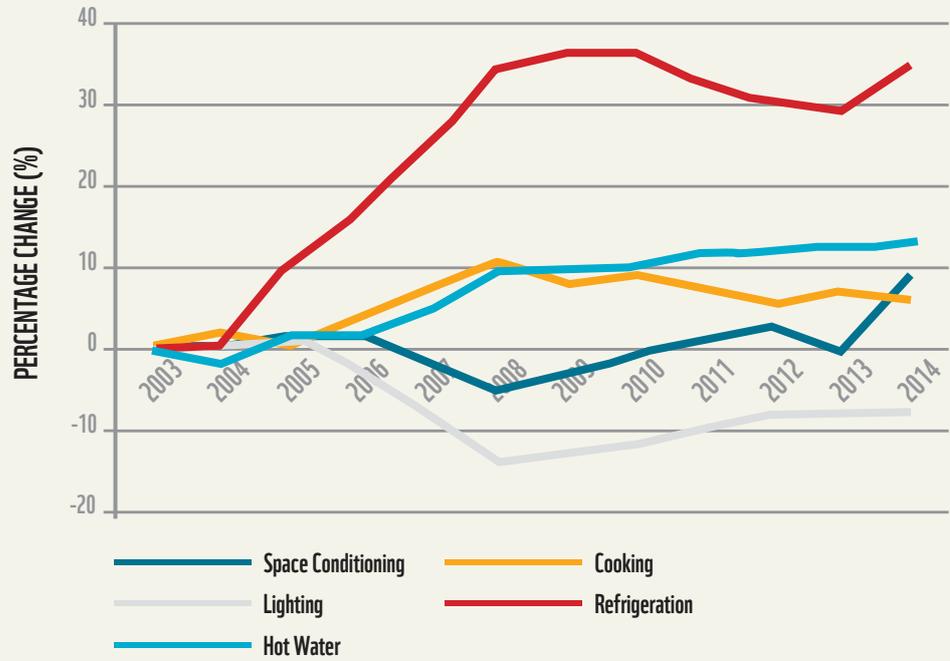
**PERCENTAGE CHANGE (%) +74%**

In a typical supermarket, the refrigeration system is responsible for 50-64 per cent of total electricity consumption [3]. Refrigeration is the fastest growing energy use in Hong Kong and as such is responsible for directly intensifying the impact of climate change. The total energy consumed by refrigeration in 2014 showed a 35 per cent increase over the preceding 10 years, the highest growth rate among all energy end-uses in the city (e.g. air-conditioning, cooking, lighting), according to figures from the Electrical and Mechanical Services Department (EMSD).

### ELECTRICITY CONSUMPTION OF A TYPICAL SUPERMARKET IN TAIWAN



### TREND OF ENERGY END-USE BY CONSUMING ITEMS



Hong Kong End-use Data 2016, EMSD

# 3. PHASE OUT OPEN DISPLAY CHILLERS AND FREEZERS





YOGURTS 乳酪

DESSERTS 甜品

INDIAN 印度式食品

ITALIAN 意式食品

SAVOURY PASTRY 餡批

SLICED MEATS 薄片肉類

DIPS 滋味醬

### 3. PHASE OUT OPEN DISPLAY CHILLERS AND FREEZERS

---

Most people understand that they should close the fridge door when it is not in use, as this can save energy and keep the cool air trapped. However, it is common practice that grocery retailers leave the fridges without doors, requiring more energy to maintain the cooling temperature under the same conditions. This particular problem has been overlooked by customers, retailers, store owners and government for a long time.

Most people understand that they should close the fridge door when it is not in use, as this can save energy and keep the cool air trapped. However, it is common practice that grocery retailers leave the fridges without doors, requiring more energy to maintain the cooling temperature under the same conditions. This particular problem has been overlooked by customers, retailers, store owners and government for a long time.

Open display fridges, chillers and freezers are readily found in grocery retail stores, in particular supermarkets, convenience stores, frozen markets and department stores, putting both the climate and food safety at risk. Unfortunately, these fridges are usually used for storing perishable food.



© Olivia To / WWF-Hong Kong

Open freezer (horizontal type) in a department store.



© Olivia To / WWF-Hong Kong

Open chiller (vertical type) in supermarket.



Open freezer (horizontal type) in a frozen food market.



Open chiller (vertical type) with a folded up plastic curtain in a convenience store.

## CHARACTERISTICS OF OPEN DISPLAY CHILLERS AND FREEZERS

There are two types of open display chillers and freezers used in Hong Kong's retail market: horizontal and vertical. The operating temperature of chillers – which store dairy products such as milk and cheese, fresh meat, fruits and vegetables – should be kept between 0-4°C. The operating temperature for freezers – which store frozen meat, seafood and ice-cream – should be below 18°C. In addition to these temperature recommendations from the FEHD, the Milk Regulation section of the Public Health and Municipal Services Ordinance (Cap. 132) [11] specifies that milk and milk beverages should be kept below 10°C. These perishable food items can become contaminated if not kept within the recommended temperature range.

### CHILLER AND FREEZER : TWO TYPES OF DESIGN - HORIZONTAL OR VERTICAL.



**HORIZONTAL**



**VERTICAL**

### 3.1 FRIDGE STUDY

WWF-Hong Kong conducted an open display refrigeration study, measuring energy consumption and temperature performance over a 10-hour period under three scenarios: when the fridge had a sliding glass door, when it had a transparent plastic curtain and when it had no door or curtain.

The study used a 510-litre vertical chiller pre-set to 3.5°C and loaded with 110 litres of consumables. To assess the space temperature profile within the cabinet, twenty e-thermometers were installed in the fridges different spots to measure its performance over the study period. In addition, energy meters were plugged into the electric socket to record the overall energy consumption.



Setting A : With door



Setting B : With plastic curtain



Setting C : Without door or curtain



## FINDING 1 : DOOR - CLOSED FRIDGE SAVES 50 PER CENT OF ELECTRICITY

For energy consumption, the study showed that a fridge installed with a sliding glass door and the fridge with the plastic curtain consumed 50 per cent and 35 per cent less electricity, respectively, than the fridge with no door. This translates as a saving of 5,000kWh per year, or HKD\$5,700 [4]. These results are similar to research conducted in UK, America and Sweden (Appendix 1) [5]. Retrofitting doors on fridges is potentially the most effective energy saving measures for grocery retailers.



Energy meter



E-thermometer



## FINDING 2 : DOOR - CLOSED FRIDGE ENSURES FOOD SAFETY

The results of the study showed that an open display fridge failed to keep the temperature cool and the products safe. According to FEHD, the maximum temperature for storing perishable foods is 4°C [6]. Results showed that the open display fridge and fridge with the plastic curtain failed to maintain a safe temperature for up to 94 per cent and 70 per cent of the study period, respectively. In comparison, fridges with door managed to sustain a lower storage temperature.

## OVERALL PERFORMANCE COMPARISON OF FRIDGES' SETTING

Assumptions					
Chiller Volume	510 Litres				
Pre-set Operation Temperature	3.5 °C				
Loading	110 litres				
   Highest Temperature Record  Electricity Bill /year					
<b>A</b>	 <b>Doored</b> (Low Risk)	<b>5,000 kWh</b>	<b>3,300 kg</b>	<b>6.1°C</b>	<b>\$5,700</b>
<b>B</b>	 <b>Plastic Curtained</b> (Middle Risk)	<b>6,400 kWh</b>	<b>4,200 kg</b>	<b>7.4°C</b>	<b>\$7,250</b>
<b>C</b>	 <b>Open Display</b> (High Risk)	<b>10,000 kWh</b>	<b>6,600 kg</b>	<b>11.2°C</b>	<b>\$11,300</b>

## 3.2 FRIDGE CENSUS – HONG KONG'S TOP 26 GROCERY RETAILERS

To see how the test results were reflected in real-life scenarios, WWF-Hong Kong and 35 citizen scientists conducted a comprehensive city-wide “Fridge Census” from October 2015 to January 2016. The census, covered over 644 stores from 26 grocery retail brands (covering 25 per cent of each brand’s stores) in 13 corporate groups. In total, more than 8,500 commercial fridges were investigated.

The results are worrying. Over 70 per cent of surveyed retail brands have a “doored-fridge ratio” lower than the 48 per cent average of surveyed stores in Hong Kong. Among the surveyed brands, 7-Eleven has the highest percentage of fridges with doors (84 per cent) while AEON ranks the lowest (15 per cent).

### 3.2.1 ENERGY EFFICIENCY AND DOORED FRIDGE RATIO

Rank	Grocery Retailer	Total no. of store in Hong Kong	No. of doored fridge/ Total no. of investigated fridge	Doored Fridge Ratio	
PASSED 😊	1	7-Eleven	910	1,466 / 1,750	83.8%
	2	Vango	55	50 / 62	80.6%
	3	Circle K	354	574 / 730	78.6%
	4	759 Supermarket	16	145 / 194	74.7%
	5	759 Store	203	140 / 211	66.4%
	6	759 Frozen Market	10	36 / 58	62.1%
	7	Hung Fook Tong	111	37 / 66	56.1%
<b>Average Ratio: 48%</b>					
FAILED 😞	8	Vanguard	73	141 / 322	43.8%
	9	ThreeSixty	1	19 / 44	43.2%
	10	Wellcome	285	541 / 1,441	37.5%
	11	SU-PA-DE-PA	1	19 / 51	37.3%
	12	Market Place by Jasons	31	64 / 173	37.0%
	13	HealthWorks	20	9 / 25	36.0%
	14	Gourmet Food Hall	1	13 / 38	34.2%
	15	PARKnSHOP Frozen Food	13	20 / 59	33.9%
	16	Marks & Spencer Food	9	10 / 30	33.3%
	17	Fusion by PARKnSHOP	35	109 / 348	31.3%
	18	Great Food Hall	1	28 / 86	30.2%
	19	International by PARKnSHOP	19	53 / 176	30.1%
	20	PARKnSHOP	199	286 / 952	30.0%
	21	DCH Food Mart/Deluxe	83	50 / 202	24.8%
	22	city'super	4	45 / 183	24.6%
	23	YATA	7	45 / 189	23.8%
	24	Kai Bo Food Supermarket	90	85 / 392	21.7%
	25	Taste	14	74 / 346	21.4%
	26	AEON	13	67 / 454	14.8%
<b>Total</b>		2,558	4,124 / 8,582	48%	

\*Last updated in June 2016

### 3.2.2 ANNUAL CARBON EMISSION OF OPEN DISPLAY FRIDGES (BY GROUP)

WWF-Hong Kong estimates that there are over 18,000 open display fridges in the city, resulting in an excess use of 90 million kWh of electricity, and 51,000 tonnes of carbon emissions, every year. This is equivalent to the electricity powering 20,000 average Hong Kong households, and the CO<sub>2</sub> absorbed by 2.2 million trees or 20,400 acres of forest land (434 times the size of Victoria Park).

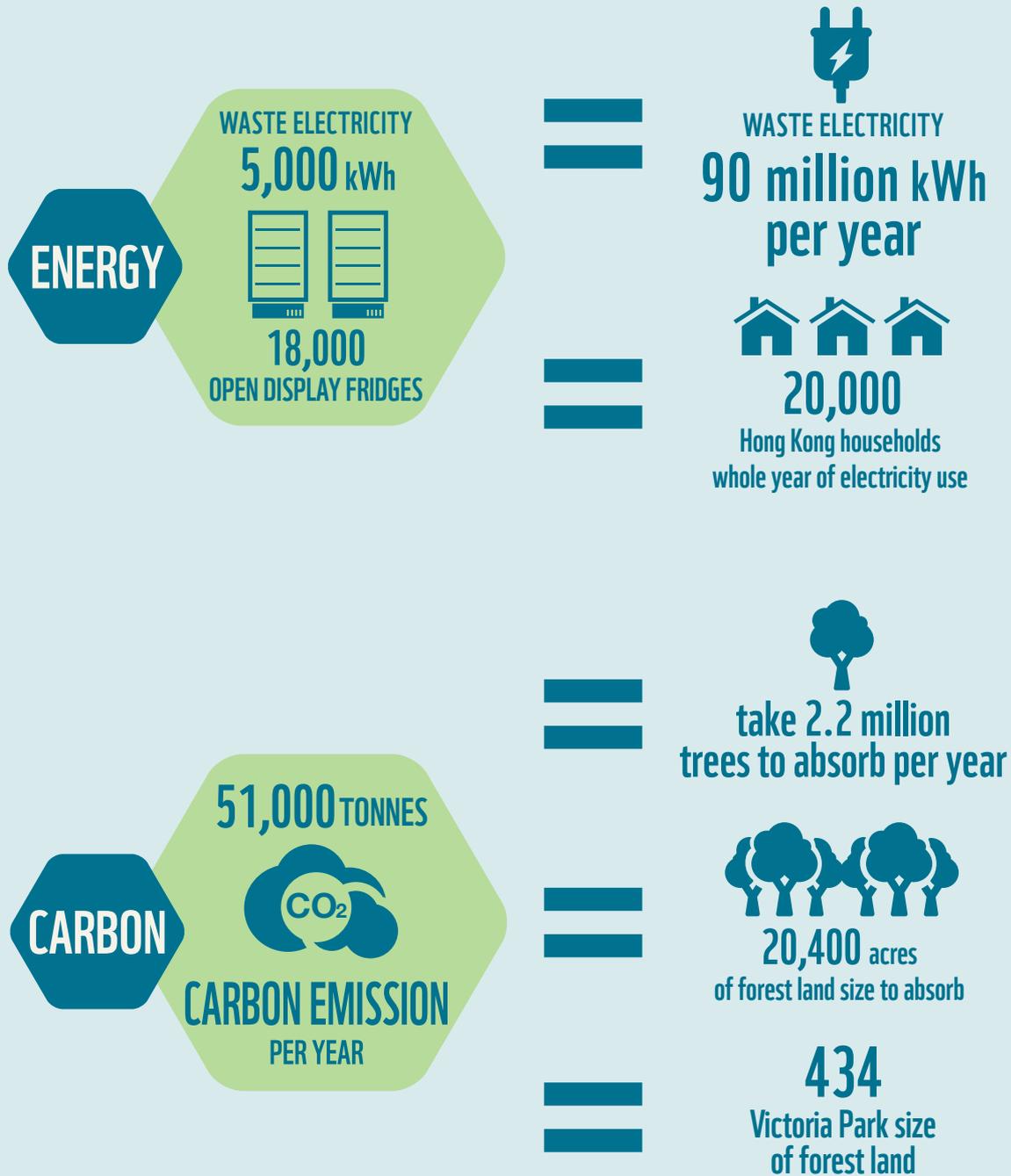
#### ANNUAL CARBON EMISSION OF OPEN DISPLAY FRIDGES (BY GROUP)

Rank	Group	Grocery Retailer	Total Additional CO <sub>2</sub> (tonnes)
1	Swire Coca-Cola	HealthWorks	150
2	Marks & Spencer plc	Marks & Spencer Food	197
3	Hung Fook Tong	Hung Fook Tong	366
4	The Wharf Holdings	city'super	910
5	Sun Hung Kai Properties	Yata	1,106
6	International Holdings	759 Store 759 Frozen Market 759 Supermarket	1,326
7	Dah Chong Hong Holdings	DCH Food Mart/ Deluxe	1,980
8	Fung Group	Circle K	2,169
9	AEON Group	AEON Stores (Hong Kong)	2,760
10	CR Vanguard	Vanguard Vango	2,415
11	Moretide Investments	Kai Bo Food Supermarket	3,952
12	A.S. Watson Group	PARKnSHOP, PARKnSHOP Frozen Food Store, Fusion by PARKnSHOP,	16,771
13	Dairy Farm Group	7-Eleven, Wellcome, Market Place by Jasons, ThreeSixty	17,183

**Total additional CO<sub>2</sub>**

**51,282**

## ENERGY CONSUMPTION AND CARBON EMISSION OF OPEN DISPLAY FRIDGES



# 4. RISKS ASSOCIATED WITH GROCERY RETAILERS



SALMON - PURE GOODNESS FROM THE NORWEGIAN SEA

**LAX FILE**  
急凍三文魚柳  
Salmon fillet frozen

500g **\$139**

**LAX FILE**  
急凍挪威三文魚柳 - 500克  
Salmon fillet, frozen, 500g  
請仔細閱讀包裝上的三文魚，可與黃  
瓜片同食。

**\$139**

**SJÖRAPPORT**  
急凍挪威煙三文魚 - 200克  
Cold smoked salmon,  
frozen, 200g

**\$69**

**BRÖD TUNNBRO**  
急凍北歐薄片麵包 - 225克  
Soft thin bread, frozen, 225g

**\$19**



## 4. RISK ASSOCIATED WITH GROCERY RETAILERS

The low-energy efficiency and high energy demands of open display fridges cost grocery retailers 10s of millions of dollars every year. In addition, food safety and hygiene are severely compromised by the inability of fridges to maintain a safe temperature and consumer comfort is compromised by the low temperatures in the areas around open display fridges.



### 4.1. FINANCIAL COST (BY CATEGORY)

Hand in hand with greater energy consumption comes higher electricity bills and lower business profitability. Retrofitting doors on existing commercial fridges not only reduces carbon emissions but can reduce retailers' annual electricity bills by 25-32 per cent [9]. In other words, open display fridges resulted in higher carbon emissions and operating costs.

WWF-Hong Kong estimates that two of Hong Kong's grocery retail giants, Wellcome and PARKnSHOP, can save up to \$15 million and \$17 million in operating expense, respectively, in addition to 16,800 and 17,200 tonnes of carbon emission, respectively, simply by retrofitting doors on their fridges. And what is the cost of retrofitting glass doors on an open display fridge? A mere \$5,000. The below tables show the additional operating costs to Hong Kong retailers from open display fridges.

### Category 1 : Supermarket

Rank	Company	Additional CO <sub>2</sub> (tonnes)	Total No. of Store	Extra Operating Cost per year (HKD)
	ThreeSixty	82	1	\$120,600
	Gourmet Food Hall	82	1	\$120,600
	Great Food Hall	198	1	\$288,700
4	Marks & Spencer Food	198	9	\$289,000
5	759 Supermarket	235	16	\$342,600
6	International by PARKnSHOP	1,283	19	\$1,870,200
7	Market Place by Jasons	1,392	31	\$2,029,900
8	Taste	2,089	14	\$3,046,000
9	Vanguard	2,294	73	\$3,344,400
10	Fusion by PARKnSHOP	2,296	35	\$3,347,500
11	PARKnSHOP	10,161	199	\$14,811,100
12	Wellcome	11,586	285	\$16,887,600
<b>Total</b>		<b>31,896</b>	<b>684</b>	<b>\$46,498,200</b>

### Category 2 : Convenience store

Rank	Company	Additional CO <sub>2</sub> (tonnes)	Total No. of Store	Extra Operating Cost per year (HKD)
	Vango	121	55	\$176,800
	HealthWorks	151	20	\$220,100
	Hung Fook Tong	366	111	\$534,200
4	759 Store	971	203	\$1,415,600
5	Circle K	2,169	354	\$3,162,300
6	7-Eleven	4,123	910	\$6,010,100
<b>Total</b>		<b>7,901</b>	<b>1,653</b>	<b>\$11,519,100</b>

### Category 3 : Frozen food market

Rank	Company	Additional CO <sub>2</sub> (tonnes)	Total No. of Store	Extra Operating Cost per year (HKD)
 1	759 Frozen Market	1,201	10	\$176,600
 2	ParknShop Frozen Food Store	556	13	\$811,500
 3	DCH Food Mart/Deluxe	1,980	83	\$2,886,400
4	Kai Bo Food Supermarket	3,952	90	\$5,760,900
<b>Total</b>		<b>7,689</b>	<b>196</b>	<b>\$9,635,400</b>

### Category 4 : Department store

Rank	Company	Additional CO <sub>2</sub> (tonnes)	Total No. of Store	Extra Operating Cost per year (HKD)
 1	SU-PA-DE-PA	105	1	\$154,200
 2	city'super	910	4	\$1,326,200
 3	YATA	1,106	7	\$1,612,800
4	AEON	2,761	13	\$4,024,200
<b>Total</b>		<b>4,882</b>	<b>25</b>	<b>\$7,117,400</b>

## 4.2. FOOD SAFETY AND LEGAL RISKS - TEMPERATURE MONITORING

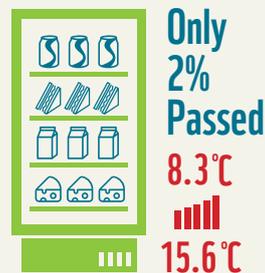
In Hong Kong, the maximum temperature suggested by FEHD for fridges storing perishable food is 4°C or below while the Milk Regulation [10] specifies that milk or milk beverages should be kept below 10°C. Perishable food items can become contaminated if not kept within the recommended temperature range.

In April and June 2016, WWF-Hong Kong monitored the operating temperatures of open display fridges over a three-hour period at 58 branches of five convenience store operators (7-Eleven, Circle K, VanGO, Hung Fook Tong and HealthWorks).

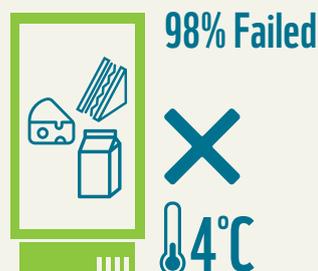
The results revealed that 98 per cent of open display fridges have operating temperatures higher than 4°C. The average temperature of open display fridges hovered around 8.3°C with 17 per cent exceeding 10°C. The highest recorded temperature was 15.6°C. On average, the temperature of open display fridges was 2.2-6.4°C higher than doored fridges (measured over a 3-hour period).



- April and June of 2016, 58 branches of five convenience stores including 7-Eleven, Circle K, VanGO, Hung Fook Tong and Healthworks



- Average temperature recorded was 8.3 °C
- 17% exceeded 10 °C, 3 hour monitoring
- Highest temperature recorded 15.6 °C
- Violated the Ordinance



- Storing dairy products, e.g. milk, cheese & sandwiches
- 98% failed to meet the temperature standard of 4°C



- Breached the temperature standard suggested by FEHD
- 10 hour comparison, the average temperature of the open display fridges > temperature of doored fridges by 2.2 - 6.4 °C



The survey also found that retailers relied on electronic thermometers placed near the fridge's cooling fan to monitor the temperature, which does not accurately reflect the temperature inside the cabinet. This failure to properly monitor the temperature of fridges could lead retailers to create public health risks and violate the Public Health and Municipal Services Ordinance. Using an independent electronic temperature logging device is particularly important when monitoring fridge temperatures to ensure that they meet the required 4°C limit.



© CHIAI TO / WWF-Hong Kong



© CHIAI TO / WWF-Hong Kong

Electric thermometers can normally be seen on fridges, but fail in telling the actual temperature in the cabinet.



To address the problem, follow-up action was taken in collaboration with a local department store and a local convenience store. WWF-Hong Kong carried out a comprehensive assessment, monitoring the in-store fridges in regard to energy and temperature performance. Two types of fridges (chillers and freezers) were tested for temperature performance under three scenarios (with a door, with a curtain, with no door). Results showed that open display fridges commonly had temperatures outside the safe range.

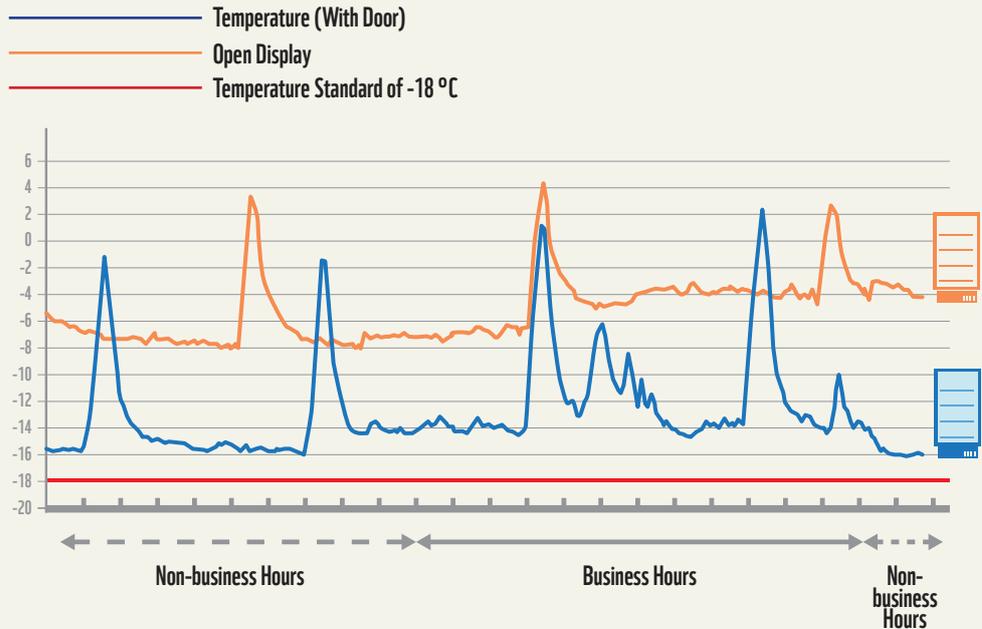


© OnMa To / WWF-Hong Kong  
Buoy

Open display fridge failed to sustain the cooling temperature raises concern about food safety.

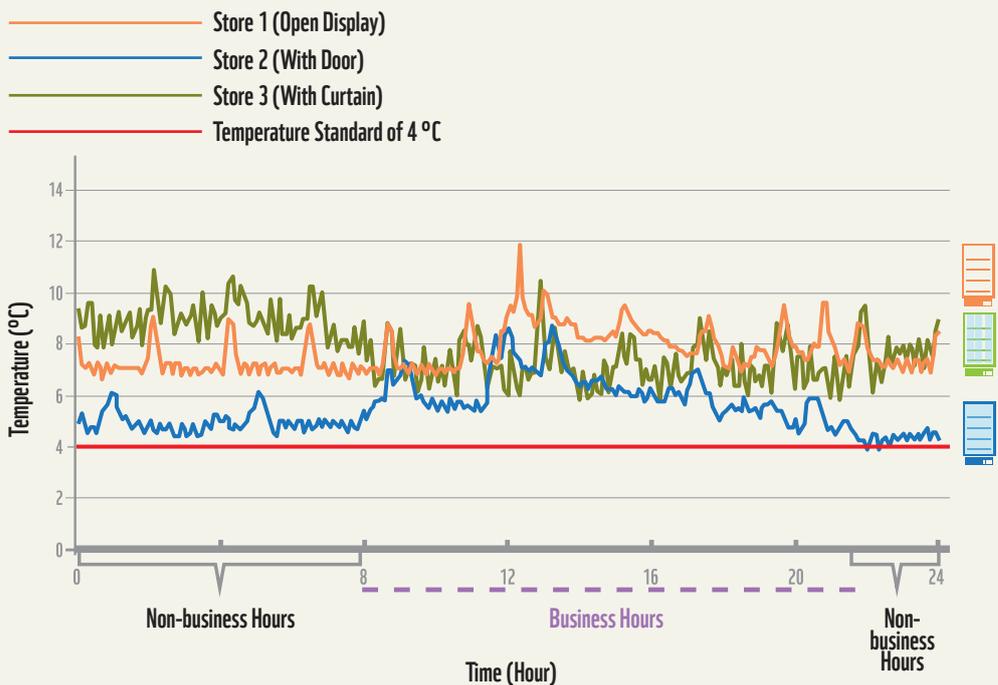
## RETAILER A (DEPARTMENT STORE) TEMPERATURE PERFORMANCE OF FREEZERS UNDER TWO SCENARIOS

TEMPERATURE DIFFERENCE OF OPEN DISPLAY AND DOORED FREEZER  
DATE: 25 MAR 2016



## RETAILER B (CONVENIENCE STORE) TEMPERATURE PERFORMANCE OF CHILLERS UNDER 3 SCENARIOS

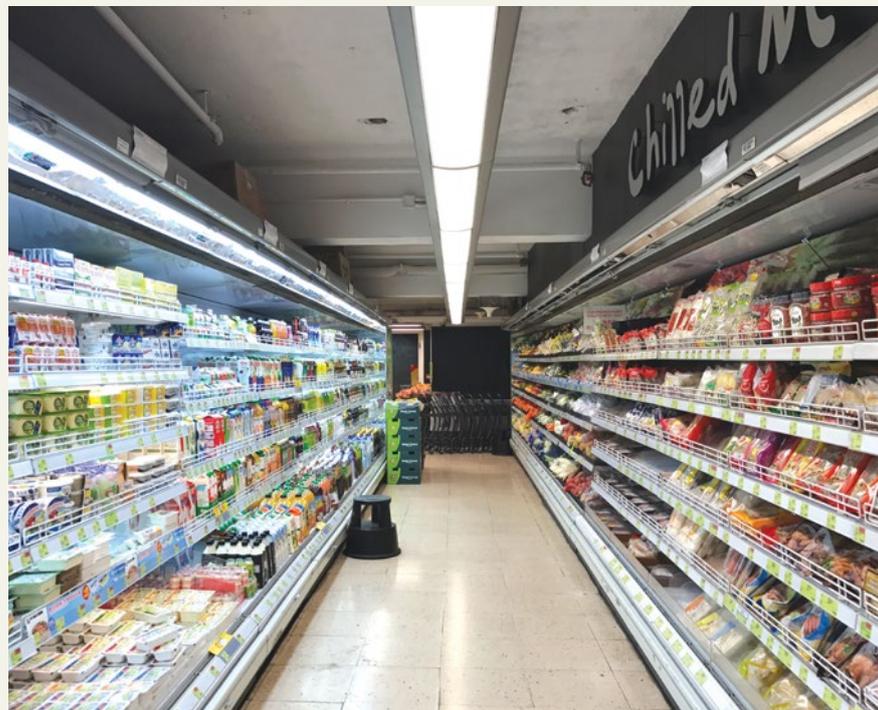
AVERAGE TEMPERATURE OF FRIDGES  
DATE: 30 JUL 2016  
PRODUCT: PACKAGED SOUP AND BEVERAGES



The study recorded the average temperature in fridges – which stored potentially hazardous food and drink such as milk, dairy products, sandwiches and other perishable products. In accordance to the Food Hygiene Code released by the FEHD, temperatures from 4-60°C increase the potential of food poisoning and other foodborne pathogens. Potentially hazardous food should be stored outside these temperatures, yet the storage temperature of open display fridges commonly breaches the standard.

### 4.3 CONSUMER COMFORT

The ambient temperature in stores has a direct relationship with the customer's shopping experience. As suggested by the Hong Kong government, the ideal indoor temperature is 25.5°C [11]. Comfortable ambient temperatures can influence consumers intention to purchase a product [12]. Open display fridges are one of the key culprits for indoors temperatures far below the comfort level, with areas around open display fridges considerably colder than the rest of the store.

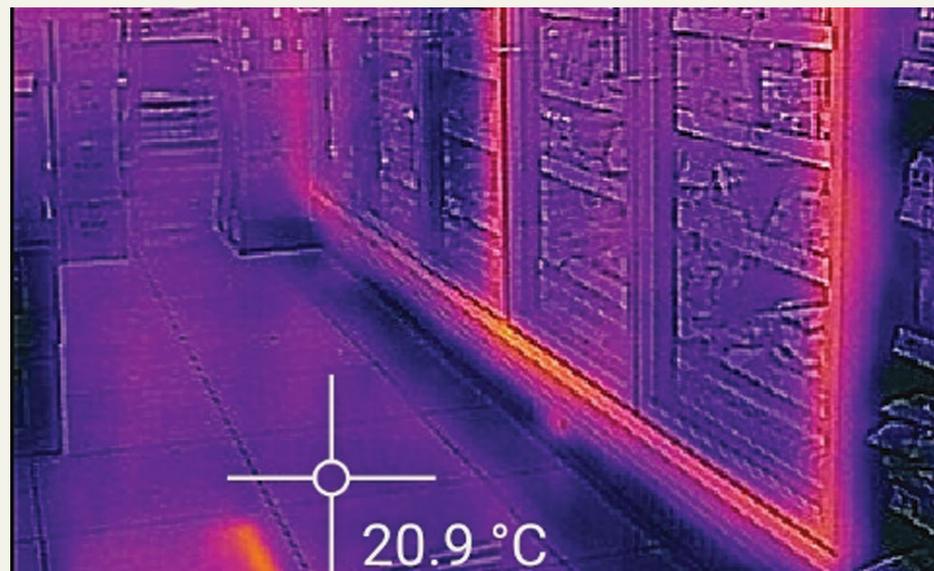


Freezing cold corridor next to the open display fridges

Using a thermal infrared camera, WWF-Hong Kong recorded and compared the temperature difference of areas near doored fridges and open display fridges in the same supermarket. Results showed that corridor with open display fridges (top) recorded a freezing temperature of 12.7°C, while the corridor with doored fridges (bottom) recorded a temperature of 20.9°C. Such a huge difference in ambient temperature poses negative impact on customer's shopping experience and can potentially affect product sales.



Corridor temperature next to open display fridges



Corridor temperature next to doored fridge



## Sales Test A

Open Display  
Friday to Sunday



## Sales Test B

Doored  
Friday to Sunday

### 4.4 SALES IMPACT MYTH

One of the major barriers to retailers retrofitting doors on their fridges is the perception that doors will negatively affect consumers' shopping experience and lead to a drop of sales, whereas they believe open display fridges will stimulate sales. This myth was debunked with the help of a sales comparison test.

Working in collaboration with a local supermarket, WWF-Hong Kong compared sales data for two types of Parma ham over two consecutive weekends: the first weekend using an open display commercial fridge and the second using the same fridge retrofitted with a pair of sliding glass doors. The products for sale and the location of the fridge was identical on both weekends.

The results of the study showed the opposite trend to retailers' expectations: product sales increased from 4-23 per cent following the retrofitting of sliding glass doors. Similar findings have been found in studies conducted in the US [13] and New Zealand [14] supermarkets. It is self-explanatory that consumers preferred to purchase perishable products which are stored in a doored fridge rather than an open-display fridge.



© Olivia To / WWF-Hong Kong

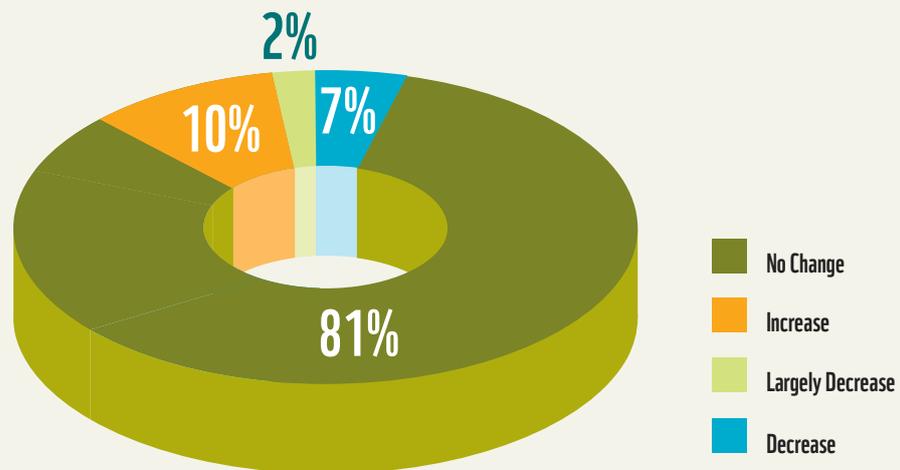
Sales impact survey debunked the myth that a doored fridge affected customers' shopping experience.

## 5. CUSTOMERS' POINT OF VIEW

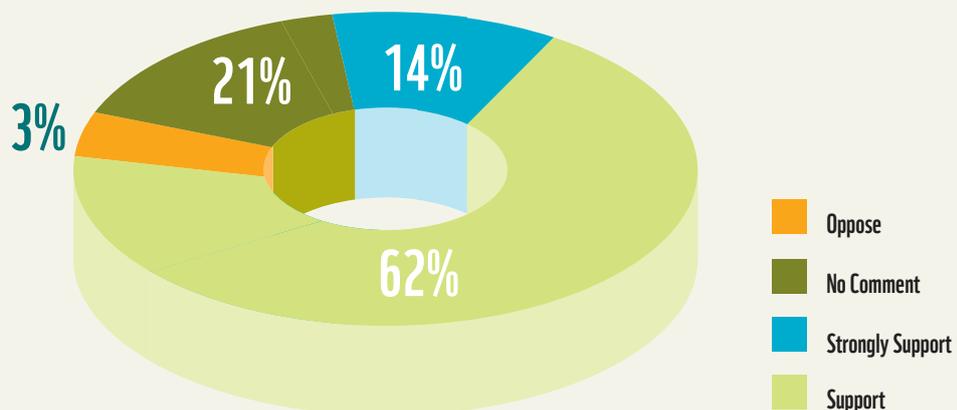
In December 2015, WWF-Hong Kong randomly interviewed 533 pedestrians in Mongkok, Wan Chai and Causeway Bay on their impressions towards doored and open display fridges. The results showed 81 per cent of them felt the display door would not affect their shopping intention. Only 9 per cent of people thought the door would be a barrier. Retailers generally believed that open display fridges can provide a barrier-free shopping experience and stimulate sales of products, yet the survey findings indicated a big contradiction. In addition, 76 per cent of people supported the retailers to install the display door while only 3 per cent of people opposed to it.

Results were further verified by two similar customer surveys conducted inside retail spots, in collaboration with AEON Stores and 759 Stores, between January and March 2016. Retailers should take immediate action to meet public expectations and to be in line with the wishes of consumers.

WILL THE DOORS AFFECT YOUR INTENTION TO SHOP?

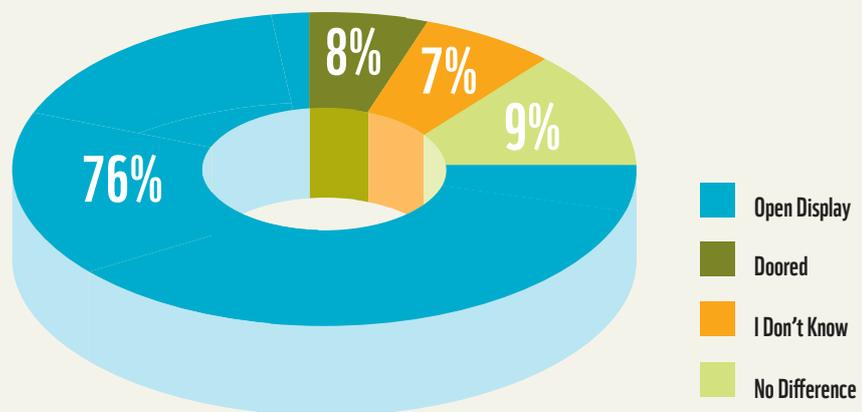


DO YOU SUPPORT GROCERY RTAILERS TO INSTALL DOOR ON FRIDGES?

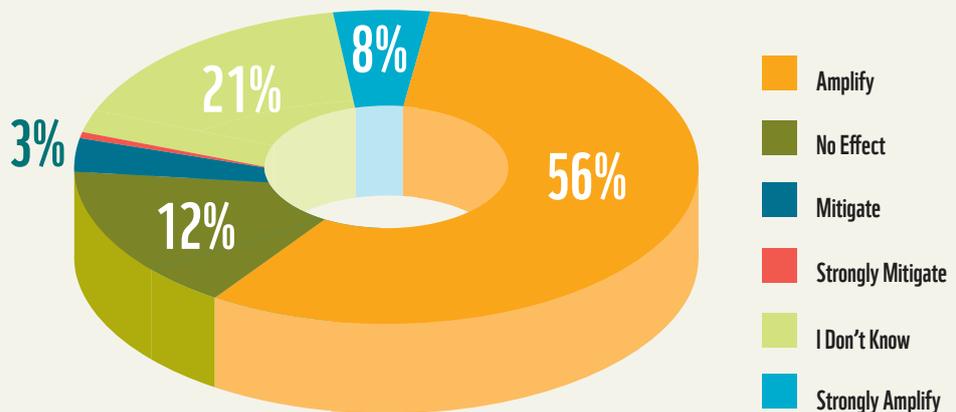


Regarding the awareness of customers towards the negative effect of an open display fridge, 76 per cent of people agree the open display fridges would consume more electricity than a doored fridges. And 64 per cent of people think the open display fridges are amplifying climate change. To conclude, customers acknowledge the negative consequences of open display fridges and support retailers to install doors to securing a cooler temperature and reduce the impact on climate change.

#### WHICH KIND OF FRIDGE WOULD CONSUME MORE ELECTRICITY?



#### DO YOU THINK THE OPEN DISPLAY FRIDGES ARE AFFECTING CLIMATE CHANGE?



## 6. BEST PRACTICES BY RETAILERS



### 7-Eleven

“We have completed the project of retrofitting doors on fridges in 2016. A total of 2,150 open chillers across all Hong Kong stores are installed with doors and a total 3,907,200kg of carbon emissions will be avoided per year. 7-Eleven will use door-closed refrigerators for all new stores in the future. Over the period, the energy consumption of stores dropped 35 per cent after the installation.”



### Hung Fook Tong

“As a further means to reduce energy waste, an increasing number of fridges at HFT retail stores are now equipped with sliding doors or plastic curtains. Currently, around one-fifth of the fridges are door-closed. This percentage will gradually increase to optimize energy efficiency and reduce carbon emissions. Clear and updated guidelines on temperature recording and reporting procedures are set for frontline staff to closely monitor the fridge temperature.”



### 759 Store

“Open Display Fridges will be phased out gradually and replaced by doored fridges to save energy and increase energy efficiency within two years. We collaborated with WWF-Hong Kong to conduct a comprehensive sales comparison and customer survey to understand more on customer’s willingness on retrofitting doors. We also did a fridge test and found that doored fridge saved 35 per cent in energy consumption.”



© city'super

## city'super

“city'super is committed to phasing out “open-display” freezers in our stores to reduce power consumption. Our vision going forward will be adopting “door-closed” freezers in new store development and renovation projects. The New Town Plaza store will be fully implemented such measures by Q4-2017. Besides, our technical teams are conducting research on adopting higher energy efficient refrigeration systems and the feasibility of installing doors at our existing stores or chiller showcases.”



© Olivia To / WWF-Hong Kong

## Marks & Spencer

“A new store opened in Central MTR station is fully equipped with doored chillers, which help test the energy performance. We also conduct a survey on customer's perception.”



© Olivia To / WWF-Hong Kong

## VanGo

“We plan to gradually install sliding glass doors on existing open display fridges to maintain the fridge temperature and product sales. Also, we regularly record the fridge temperature to avoid breaching the food safety standard.”



© Olivia To / WWF-Hong Kong

## AEON Stores

“Our Kornhill Store and Whampoa Store were renovated to AEON STYLE in 2016. We have replaced part of the freezers to the door closed type. Recently, both stores have close to 50 per cent of their freezers equipped with doors.”

# 7. RECOMMENDATIONS

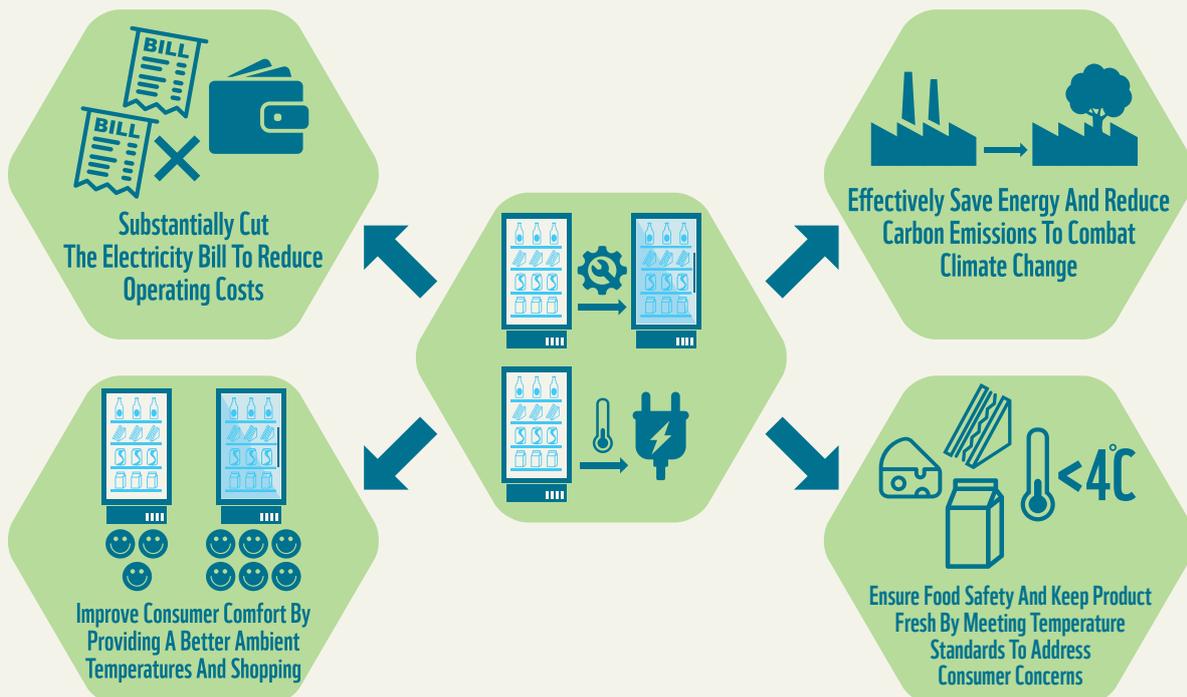


## TO GROCERY RETAILERS

It is critical for retailers to take corporate responsibility to improve energy efficiency and reduce carbon emissions. WWF-Hong Kong urges retailers to immediately retrofit doors on fridges and have a complete switch to using doored fridges under a concrete timeline.

This simple yet effective measure can significantly reduce operating costs by up to 32 per cent due to the electricity bill savings. Our market research found that the electricity savings of using a fridge with a door could pay back the investment of adding doors a mid-size 600 litre fridge within a mere 1-2 years, given that the retrofitting cost of a pair of sliding glass door is only around \$5,000.

Retailers should review and upgrade the methods currently used to monitor the inside temperature of a fridge to meet public health expectations and safety requirements by using an independent temperature logging system. In addition, it is also important to set clear temperature monitoring and reporting guidelines for frontline staff, ensuring the storage temperature to be kept within 4°C limit.





## TO GOVERNMENT

Commercial electrical appliances are not currently covered by Hong Kong's energy efficiency regulations, yet commercial sectors account for 70 per cent of the city's electricity consumption. WWF-Hong Kong believes that it is critical for the government to extend the regulation of electrical appliances under the Mandatory Energy Efficiency Labelling Scheme (MEELS) from domestic to commercial appliances. In addition, the Scheme should have a broader spectrum of coverage and put priority on high energy consumption commercial appliances like fridges, air-conditioners and heaters.



In addition to regulating commercial electricity consumption, the government should provide supportive measures to improve energy performance, mitigate climate change and meet the city's long-term carbon reduction targets. These transparent guidelines and legal regulations should be backed up by regular on-site investigation at retail spots to ensure comprehensive implementation. Compared with other countries, Hong Kong policy is lagging. The US and Japan, for instance, have already implemented energy standards to regulate the energy efficiency of commercial appliances, including commercial fridges.

## OVERSEA STANDARDS ON FRIDGE'S ENERGY EFFICIENCY

Jurisdiction	Standard	Indicator	Type of Fridge
Hong Kong	Mandatory Energy Efficiency Labelling Scheme [15]	Energy Efficiency	<b>Domestic only</b>
Taiwan	Minimum Energy Performance Standard & Energy Efficiency Rating Labeling [16]	Energy Efficiency	Commercial & Domestic
Korea	Energy Efficiency Label and Standard Program [17]	Energy Performance	Commercial & Domestic
Japan	Top Runner Program [18]	Energy Efficiency	Commercial & Domestic
U.S.	Minimum Energy Performance Standard & Refrigeration Products Energy Conservation Standards [19]	Daily Energy Consumption	Commercial & Domestic

The government is responsible for protecting public health and strengthening food safety, yet only a loose regulation is in place to regulate perishable products and storage temperatures, covering milk and fresh meat products only, not to mention it allows the storage temperature to be kept within 10°C.

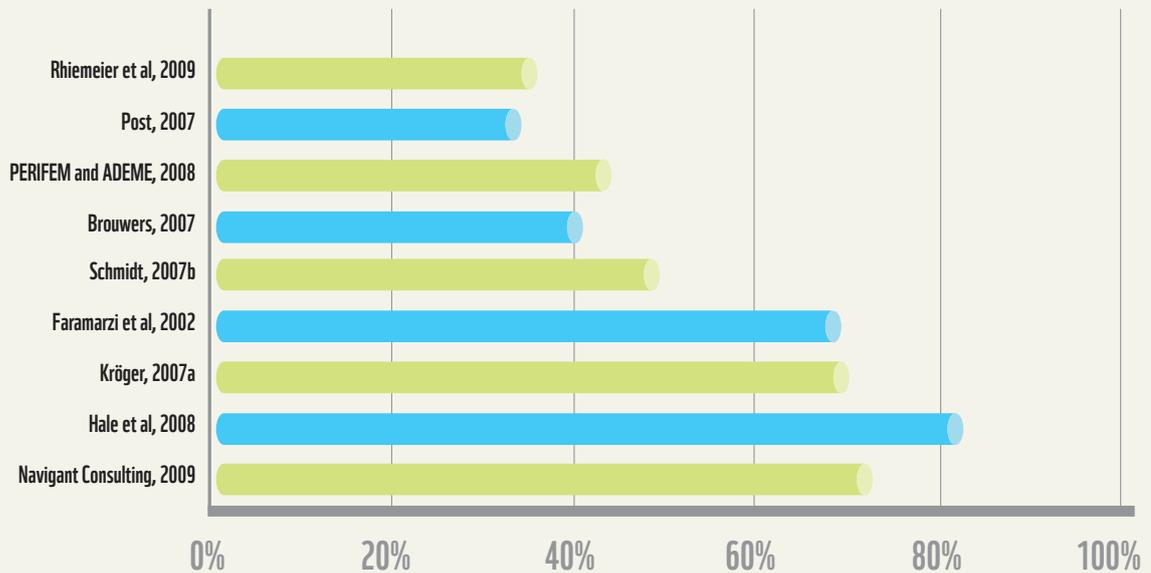
Policy makers should review the current legislation, in reference to other jurisdictions such as Australia and Taiwan. Hence, a clear legal regulation should be established and applied to all perishable products. The government should also establish a transparent guideline and update the legal temperature standard to regulate the storage temperature. Additionally, regular on-site investigation should be conducted at various retail spots to ensure the implementation of law.

## OVERSEA TEMPERATURE STANDARDS OF REFRIGERATION

Jurisdiction	Temperature	Nature	Items
Hong Kong	10°C [10]	Regulation	<b>Milk and Fresh Meat Only</b>
Australia	5°C [20]	Standard (Legislative)	Ordinary food
England	8°C [21]	Regulation	All items inside the fridge
Taiwan	Depends on the food producer [22]	Standard (Legislative)	All items inside the fridge

## APPENDIX 1

### Reported Energy Savings Associated with Door-ed Fridges Compared with Open Display Fridges



Source: The Institute of Refrigeration (2014)

## END NOTES

---

- [1] Electrical and Mechanical Services Department. (2015). Energy End Use Data. Retrieved from [http://www.emsd.gov.hk/filemanager/en/content\\_762/HKEEUD2015.pdf](http://www.emsd.gov.hk/filemanager/en/content_762/HKEEUD2015.pdf)
- [2] Consumer Council. (2013). Market Power of Supermarket Chains Under Scrutiny. Hong Kong: Hong Kong Government Printer.
- [3] Li, K. P., Chai, Y. C., & Jang, J. L. (2006). The Research on the Energy Consumption Characteristics of Supermarkets. Retrieved from <http://www.hvac-net.org.tw/archive/files/1417b9-5.pdf>
- [4] China Light & Power. (2017). Electricity Tariff. Retrieved from <https://www.clp.com.hk/en/customer-service/frequency-asked-questions/2017-electricity-tariff>
- [5] The Institute of Refrigeration. (2014). Are doors on fridges the best environmental solution for the retail sector? Retrieved from <https://www.iior.org.uk/app/images/downloads/Evans6rhFebruary2014LCCI.3.pdf>
- [6] Food and Environmental Hygiene Department. (2007). Safe Food Handling. Retrieved from [http://www.fehd.gov.hk/english/publications/code/allc\\_4.htm](http://www.fehd.gov.hk/english/publications/code/allc_4.htm)
- [7] Calculations based on individual retailer s' official websites, indicating all retail spots in Hong Kong by June.2016
- [8] City University of Hong Kong. (2013). Carbon Audit Guideline. Hong Kong; City University of Hong Kong press. Carbon Emission Factor set as 0.66kg CO<sub>2</sub>-e per unit, the average emission factor of CLP and HKE.
- [9] Calculations with the assumption of refrigeration in supermarket shares 51-64 per cent of total energy consumption
- [10] Centre for Food Safety. (2013). Milk Regulation (Cap 132AQ). Retrieved from [http://www.blis.gov.hk/blis\\_pdf.nsf/CurAllEngDoc/FEE8F0F9D8D517E7482575EE00409F7B/\\$FILE/CAP\\_132AQ\\_e\\_b5.pdf](http://www.blis.gov.hk/blis_pdf.nsf/CurAllEngDoc/FEE8F0F9D8D517E7482575EE00409F7B/$FILE/CAP_132AQ_e_b5.pdf)
- [11] Electrical and Mechanical Services Department. (2004). Energy Efficiency Office. Retrieved from [http://www.emsd.gov.hk/filemanager/conferencepaper/en/upload/22hkie\\_environmental\\_annual\\_seminar\\_paper\\_25.5\\_deg\\_c\\_and\\_human\\_comfort.pdf](http://www.emsd.gov.hk/filemanager/conferencepaper/en/upload/22hkie_environmental_annual_seminar_paper_25.5_deg_c_and_human_comfort.pdf)
- [12] Huang, X. L., Zhang, M., Hui, M. K., & Wyer, R. S. (2013). Warmth and conformity: The effects of ambient temperature on product preferences and financial decisions. *Journal of Consumer Psychology*, 24(2), 241-250.
- [13] Fricke, B. A., & Becker, B. R. (2010). Doored Display Cases They Save Energy, Don't Lose Sales. Retrieved from [https://www.researchgate.net/publication/289905798\\_Doored\\_Display\\_Cases\\_They\\_Save\\_Energy\\_Don%27t\\_Lose\\_Sales](https://www.researchgate.net/publication/289905798_Doored_Display_Cases_They_Save_Energy_Don%27t_Lose_Sales)
- [14] The Australian Institute of Refrigeration, Air conditioning and Heating. (2015). Trial Retrofit of Doors on Open Refrigerated Display Cabinets. Retrieved from [https://www.airah.org.au/Content\\_Files/Resources/Trial-Retrofit-of-Doors-on-Open-Refrigerated-Display-Cabinets.pdf](https://www.airah.org.au/Content_Files/Resources/Trial-Retrofit-of-Doors-on-Open-Refrigerated-Display-Cabinets.pdf)
- [15] Electrical and Mechanical Services Department. (2015). Mandatory Energy Efficiency Labelling Scheme. Retrieved from [http://www.emsd.gov.hk/tc/energy\\_efficiency/mandatory\\_energy\\_efficiency\\_labelling\\_scheme/](http://www.emsd.gov.hk/tc/energy_efficiency/mandatory_energy_efficiency_labelling_scheme/)

- [16] Bureau of Energy Ministry of Economic Affairs. (2012). Minimum Energy Performance Standard. Retrieved from [http://web3.moeaboe.gov.tw/ECW/english/content/Content.aspx?menu\\_id=1535](http://web3.moeaboe.gov.tw/ECW/english/content/Content.aspx?menu_id=1535)
- [17] Korea Energy Agency. (2015). Energy Efficiency Labeling and Standard. Retrieved from [http://www.energy.or.kr/renew\\_eng/energy/appliances/labeling.aspx](http://www.energy.or.kr/renew_eng/energy/appliances/labeling.aspx)
- [18] Ministry of Economy, Trade and Industry. (2015). Top Runner Program. Retrieved from [http://www.enecho.meti.go.jp/category/saving\\_and\\_new/saving/data/toprunner2015e.pdf](http://www.enecho.meti.go.jp/category/saving_and_new/saving/data/toprunner2015e.pdf)
- [19] Department of Energy. (2014). Federal Register. Retrieved from <https://www.gpo.gov/fdsys/pkg/FR-2014-03-28/pdf/2014-05082.pdf>
- [20] Federal Register of Legislation. (2014). Food Safety Practices And General Requirements. Retrieved from <https://www.legislation.gov.au/Details/F2014C01204>
- [21] The Secretary of State. (2013). The Food Safety and Hygiene (England) Regulations 2013. Retrieved from <http://www.legislation.gov.uk/ukSI/2013/2996/contents/made>
- [22] Food and Drugs Administration. (2013). Organization Act of the Food and Drug Administration, Ministry of Health and Welfare. Retrieved from <https://www.fda.gov.tw/TC/siteContent.aspx?sid=3077>

# FRIDGE DOORS SAVE THE CLIMATE

**90m kWh**

of electricity is wasted by open display fridges annually

**1,200**

Retail spots committed to completely retrofit doors on fridges with a phase out plan

**51,000 tonnes**

of extra carbon emitted, further warming our atmosphere

**98%**

Open display fridges failed to meet 0-4°C standard cooling temperature



Working to sustain the natural world for people and wildlife

together possible wwf.org.hk