

# 《ATMOsphere Asia 2015》

## Lawson's Natural Refrigerant(CO<sub>2</sub>) Technology



 **ATMO**  
**sphere**  
solutions for asia  
**natural refrigerants**

3-5 February 2015 in Tokyo

2015/2/3 LAWSON, INC.

# Corporate Profile

As of end-February 2014

Company name	Lawson, Inc.
Head office	East Tower, Gate City Ohsaki 11-2, Osaki 1-chome, Shinagawa-ku, Tokyo, Japan
President and CEO, Representative Director	Genichi Tamatsuka
Date established	April 15,1975
Capital	58,506.644 million Yen
Employees	6,336
Business activities	Franchise chain development of "Lawson", "Lawson Mart", "Lawson Store 100" and "Natural Lawson"
Total net sales	1,945 billion yen
Number of stores	11,606 (Japan)
Operating regions	47 prefectures of Japan, cities of Shanghai (joint venture), Chongqing, Dalian and Beijing in China, Indonesia ,Hawaii in USA, Thailand

\* The total number of stores refers to the number of convenience stores operated by the consolidated group and includes stores operated by Lawson Mart, Inc., Lawson Okinawa, Inc., Lawson Minamikyushu, Inc. and Lawson Kumamoto, Inc.

<Group Companies> ■ Consolidated Subsidiary ◆ Affiliated Company

■ Lawson Mart, Inc. ■ Lawson HMV Entertainment, inc.

■ Lawson ATM Networks, Inc ■ Best Practice Inc. ■ Smart Kitchen, Inc.

■ Shanghai Hualian Lawson, Inc. ■ Chongqing Lawson, Inc. ■ Dalian Lawson, Inc.

◆ Lawson Okinawa, Inc.

# ***Natural Refrigerant (CO<sub>2</sub>) Technology***

## Mid-term Energy Conservation Target (FY2020)

“Electricity Consumption Reduction by **20%**  
per Store Compared with FY2010”

### <Action Plan>

- ① LED Lighting to ALL Stores
- ② CO<sub>2</sub> Freezer-Refrigerator System to New Stores, As Standard System from Sep. 2014
- ③ Eco-Friendly Pilot Stores: For the Validation of Energy Conservation, Developing the Knowledge for Energy Saving Stores
- ④ Energy Efficient Package: Developing Store Model for 30% Energy Saving (in Validation)
- ⑤ “10 Rules for Energy Conservation” for Store Operation Management
- ⑥ High Performance, Quick Built and Low Cost Prefabricated Structure
- ⑦ JCM grant Project: Expansion to South East Asia, Others

Driving “CO<sub>2</sub> Refrigeration System” to Achieve Mid-term Target

# Advantages of CO<sub>2</sub> Refrigeration System

## 【Advantages of CO<sub>2</sub> System】

- ① Low GWP Refrigerant  
Minimum 1/4000 Compared with HFCs
- ② High Energy Efficiency from Superior Thermal Properties

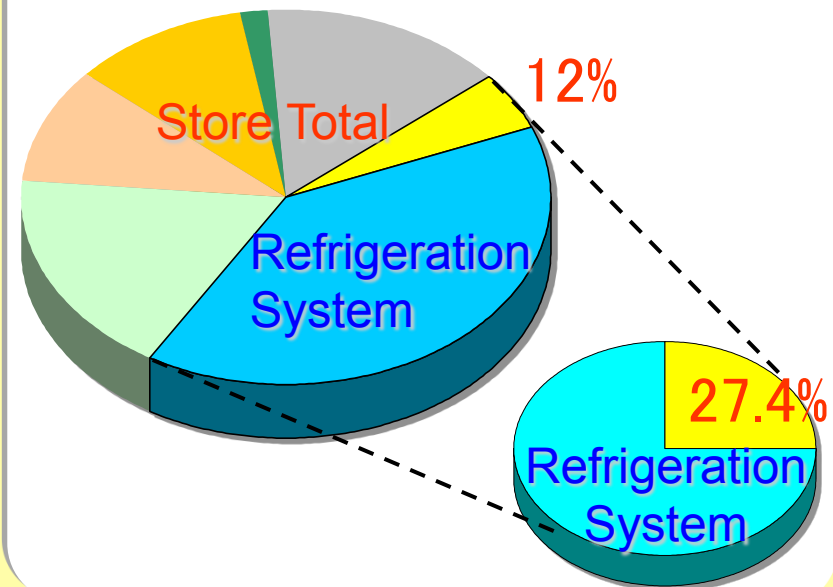
## 【Impact by CO<sub>2</sub> System】

- ① HFC Refrigerant Emission Reduction (CO<sub>2</sub> Equivalent)  
19.38ton-CO<sub>2</sub>/Store/Year
- ② Energy Saving from High Efficiency  
Electricity Consumption Reduction:  
22,920kWh/Store/Year  
(12% in Store Total, 27.4% in Refrigeration System)

## ① GWP(Global Warming Potential)

Natural Refrigerant (CO <sub>2</sub> )	: 1
HFC (R404A)	: 3,920
HFC (R410A)	: 1,730

## ② Electricity Reduction Ratio from Efficiency Improvement



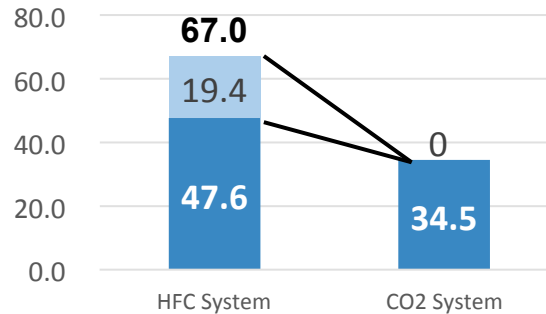
## ● Global Warming Impact

- Reduction of HFC Leakage
- High Energy Efficiency



**CO<sub>2</sub> Emission Reduction by Half** Compared with HFC Systems

(t) CO<sub>2</sub> Emission Reduction with CO<sub>2</sub> Refrigerant



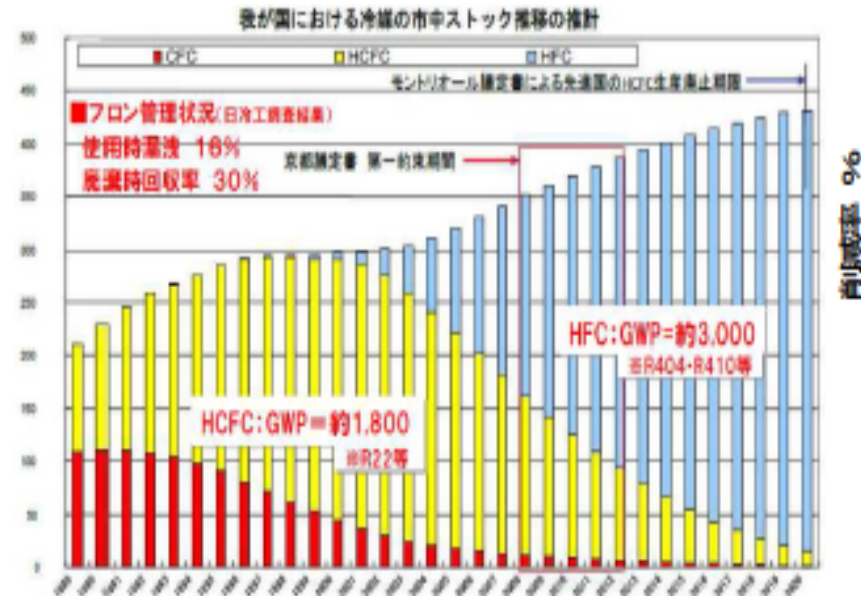
■ CO2 Emission from Refrigerant Leakage

■ CO2 Emission from Electricity



## ● Regulations Reducing HFCs Emission

- HCFC ⇒ Montreal Protocol: Phase-out in 2020 (Developed Countries)
- HFC ⇒ Necessary to be controlled: High GWP



# Japanese proven CO<sub>2</sub> technology for CVS (Lawson&Panasonic)

Outdoor units for Refrigerators and Freezers were replaced by Panasonic CO<sub>2</sub> Units (10HP and 2HP)



The Total Energy Save: **27%**



# CO<sub>2</sub> System New Installation

## Next-Generation CVS

(15hp Refrigerator and 2x 2hp Freezer)

Branch	Regional Office	Store Name	Opening Date
Kinki	Osaka-Higashi	Hirakata Hoshigaoka	2014/9/1
Kita-Kanto	Saitama-Chuo	Asaka Nishibenzai 1 Chome	2014/11/1
Kita-Kanto	Saitama-Chuo	Omiya Miyacho	2014/11/10

## Installation Case



【Outdoor Unit:  
15hp Refrigerator】



【Open Showcase】



【Reach-in Freezer】



# Introduction results

## ■ 461 stores installation of CO2 System

FY 2010 ⇒ 1    FY 2011 ⇒ 50

FY 2012 ⇒ 24    FY 2013 ⇒ 62

FY 2014 ⇒ 306 (As of end-January 2015)



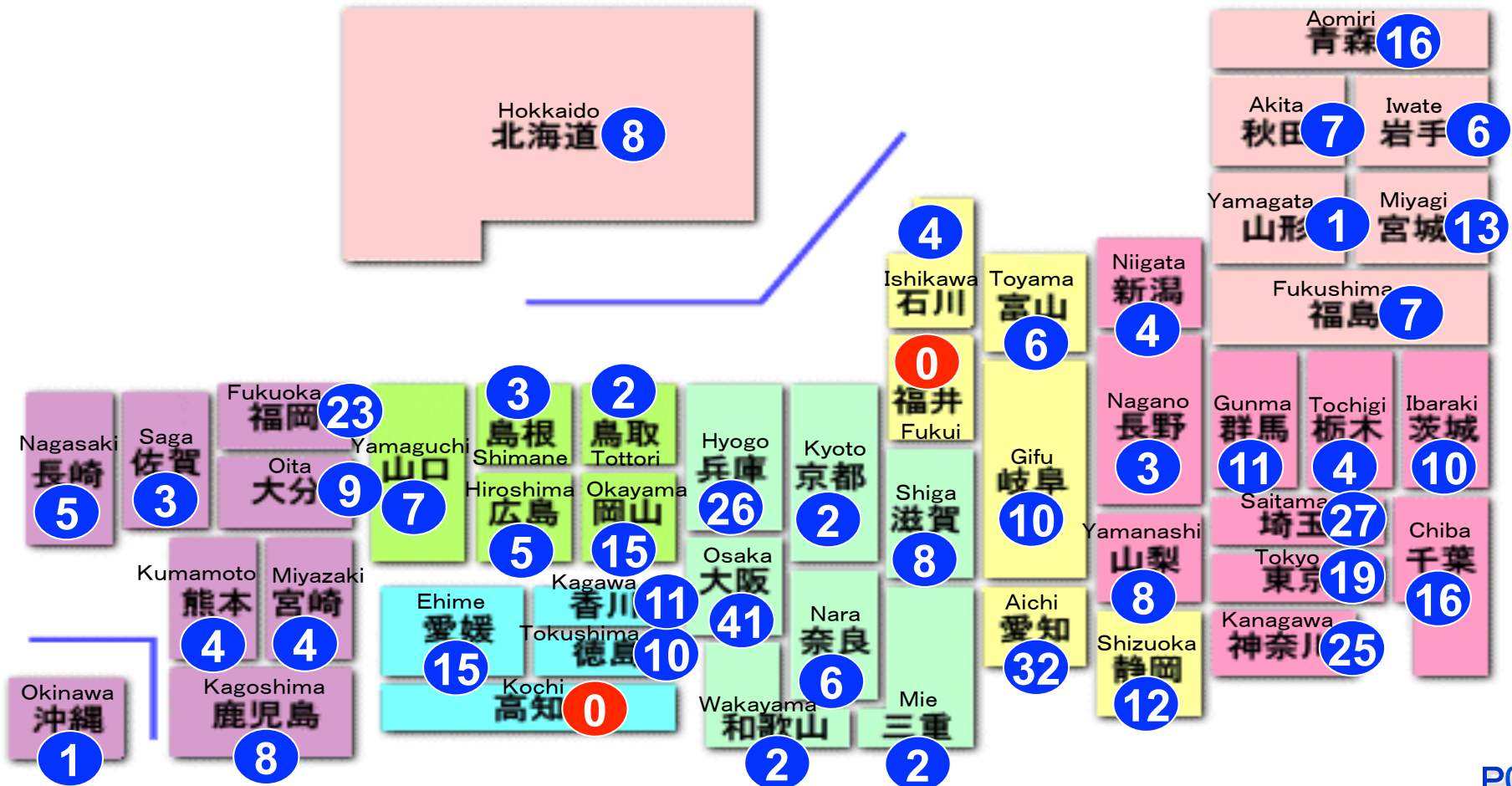
Eco-Friendly, Cold Area  
Specialized Pilot Store:  
Yuri-Honjo Yamamoto Store  
(Opened in Nov. 2013)



# CO<sub>2</sub> System Installation Result (FY2014)

461 Stores in 45 Prefecture (at the End of Jan. 2015)

570 Stores Expected at the End of Feb. 2015



## 【Installation Technician Training】

Installation technician training by manufacturer (Continued)

Technician training which provide the knowledge and skills required for safe and quick installation at various type of stores. is provided to increase the number of skilled technicians.

## 【Maintenance System】

Remote monitoring makes it possible to quickly respond to the problems.

Remote monitoring is installed at every CO<sub>2</sub> store, the data taken are utilized for commissioning, pre-maintenance and failure analysis.

## 【Government Policies】

Classification in “High-pressure gas safety law” is a barrier for more spreading of CO<sub>2</sub> refrigeration systems. Installation of middle capacity range CO<sub>2</sub> unit (>3RT) needs a reporting to the authority.

Application term of the subsidy doesn't match well to retailer's business cycle.

General public relations like “Freon visualization” are important about global warming caused with conventional refrigerants.

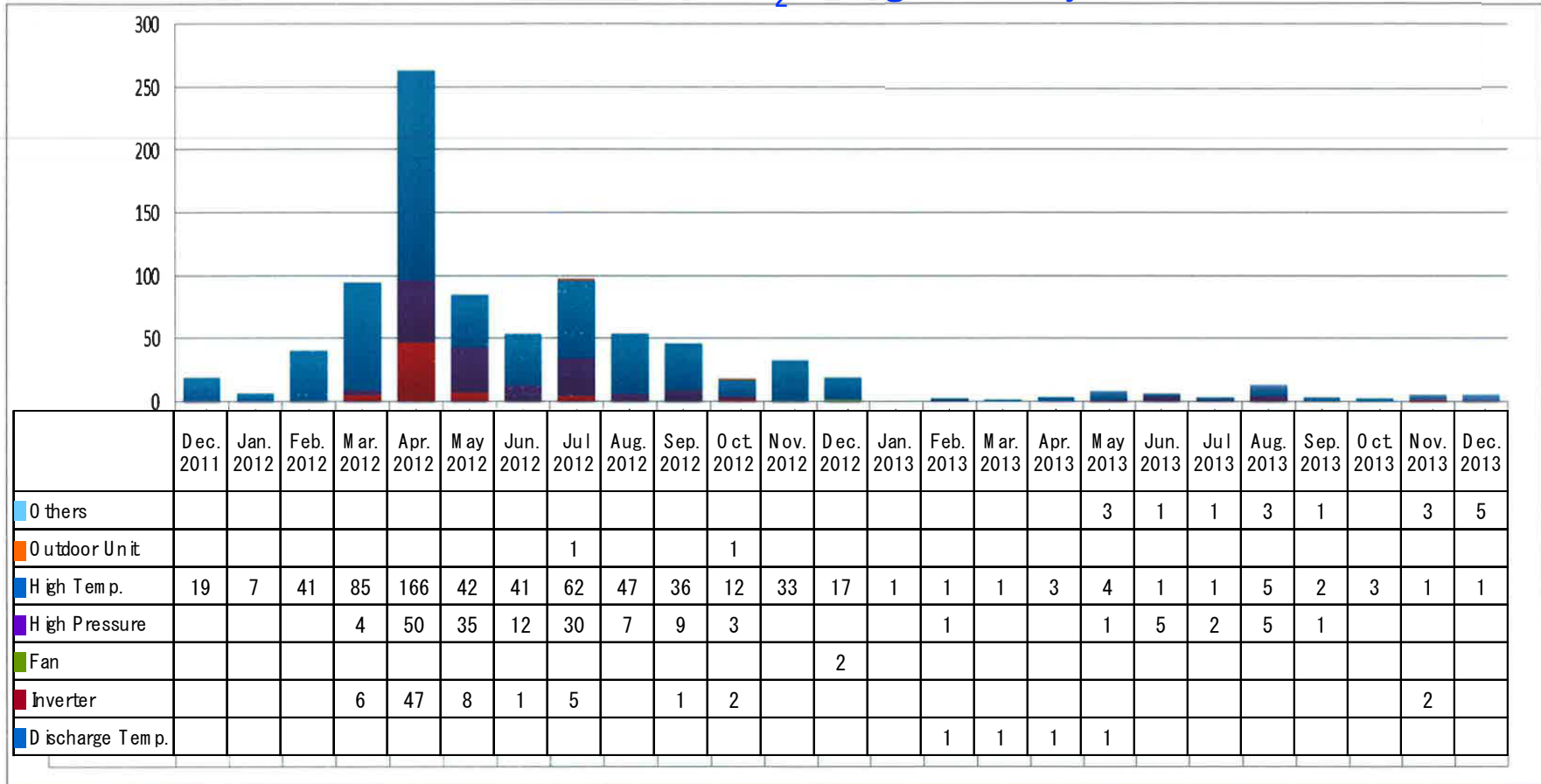
## 889 trainees from 238 provider complete the installation technician training course

No.	Trainees	Date	Number of trainees	Location
1	Service leader	7-8 Jun. 2011	14	Panasonic Training Center
2	Installer, Engineering, Sales	3 Oct 2011	59	Panasonic Training Center
3	Installer, Service, Sales	25 Nov. 2011	12	Panasonic Training Center
4	Service leader	7-9 Dec. 2011	25	Panasonic Training Center
5	Service, Maintenance Provider	21 Dec. 2011	14	Panasonic Training Center
6	Maintenance Provider	14 Mar. 2012	8	On site
7	Maintenance Provider	2 Apr. 2012	8	On site
8	Installer, Engineering, Sales	6-8 Jun. 2012	30	Panasonic Training Center
9	Maintenance Provider	26 Jul 2012	8	On site
10	Maintenance Provider	20 Sep. 2012	12	On site
11	Maintenance Provider	1 Oct 2012	8	On site
12	Maintenance Provider	25 Oct 2012	6	Panasonic Training Center
13	Installer, Maintenance Provider	7 Dec. 2012	14	On site
14	Installer, Maintenance Provider	18 Dec. 2012	25	Panasonic Training Center
15	Maintenance Provider	11 Jan. 2013	6	On site
16	Maintenance Provider	26-27 Mar. 2013	9	On site
17	Maintenance Provider	9 Apr. 2013	7	On site
18	Installer, Engineering, Sales	11-12 Jun. 2013	40	Panasonic Training Center
19	Installer, Maintenance Provider	20-21 Jun. 2013	21	On site
20	Installer	2 Aug. 2013	15	On site
21	Installer, Engineering, Sales	19-20 Sep. 2013	18	Panasonic Training Center
22	Installer (Indonesia)	1-3 Oct 2013	4	Panasonic Training Center
23	Installer, Maintenance Provider	27 May. 2014	57	On site
24	Installer, Maintenance Provider	2-3 Jun. 2014	46	On site
25	Service, Maintenance Provider	5 Jun. 2014	9	Panasonic Training Center
26	Installer, Maintenance Provider	5 Jun. 2014	58	On site
27	Installer, Maintenance Provider	9-10 Jun. 2014	28	On site
28	Installer, Maintenance Provider	11-12 Jun. 2014	35	On site
29	Service, Maintenance Provider	13 Jun. 2014	46	Kaden Kakan
30	Installer, Maintenance Provider	13-14 Jun. 2014	47	On site
31	Installer, Maintenance Provider	19 Jun. 2014	55	On site
32	Installer, Maintenance Provider	2 Oct 2014	12	On site
33	Installer, Maintenance Provider	6 Oct 2014	20	On site
34	Installer, Maintenance Provider	7 Oct 2014	10	On site
35	Installer, Maintenance Provider	17 Oct 2014	13	On site
36	Maintenance Provider	20 Oct 2014	14	On site
37	Installer, Maintenance Provider	19 Dec. 2014	40	On site
38	Service, Maintenance Provider	14-15 Jan. 2015	36	Panasonic Training Center
Total			<b>889</b>	

# Maintenance of CO<sub>2</sub> Refrigeration System

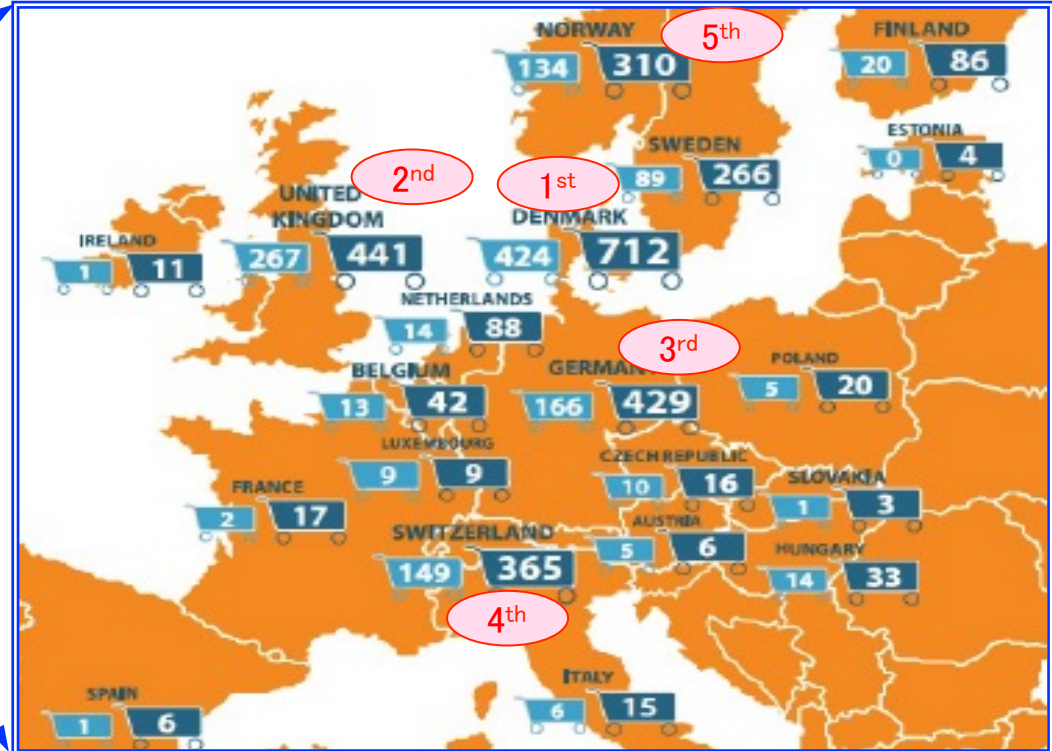
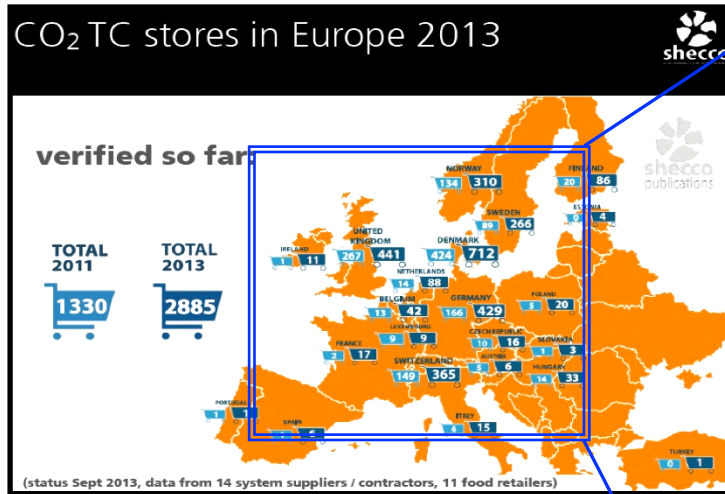
The number of maintenance activity decreased to 10/month or less in 2013 after learning countermeasure for CO<sub>2</sub> refrigeration system problems.  
 (50 Stores field test funded by METI, FY2011)

## Maintenance Activities at Stores with CO<sub>2</sub> Refrigeration System(Including Remote Maintenance)



# Comparison with Other Countries

## Number of Stores with CO<sub>2</sub> Refrigeration (EU Region)



Rank	Country	Stores
1	Denmark	712
2	UK	441
3	Germany	429
4	Switzerland	365
5	Norway	310

➔ Total 2,881 Stores  
 ※FY2011 +116%

※shecco: ATMOsphere Network Tokyo presentation

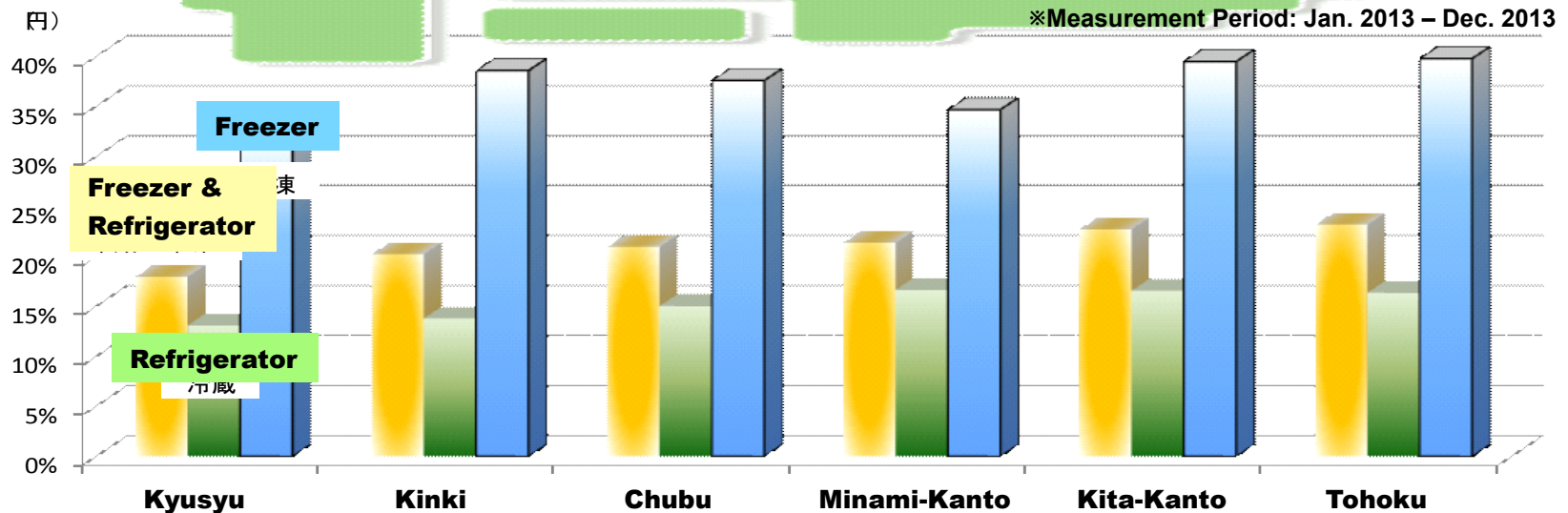
Japan is behind EU countries in natural refrigeration. But CO<sub>2</sub> technology has been proven and the number of stores almost reach to **570** by Lawson.(As of end-February 2015)

⇒ **Lawson aims “No.1 Natural Refrigeration Retailer” in the world.**

# Energy Saving of Outdoor Unit

**6,932kWh/Store/Year** Energy Saving of Refrigeration Outdoor Units (50 Stores)

	Annual Electricity ( Refrigerator )			Annual Electricity ( Freezer )			Annual Saving ( Total )	
	CO2 System	HFC System	Saving	CO2 System	HFC System	Saving		
	kWh	kWh	%	kWh	kWh	%	kWh	%
Kyusyu	23,116	26,598	13	6,143	9,072	32	6,412	18
Kinki	22,014	25,534	14	5,493	8,945	39	6,973	20
Chubu	21,276	25,040	15	5,567	8,924	38	7,120	21
Minami-Kanto	20,966	25,153	17	5,820	8,910	35	7,278	21
Kita-Kanto	19,812	23,743	17	5,258	8,693	40	7,366	23
Tohoku	16,491	19,718	16	4,866	8,084	40	6,444	23
Average	20,612	24,298	15	5,524	8,771	37	6,932	21



## 【Electricity Measured with Systems Using Different Refrigerant】

Refrigerant	Number of Stores	Annual Electricity (averaged)	Ratio to R404A
R404A	135	168,593kWh	1
R410A	220	164,264kWh	0.97
R744(CO <sub>2</sub> )	25	147,782kWh	0.88

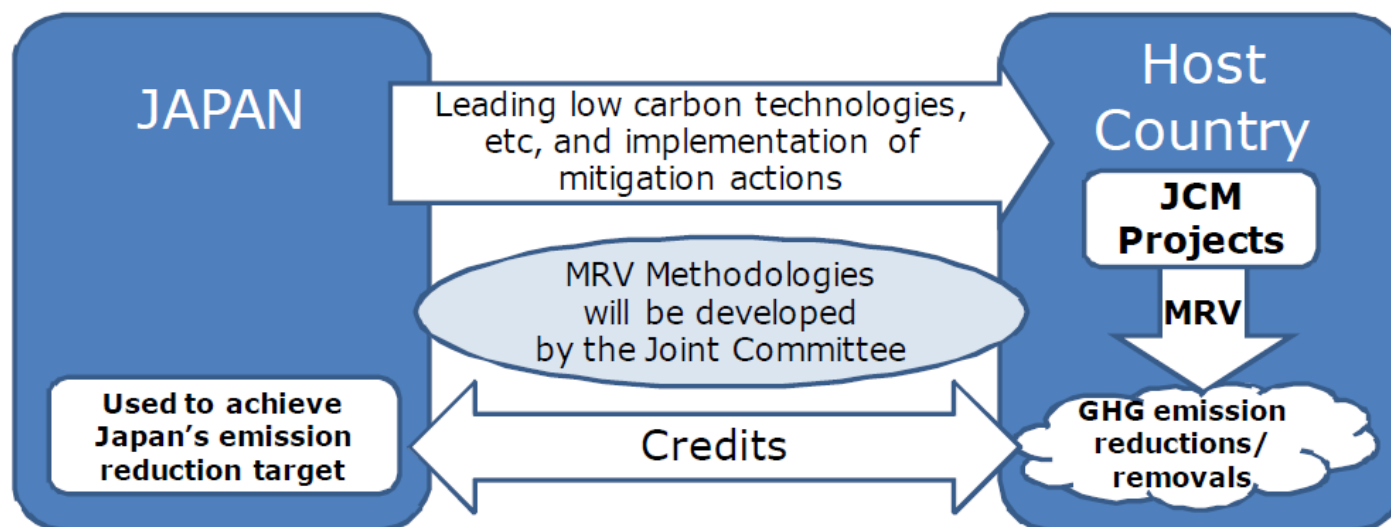
※Comparison Based on Measurement in FY2012 Period, of Stores Opened FY2011 and FY2012



# Indonesian Eco Project with Japanese government

## Basic Concept of the JCM

- Facilitating diffusion of leading low carbon technologies, products, systems, services, and infrastructure as well as implementation of mitigation actions, and contributing to sustainable development of developing countries.
- Appropriately evaluating contributions to GHG emission reductions or removals from Japan in a quantitative manner, by applying measurement, reporting and verification (MRV) methodologies, and use them to achieve Japan's emission reduction target.
- Contributing to the ultimate objective of the UNFCCC by facilitating global actions for GHG emission reductions or removals, complementing the CDM.



## ① *FS experiment for METI*

### 1. PETA BARAT

Already opened on 7th/FEB

✂ Designated equipment: CO2 refrigerant system

## ② *JCM grant project by MOE*

### 1. RADEN SALEH

Already opened on 21th/FEB

### 2. KEBAGUSAN

Planned to open on 10th/MAR

✂ Designated equipment: CO2 refrigerant system, AC, LED lighting

**10 Alfamidi stores** open in Jakarta with high efficiency equipment as a JCM Energy Saving Project.  
 (CO<sub>2</sub> Refrigeration, Inverter A/C and LED Lighting)

	Shop Name	OPEN
–	<b>Alfamidi Raden Saleh</b>	<b>21.Feb.2014</b>
–	<b>Alfamidi Kebagusan</b>	<b>10.Mar.2014</b>
<b>1</b>	<b>Alfamidi Surya Darma</b>	<b>Jan.2015</b>
<b>2</b>	<b>Alfamidi Meruyung</b>	<b>Feb.2015</b>
<b>3</b>	<b>Alfamidi Tebet Timur Dalam</b>	<b>Feb.2015</b>
<b>4</b>	<b>Alfamidi Palmerah Utara</b>	<b>Feb.2015</b>
<b>5</b>	<b>Alfamidi Matraman Raya</b>	<b>Feb.2015</b>
<b>6</b>	<b>Alfamidi Raya Tengah</b>	<b>Feb.2015</b>
<b>7</b>	<b>Alfamidi Muncang</b>	<b>Feb.2015</b>
<b>8</b>	<b>Alfamidi Ceger Raya 2</b>	<b>Mar.2015</b>
<b>9</b>	<b>Alfamidi Sawangan</b>	<b>Mar.2015</b>
<b>10</b>	<b>Alfamidi Kampung Asem</b>	<b>Mar.2015</b>

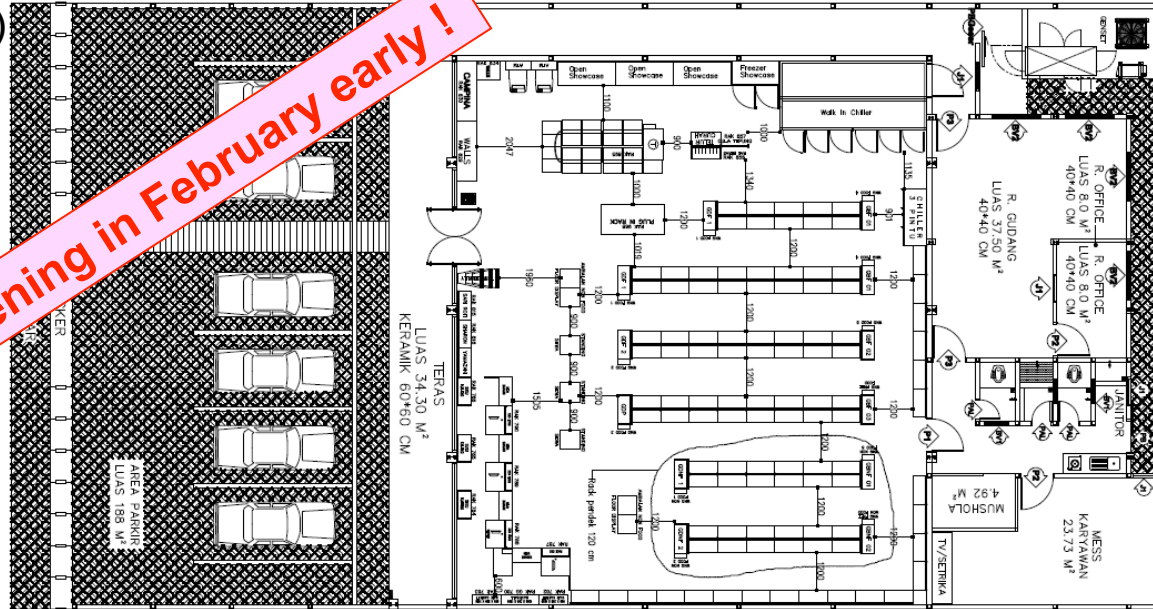


# Next Pilot Store of JCM Grant Project in Jakarta

## SURYA DARMA (Alfamidi)

- Location: Jakarta
- Equipment:
  - CO<sub>2</sub> Refrigeration System
  - A/C(Inverter)
  - LED lighting
  - Data Acquisition
  - Backup Generator (33KVA)

Opening in February early!

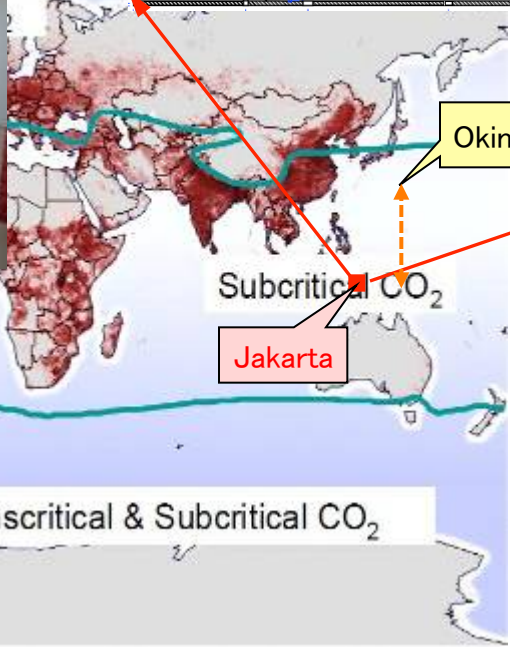
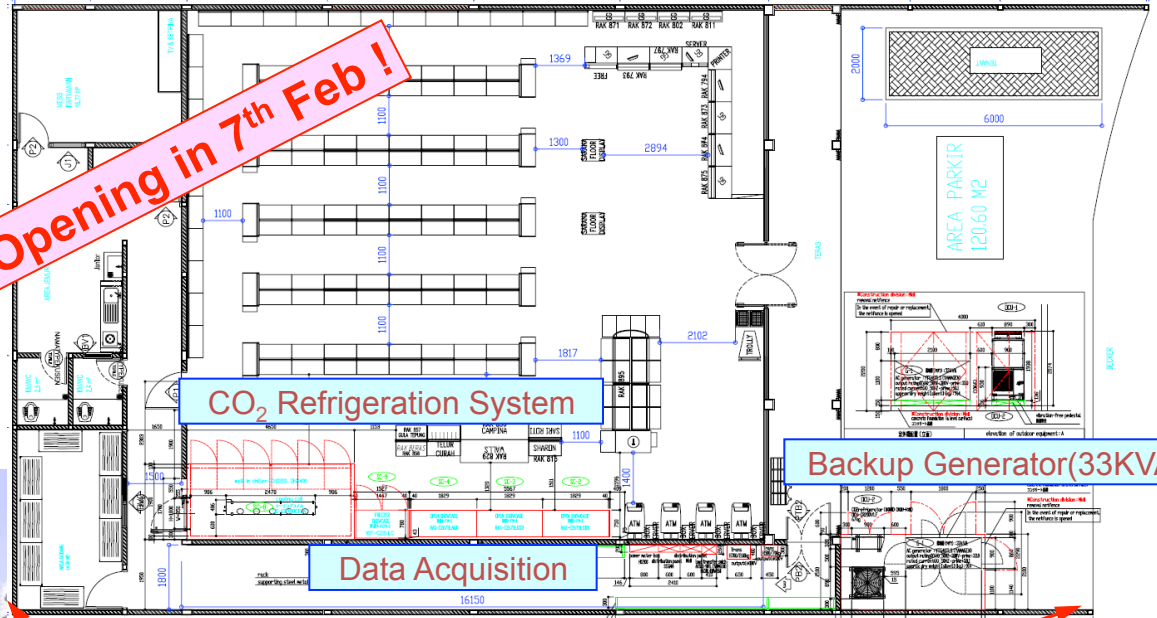


# 1st Pilot Store of JCM FS Project in Jakarta

## ■ PETA BARAT (Alfamidi)

- Location: Jakarta
- Sales Floor: 236m<sup>2</sup>
- Equipment:
  - CO<sub>2</sub> Refrigeration System
  - Data Acquisition
  - Backup Generator (33KVA)

**Opening in 7th Feb!**



Map from Globalis.gvu.unu.edu

# 1st Pilot Store of JCM Grant Project in Jakarta

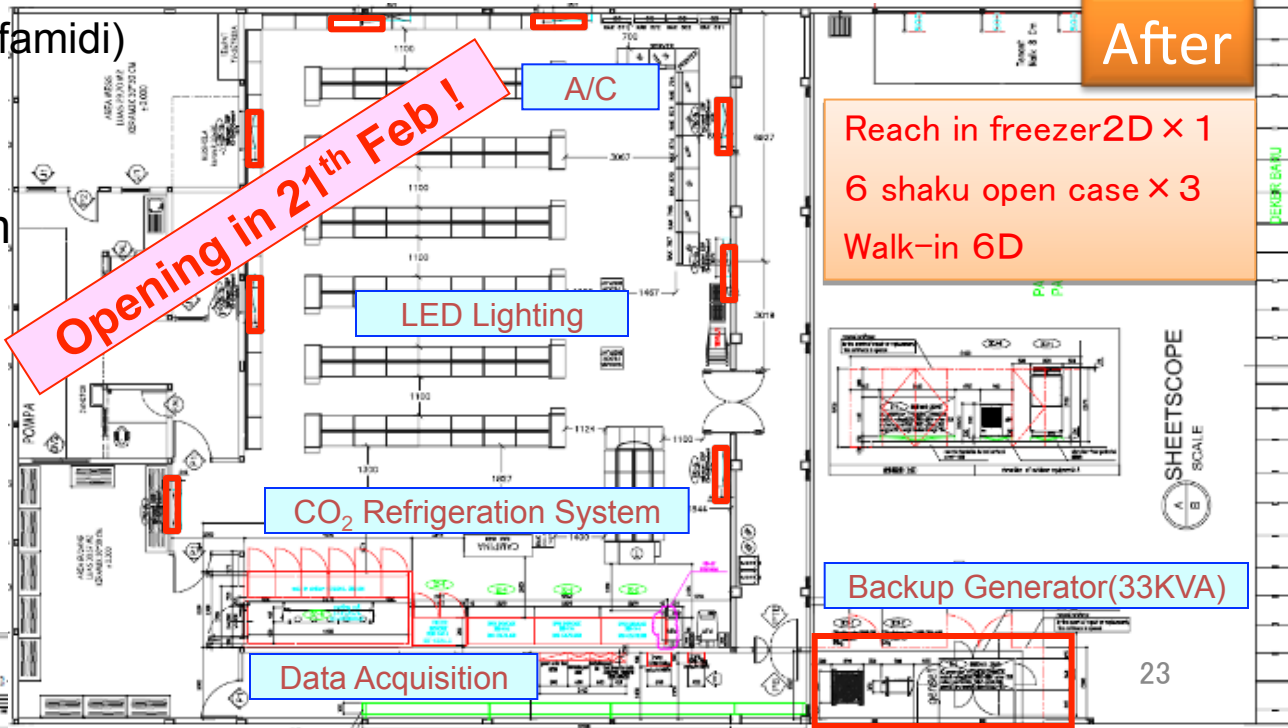
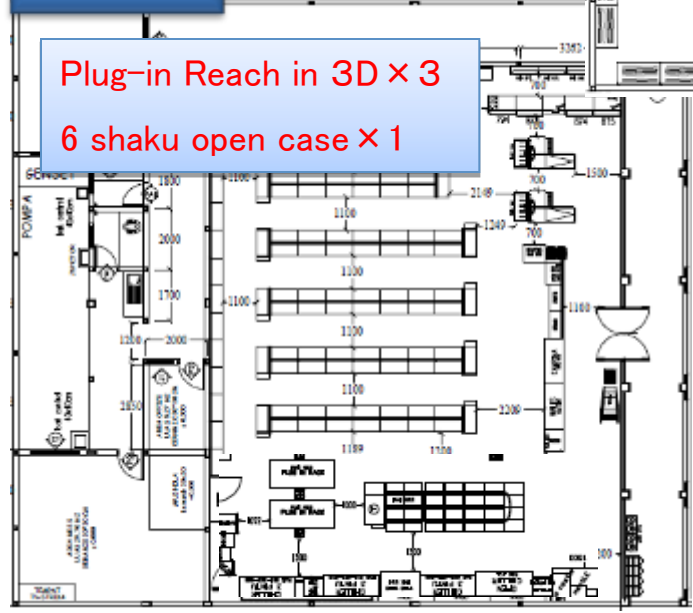
## ■ RADEN SALEH (Alfamidi)

- Location: Jakarta
- Equipment:  
 CO<sub>2</sub> Refrigeration System  
 A/C(Inverter)  
 LED lighting  
 Data Acquisition  
 Backup Generator (33KVA)

Opening in 21<sup>th</sup> Feb!

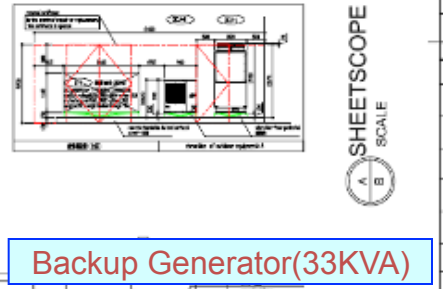
Before

Plug-in Reach in 3D × 3  
 6 shaku open case × 1



After

Reach in freezer 2D × 1  
 6 shaku open case × 3  
 Walk-in 6D



Backup Generator(33KVA)



# 2nd Pilot Store of JCM Grant Project in Jakarta

## KEBAGUSAN (Alfamidi)

- Location: Jakarta
- Equipment:  
 CO<sub>2</sub> Refrigeration System  
 A/C(Inverter)  
 LED lighting  
 Data Acquisition  
 Backup Generator (33KVA)

Opening in 10<sup>th</sup> Mar!

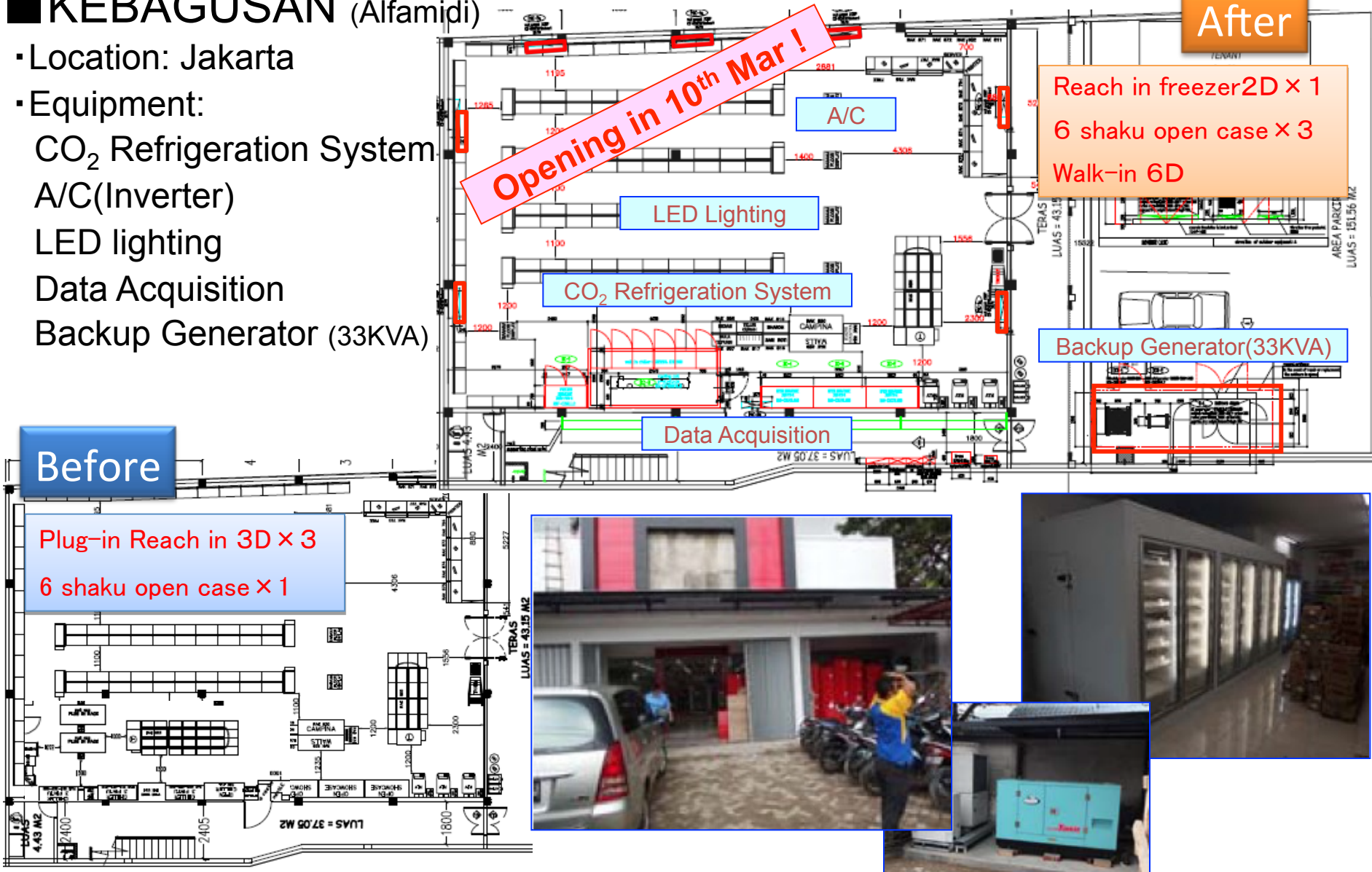
After

Reach in freezer 2D × 1  
 6 shaku open case × 3  
 Walk-in 6D

Backup Generator(33KVA)

Before

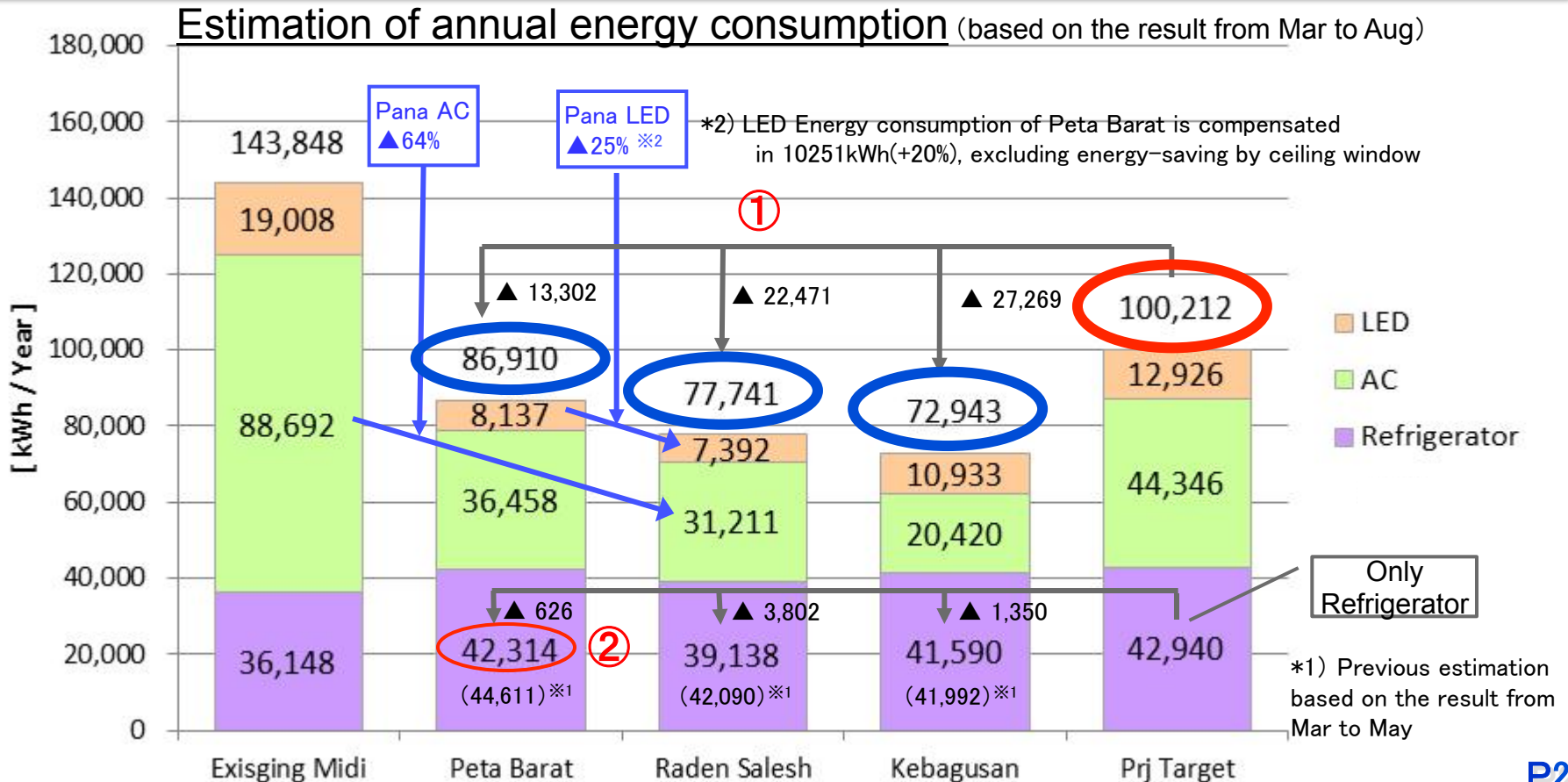
Plug-in Reach in 3D × 3  
 6 shaku open case × 1





# Quick Report on Energy-Saving

- ① Not only Raden Saleh and Kebagusan, but also Peta Barat (AC/D company, LED/Philips) will achieve a project target
  - ② Energy consumption of Refrigerator of Peta Barat has been improved by changing the setting of Walk-in showcase (July 1st).
    - Humidity setting of Defroster has been optimized.
    - Before (last report): 44,611kWh ⇒ After (this report) 42,314kWh (▲2,297kWh)
- The setting of Raden Saleh and Kebagusan have been changed on July 13th and 12th.





Thank you for your kind attention !