TOSHIBA
Leading Innovation

我が国企業における資源効率性向上の取組
Corporate Activities on Increasing Resource Efficiency in Japan

15th Feb. 2016

（株）東芝　家電リサイクル推進室　上山

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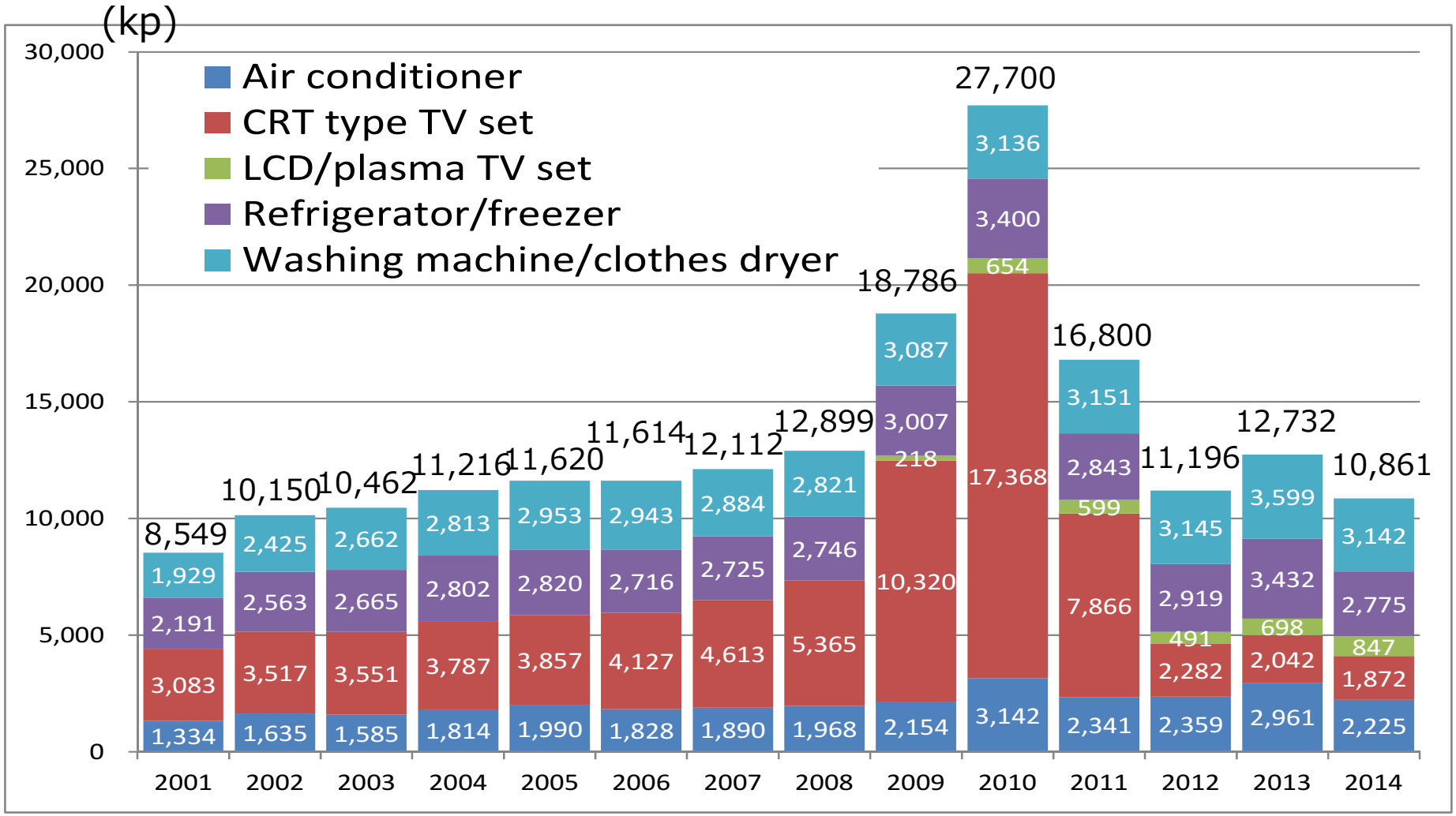
Today's Topics

1．家電リサイクル実施状況
Achievement of the Home Appliance Recycling Act
2．家電業界のDfEの取組
Common DfE activity of Japanese home appliance companies
3．弊社の取組
Toshiba's Activity for Environment and the Home Appliance Recycling
（１）長期目標 環境ビジョン２０５０、環境効率
Long term target: Environmental Vision 2050, Eco-efficiency
（２）短期目標：環境アクションプラン
Short term target : Environmental Action Plan
（３）弊社の家電リサイクルを中心とした資源循環の取組
Efficient use of recycled resource in Toshiba
①再生プラスチックの活用
Return plastics from old home appliance products to the new products
②フッ酸リサイクルの取組 (四日市工場)
Recycling HF(hydrofluoric acid) in Yokkaichi Operations

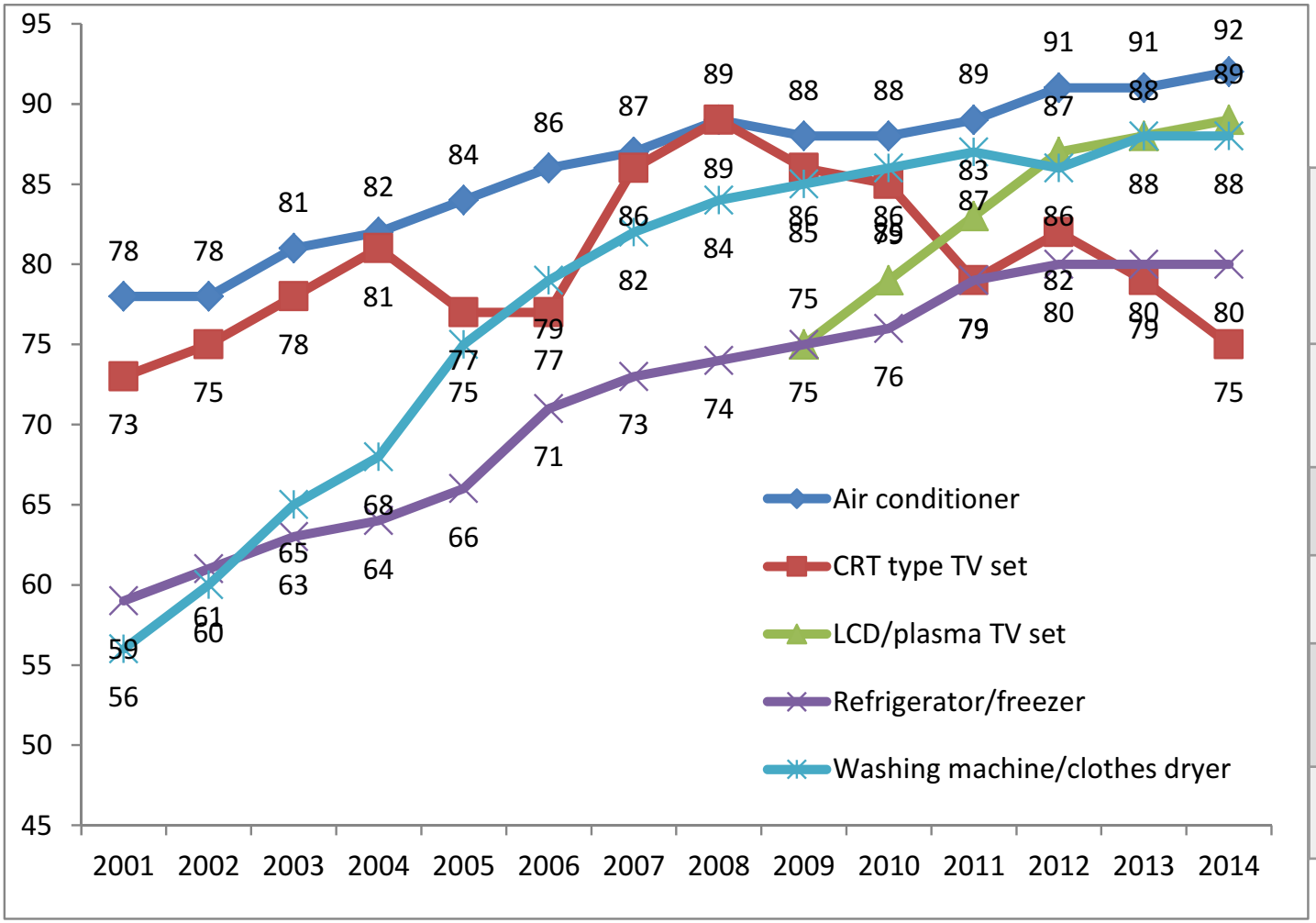
１．家電リサイクル実施状況
Achievement of the Home Appliance Recycling Act

Changes in the number of discharged home appliances accepted at the designated collection locations



Source: FY2014 Annual Report on Recycling Home Appliances (Association for Electric Home Appliances)
(Note) Home appliances which were purchased from May 15, 2009 to March 31, 2011 are entitled to get eco-points. The TV broadcasting service was fully switched to digital terrestrial broadcasting on July 24, 2011 (on April 1, 2012 in Iwate Prefecture, Miyagi Prefecture and Fukushima Prefecture).

Changes in the recycling rates

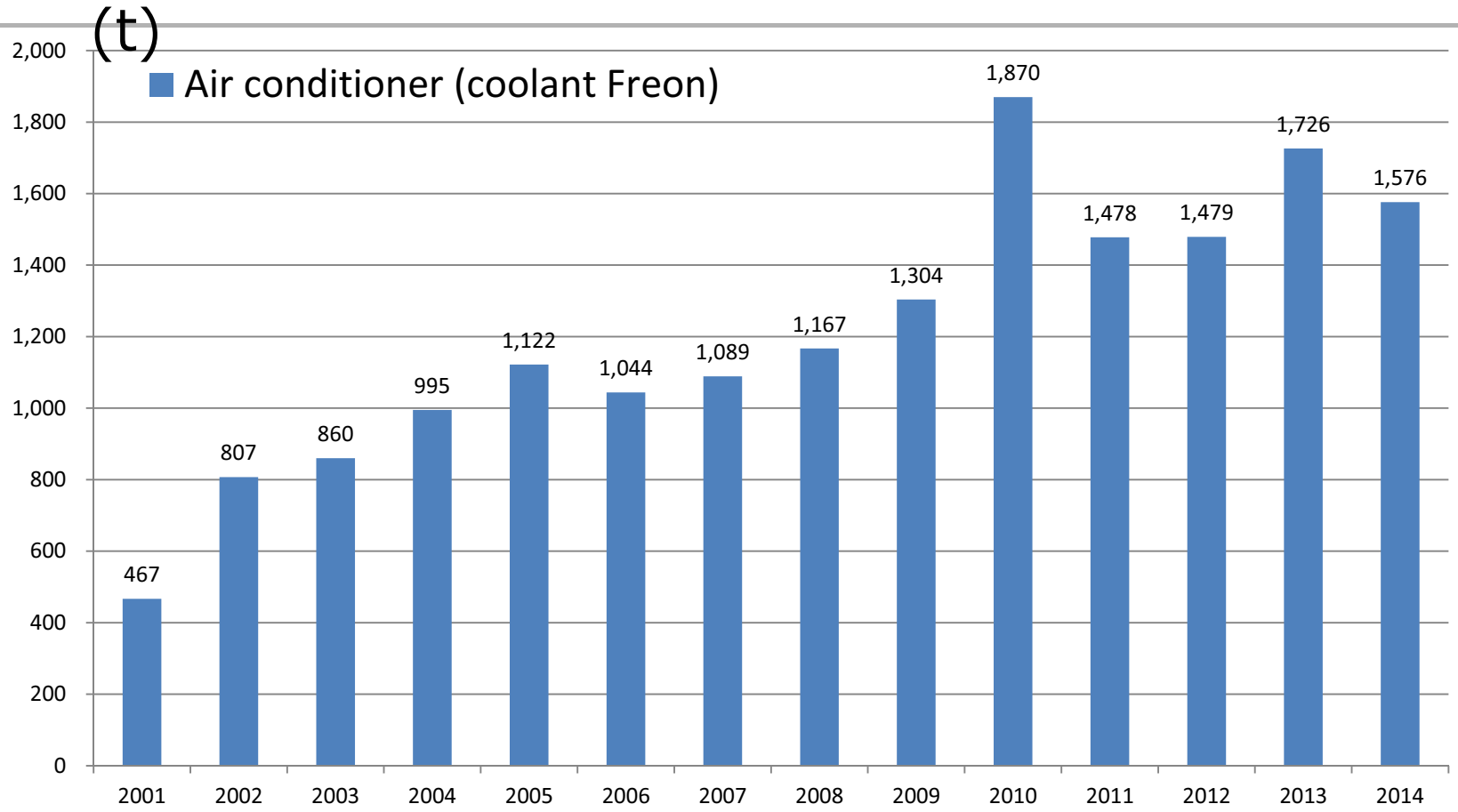


(Updated Standard recycling rate. From Apr. 2015)

Products	Legal recycling Rate (%)	
	～Mar. 2015	Apr. 2015～
Air conditioner	70	80
CRT type TV set	55	55
LCS/plasma TV	50	74
Refrigerator/freezer	60	70
Washing machine	65	82

(Note 1) Liquid crystal/plasma TV sets and clothes dryers were added to home appliances in accordance with the Act in 2009.

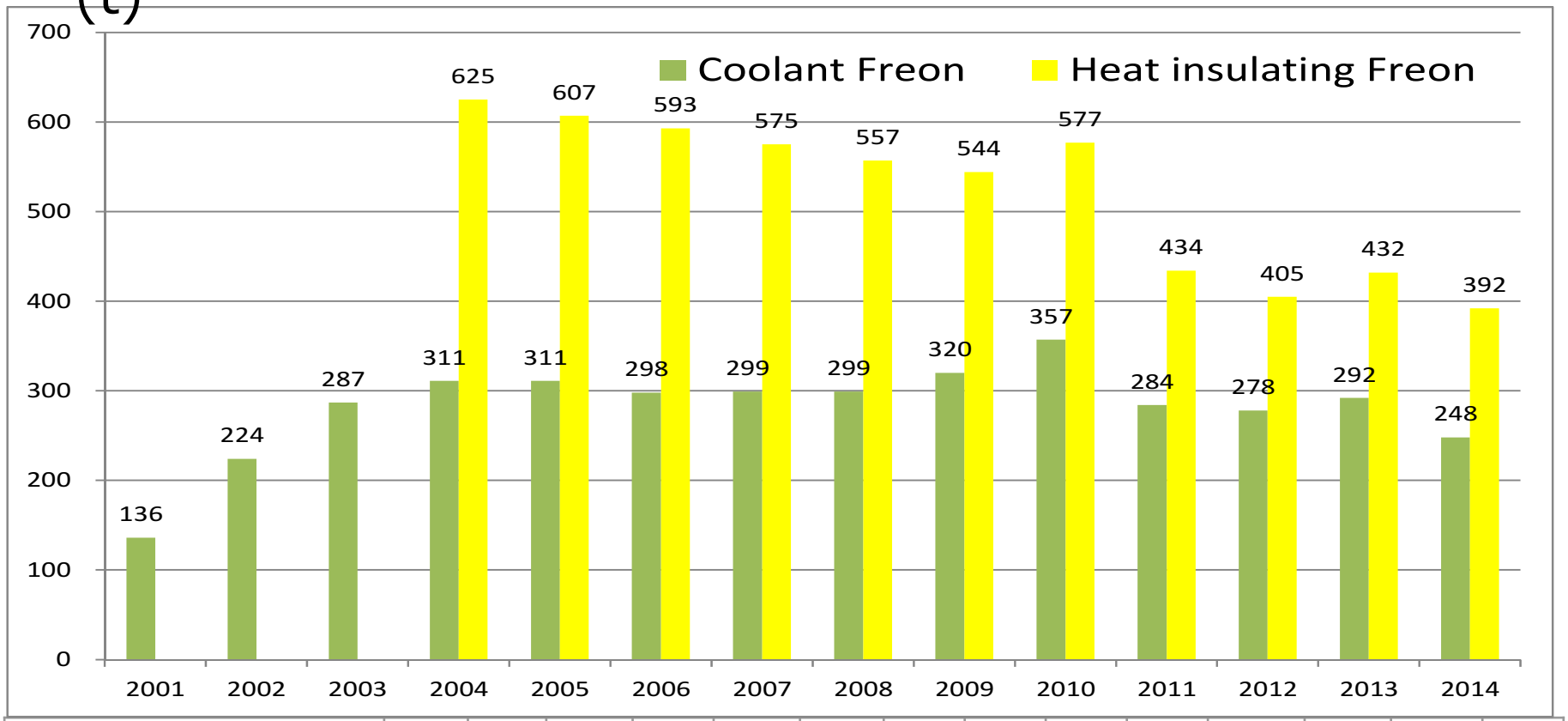
Changes in the amounts of collected Freon (Air conditioner)



year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Quantity/product (g)	350	453	543	550	564	569	582	593	617	609	623	627	634	640

Source: FY2014 Annual Report on Recycling Home Appliances (Association for Electric Home Appliances)

Changes in the amounts of collected Freon (Refrigerator/Freezer)



year		01	02	03	04	05	06	07	08	09	10	11	12	13	14
Quantity/product(g)	Coolant	62	91	108	111	111	110	110	109	107	106	100	95	91	83
	Heat insulating				223	217	219	211	204	182	171	153	139	134	132

Source: FY2014 Annual Report on Recycling Home Appliances (Association for Electric Home Appliances)
(Note 1) It has been obligated to collect heat insulating Freon in refrigerators and freezers since 2004. Since 2009, it has been obligated to collect coolant Freon in washing machines and clothes dryers. But the amounts of collected coolant Freon in washing machines and clothes dryers are too small to include them on the graph.

2.家電業界のDfEの取組
DfE of Japanese Home Appliance Companies

Progress of eco-friendly designing (DfE) ①

Reflecting feedback about issues of recycling in the designs of home appliances by continually creating opportunities to exchange opinions with design engineers of manufacturers and holding breakup training for them at recycling plants

Exchange of opinions between design engineers and RP personnel

Breakup training for design engineers

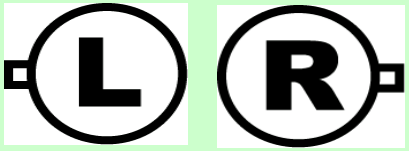
Lowering the number of steps in the breakup process by reducing the number of parts and showing their types on each home appliance

Number of screws shown

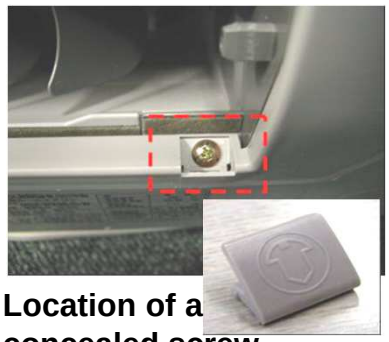
Location to remove a screw and the type of the screw shown

Progress of eco-friendly designing (DfE) ②

Increasing the efficiency of disassembling home appliances by use of the recycling symbols

		
Showing that metal parts are inserted into plastics	Showing the direction of refrigerant-containing pipes used in an electric refrigerator	Showing the location to drill a hole (location of a hole to release saltwater for the balancer of a rotary tub in an electric washing machine, etc.)

Example of the symbol actually used



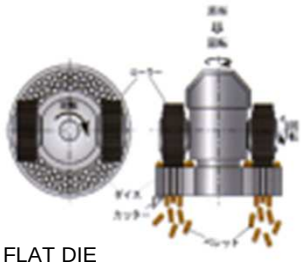
Location of a concealed screw shown

At the bottom of the back side of a refrigerator

The label says, "If you lay this refrigerator on its right side, you can collect refrigerant and refrigerant oil efficiently."

Recent topics of advanced recycling

Adoption of a machine which turns heat insulating polyurethane for refrigerators into solid fuel



FLAT DIE

Inside of a granulator (main machine equipped with two or four rollers)

Polyurethane material

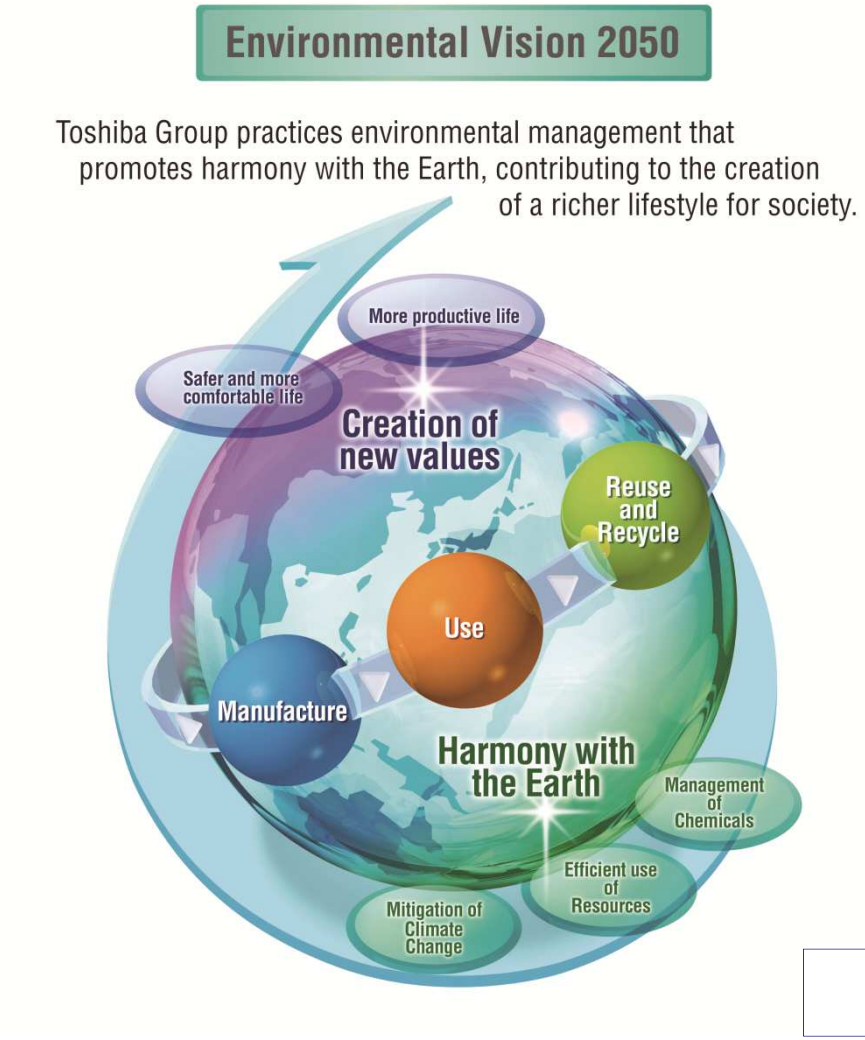
Granulating agent (pellet)

- After refrigerators have been disassembled and shredded, heat insulating polyurethane used to be just transferred to final disposal sites. However, their heat insulating polyurethane is now granulated (pelletized), and therefore able to be reused as solid fuel which can be sold for profit.
- Furthermore, the machine contributes to increasing economic efficiency and facilitating advanced resource circulation, while reducing CO2 emissions to about one third, as well as cutting down transportation costs by reducing the volume of heat insulating polyurethane.

３．弊社の取組
（１）長期目標：環境ビジョン２０５０、環境効率
Long term target:
Environmental Vision 2050,
Eco-efficiency

Environmental Management of Toshiba Gr.

Environmental Vision 2050



Ideal Situation in 2050

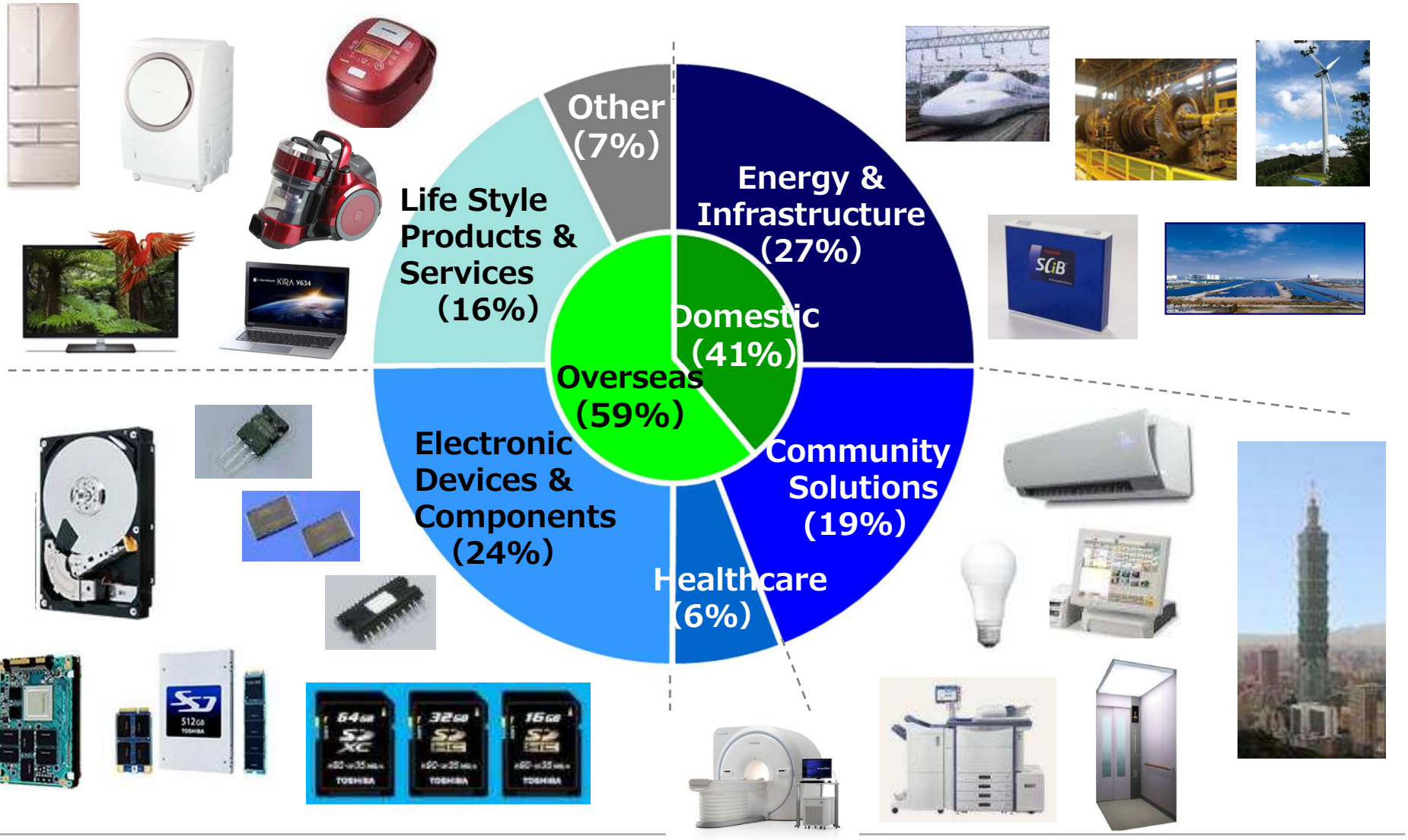
Issues to be solved in Realizing 《Affluent lifestyles in Harmony with the Earth》

- **Reduce Environmental Impact due to Increasing World Population**
- **Mitigating Environmental Impact due to Economic Development**
- **Creation of New Values**

Environmental Vision 2050

Toshiba Group Business Overview

FY2014 Sales Result: 6,655.9 Billions of yen



Concept of Eco-efficiency and Factor

General concept

$$\text{Eco-efficiency} = \frac{\text{Achievement (Sales or product value)}}{\text{Environmental impacts}}$$

Factor = Degree of improvement in eco-efficiency

Characteristics of Toshiba Group: Aiming to achieve two mutually contradictory goals of environmental conservation and economic growth

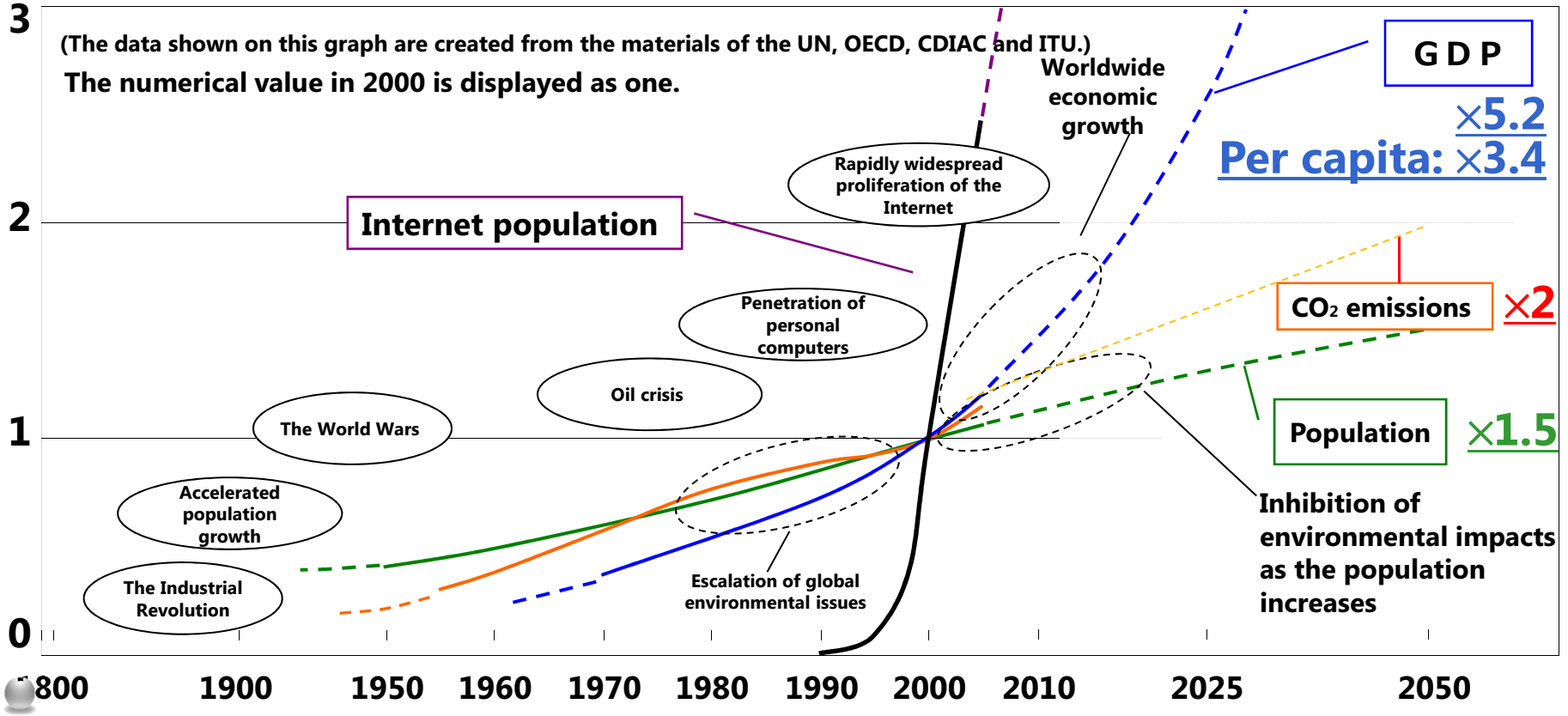
The first in Japan to implement the following three kinds of integration:

- Environmental impact (denominator): Integrated various environmental burdens into single index using LIME*1
- Product value (numerator): Integrated product value is evaluated based on various functions and/or performances with the QFD*2
- Integrating business process eco-efficiency and product eco-efficiency

*1 LIME (Life-cycle Impact assessment Method based on Endpoint modeling) is an LCIA method developed by the National Institute of Advanced Industrial Science and Technology.

*2 QFD (Quality Function Deployment) is a systematic process to integrate product functions based on the degree of their importance when the products are chosen by customers.

Background of Global Environment Problems and Issues to be addressed for 2050



Global Environmental Issues were Further Accelerated as the Global Economy Developed rapidly in the wake of the Industrial Revolution.

Considerable time is required to take Measures and obtain Results from the Same.

Toshiba has announced an Environmental Vision envisaging the Ideal Situation in 2050.

Background of Global Environment Problems and Issues

2050年の目標設定, Ideal situation in 2050

*2001年を１として表示

The numerical value in 2000 is displayed as one.

(価値,Value)

経済発展が加速で生み出すべき価値　3.4

Increase value creation by 3.4

(低減すべき環境影響,Reduce EI)

-人口増加による環境影響　1/1.5

Reduce EI with overpopulation to 1/1.5

-CO_2排出 1/2

Reduce EI with CO_2 Emission to 1/2

$$\text{Factor}=\frac{3.4}{1/1.5\ \times\ 1/2}=3.4\times1.5\times2\fallingdotseq10$$

<Environmental Vision 2050> Factor 10

EI=Environmental Impact

Aiming to achieve the “Factor 10”

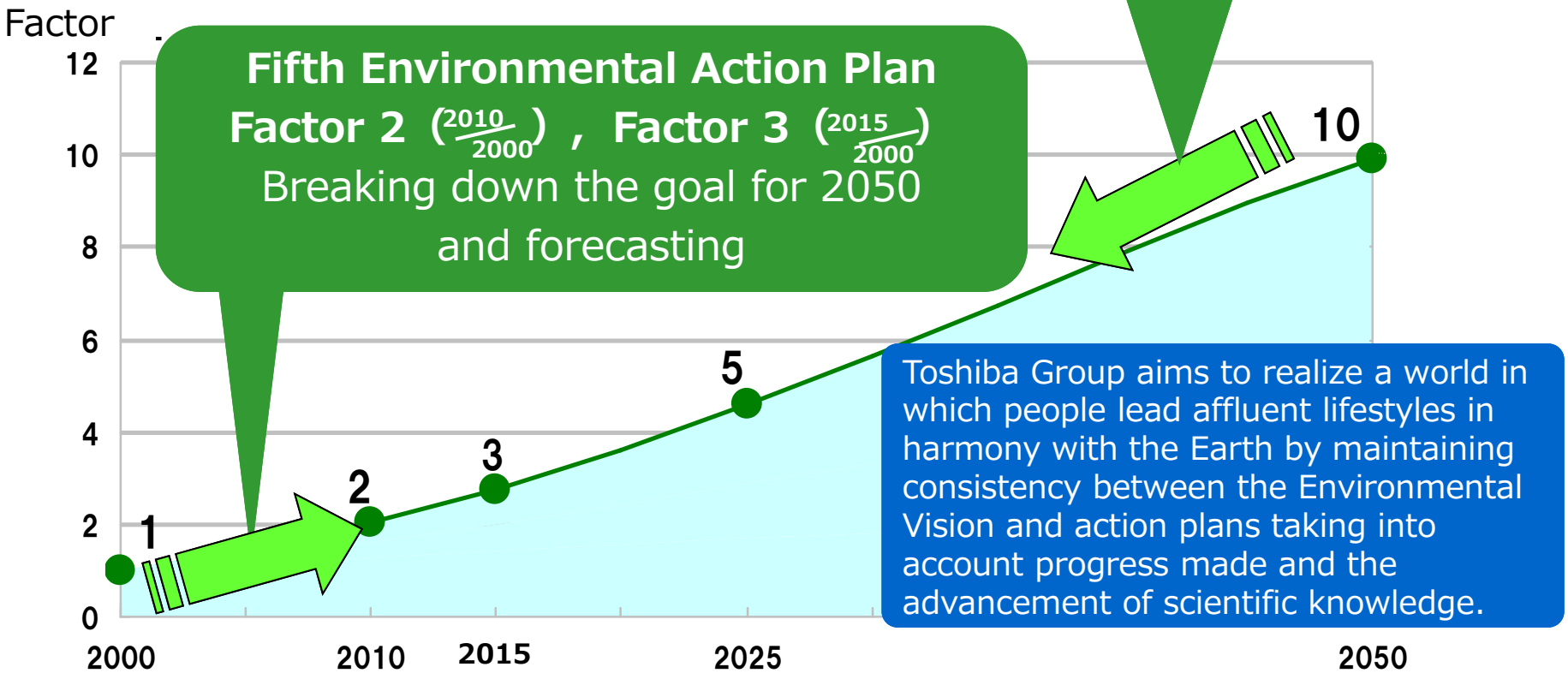
Environmental Vision 2050 : Factor 10 (2050/2000)

Backcasting from the ideal situation in 2050

Fifth Environmental Action Plan

Factor 2 (2010/2000) , **Factor 3** (2015/2000)

Breaking down the goal for 2050 and forecasting



Toshiba Group aims to realize a world in which people lead affluent lifestyles in harmony with the Earth by maintaining consistency between the Environmental Vision and action plans taking into account progress made and the advancement of scientific knowledge.

（２）短期目標：環境アクションプラン
Short term target : Environmental Action Plan

4 Strategies with the `4 Greens`

Active Promotion as a Leading Eco-Company

Establish and execute the 5th Environmental Action Plan

Greening of Products

Create products having the highest level of environmental performance

Aiming to achieve the highest level of environmental performance for all products we develop and thus reduce environmental impacts throughout product life cycles

Goal Increase sales of excellent ECPs to 1.8 trillion yen (FY2015).

Enefarm, a fuel cell for home use

dynabook R82, a detachable PC

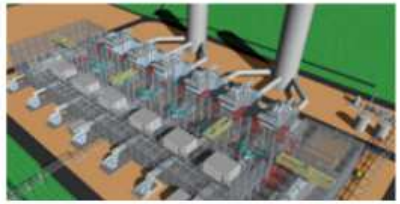
Greening by Technology

Developing advanced low-carbon technology on a global scale

Contributing to stable power supply and mitigation of climate change through low-carbon energy technologies

Goal Increase sales of energy-related products to 1.9 trillion yen (FY2015).

Mega solar system



High-efficiency combined cycle thermal power plant

Greening of Process

Pursuing the world's lowest level of environmental impacts

Minimizing production processes' impacts on the environment with high-efficiency manufacturing

Goal Increase eco-efficiency 1.5 times compared to the FY2000 level (FY2015).

Promote international marine container mixed transport

Water resource management

Green Management

Continuously improving basic activities which support Toshiba's environmental management, including human resource development, environmental communication, and conservation of biodiversity

Goal Developing biotopes at Toshiba Group's major sites worldwide

Protecting rare species

Toshiba Group Global Environmental Action

5th Environmental Action Plan – 22 FY2015 targets

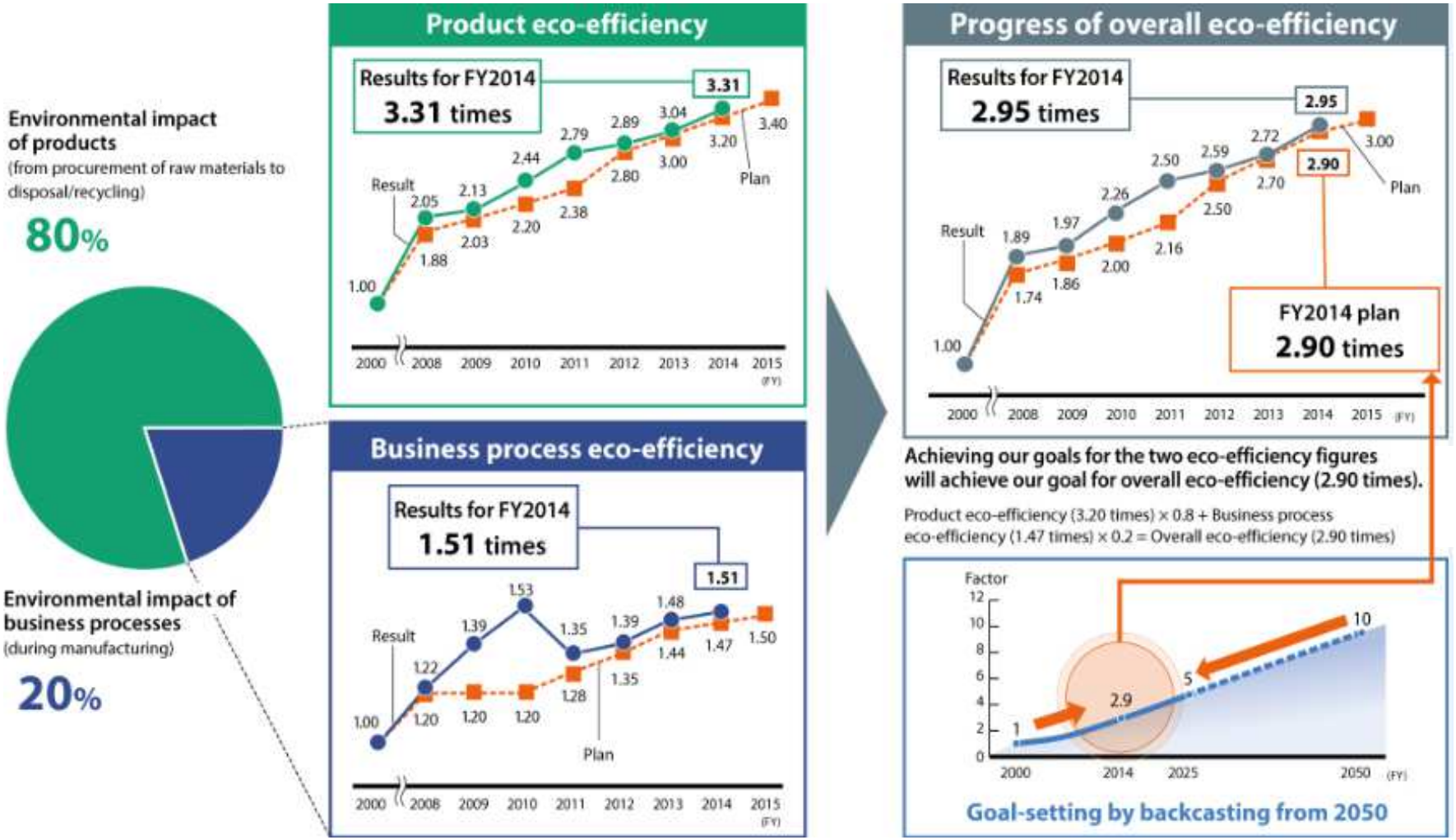
Eco-Efficiency	FY2015 Plan
Improvement of overall eco-efficiency (compared to FY2000 level)	3.0 times
Improvement of product eco-efficiency (compared to FY2000 level)	3.4 times
Improvement of business process eco-efficiency (compared to FY2000 level)	1.5 times

Greening of Product／Greenig by Technology		FY2015 Plan
Overall	Increasing sales amounts of Excellent ECPs (G of Products)	1.8 trillion yen
	Increasing sales amounts of energy-related products (G by Technology)	1.9 trillion yen
Mitigation of climate change	Reduction of CO_2 emissions through eco-products (G of Products)	15 million tons
	Reduction of CO_2 emissions through energy-related products (G by Technology)	490 million tons
Resource Efficiency	Increasing the percentage of resource savings for products	50%
	Increasing the percentage of use of recycled plastics for products	3.0%
Chemical Management	Reduction of chemical substances in products (reduction of PVC/BFRs)	80 products

Greenng of Process		FY2015 Plan
Mitigation of Climate changes	Reduction of greenhouse gas emissions (vs.FY1990)	1.39M ton(65%)
	Reduction of energy-derived CO_2 emissions per unit production (vs.FY2010)	90%
	Reduction of total CO_2 emissions from logistics per unit production (vs.FY2010)	95%
Resource Efficiency	Reduction of waste emissions (vs FY2000levels)	117,000 tons(71%)
	Improvement of the total volume of waste generated per unit production (vs FY2010 levels)	90%
	Reduction in percentage of final waste disposal (relative to Toshiba Group total emissions)	0.5%
	Reduction of the water uptake per unit production (vs.FY2010)	90%
Chemical Management	Reduction of the chemical emissions (vs.FY2000)	1,967t(77%)
	Reduction of chemicals usage per unit production (vs.FY2010)	95%

Green Managment		FY2015 Plan
Conservation of Biodiversity	Developing the ecosystem networks with the collaboration with local communities.	Implementation of measures to improve the biodiversity onto the production sites
Env. education	Developing “Toshiba eco-style Leader”	Developed 2,000 leaders
Env. Communication	Launch the global env. communication to unite the people	Promote “Environmental Action to unite the world”

Progress of overall eco-efficiency



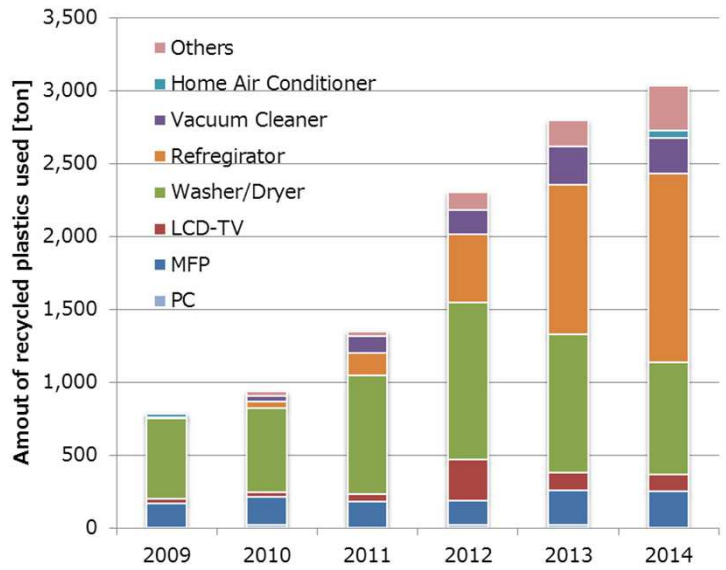
（３）弊社の家電リサイクルを中心とした資源循環の取組
Efficient use of recycled resource in Toshiba

①再生プラスチックの活用
Return plastics from old home appliance products to the new products

Item of "Green of products": Increase in the Use of Recycled Plastic

Increase in the number of newly employed products

Amount of Recycled Plastics Used



Example of products used recycled plastics

%: Ratio of recycled plastics

refrigerator **19.2%**

Washer/Dryer **22.3%**

Vacuum cleaner **24.4%**

Industrial AC **47.6%**

ventilating fan **66.9%**

LCD-TV

PC

MFP

POS

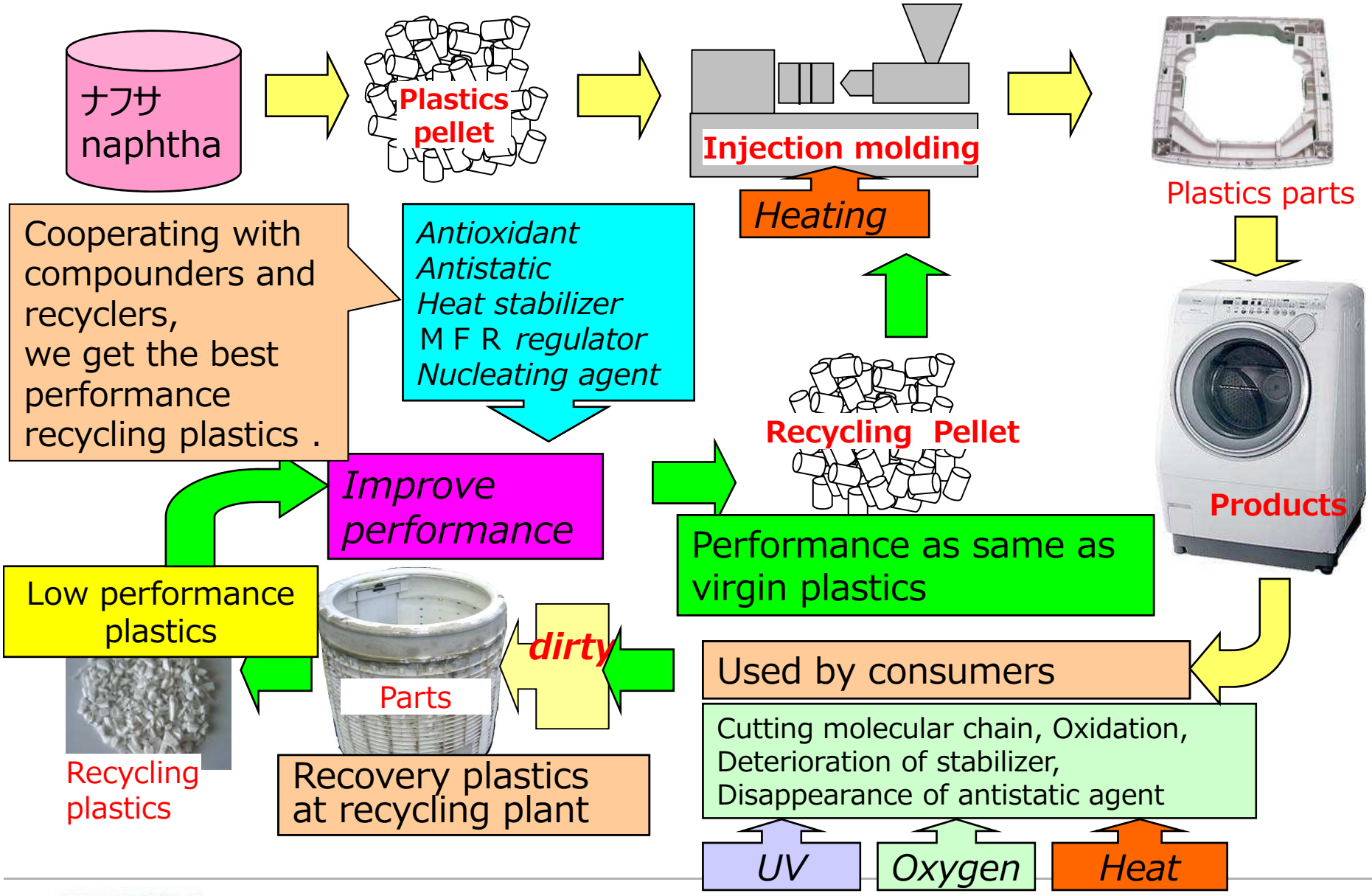
Industrial camera

Elevator

Strategies

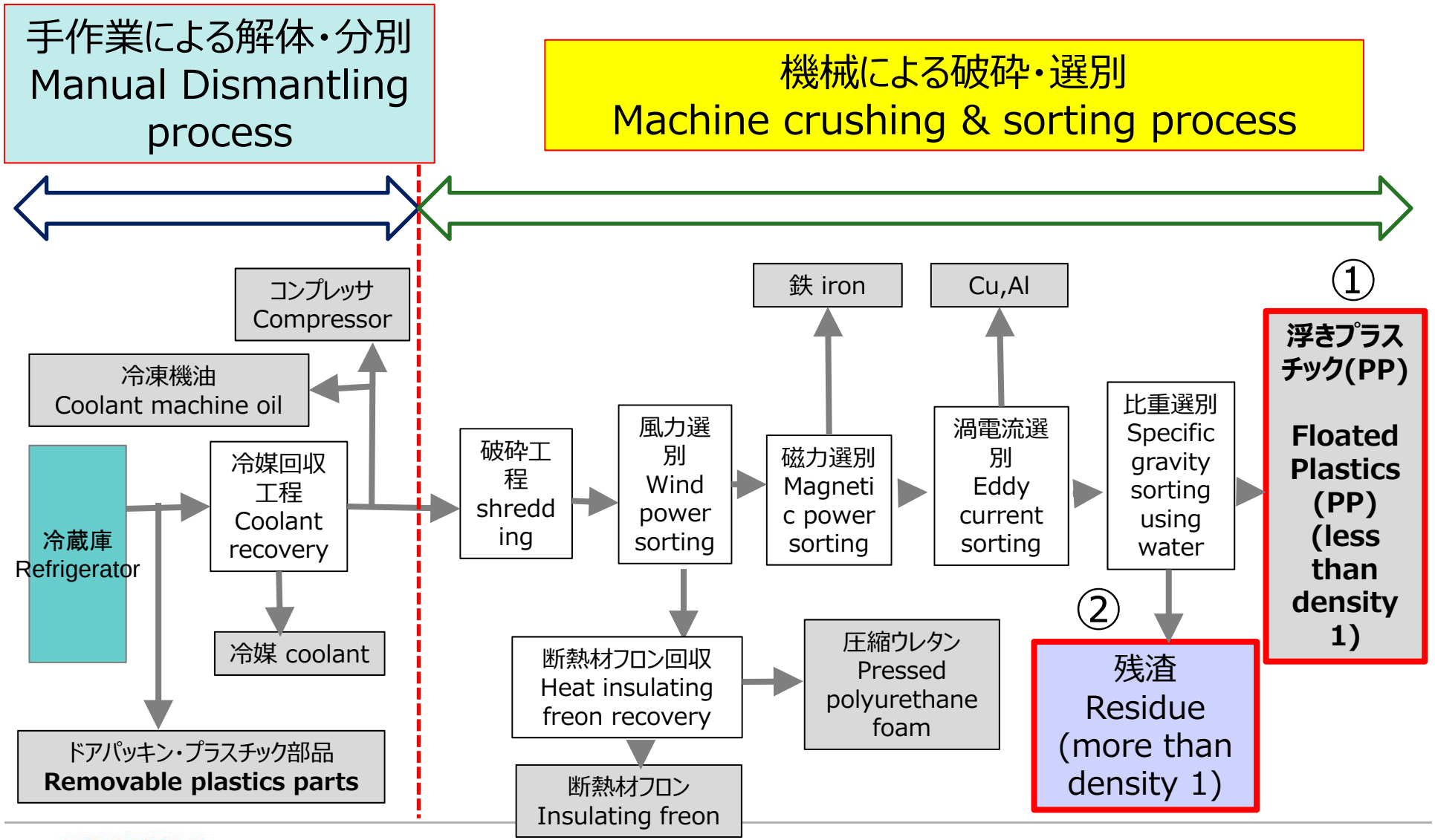
- Application of adoption examples of recycled plastics to other products.
- Study the use of recycled materials other than PPs.
- Enhance PR of models that employ recycled plastics.

リサイクル材の流れと物性の変化
Process to make Recycling plastics and change performance

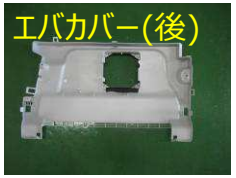
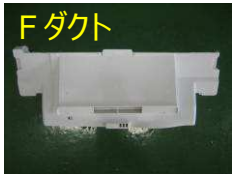
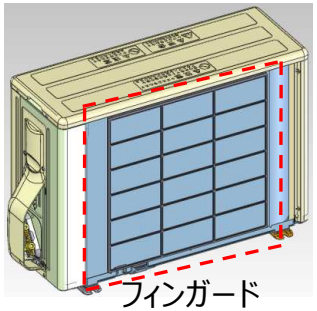


処理工程の一例（プラスチック選別工程を含むある冷蔵庫処理工程の一例）

Typical wasted products treatment (for refrigerator)& plastic sorting process



①Usage of floated plastics (PP=polypropylene)

Products	Applied parts（Examples）
Refrigerator 	 F天井板  エバカバー(後)  Fダクト  シェード固定具  PC板固定具  エバカバー(前)  内箱レール  Rﾊｳｼﾞﾝｸﾞｶﾊﾞｰ
WM 	 台板  溢水トラップ  循環継手  ホルダー  注水ケース  フィルターダクト
Cleaner 	 モータカバー（前）  モータカバー（上）  コードリールカバー  コードリール取付台 モータカバー（下）
Air conditioner 	 フィンガード Fin Guard

②残渣から取り出した再生ABS/PS材の東芝製品への活用

Separate recycling ABS/PS from Residue , apply Products of Toshiba

■ABS/PS selection process of NKRC

②残渣 Residue

重液比重選別
High density specific gravity sorting
(remove Metal.
Density: Over 1)

異物除去
(風力・ふるい選別機)
ウレタン等
軽量異物及び
ゴム類を除去
Wind power & vibration)

樹脂選別（近赤外センサー）
ミックスプラからABS/PS選別
Plastics selection by near IR Sensor Sorter
(Mix plastics ⇒ABS/PS)

X線選別
臭素系難燃プラの除去
X-ray sorter
Remove Br frame retardant Plastics.

RoHS guarantee

表面研磨
(表面研磨機)
表面異物の除去
Surface cleaning

Products

冷蔵庫 Refrigerator	全自動洗濯機 WM
 遮蔽板A ＣＳボックス に採用 	 ﾀｲﾏｰｹｰｽ1 に採用 

ABS/PC flake → Recycling Plastic manufacturer → Recycling Plastics pellet →

NKRC: Nishinihon Kaden Recycling Corporation⇒Recycling plant of Toshiba Group

②フッ酸リサイクルフッ酸リサイクルの取組
Recycling HF(hydrofluoric acid)

Separated Recovery of HF Waste Water in Yokkaichi Operations

Environmental Consideration *Management of Chemicals *Efficient use of Resources

Aim

*Reduction of chemical usage and amount of HF sludge generated
*Selling recovered valuable high concentration HF waste water

Measure

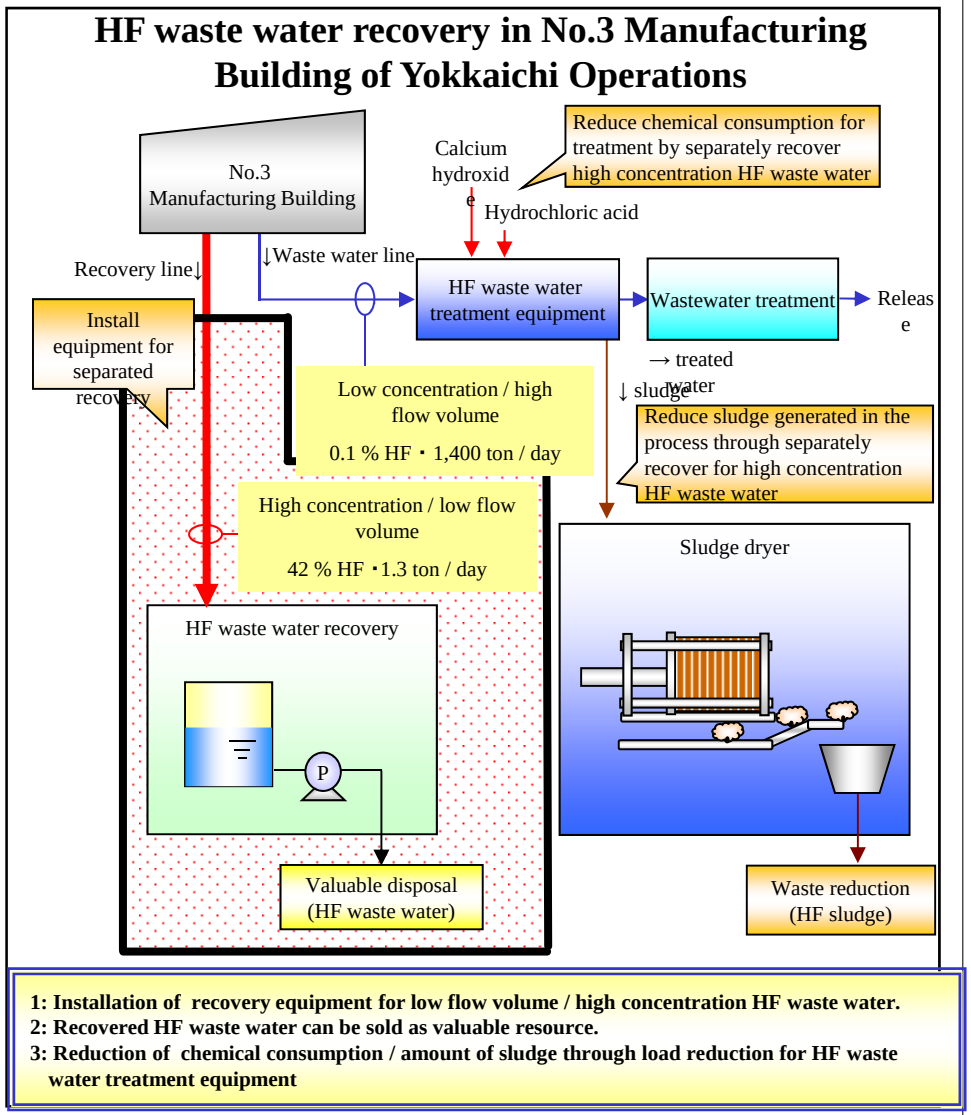
*Separately recovery of high concentration HF waste water
*Verify HF usage amount, waste water amount, cost reduction effect, etc.
*Select manufacturing machine that release valuable HF waste water by checking concentration.

Effect

- Reduction of chemical consumption :
  Hydrochloric acid 875 ton/Y
  Calcium hydroxide 765 ton/Y
- Reduction of waste generated:
  HF sludge 770 ton /Y
- Valuable waste water :
  HF high concentration waste water:475 ton/Y
- Amount of monetary effect :
  Total ¥ 77 million/Y

Section

Facility Engineering & Operations Dept., Toshiba Corporation Yokkaichi Operations



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