

# **Top Runner Approach for home appliances and equipment in Japan**

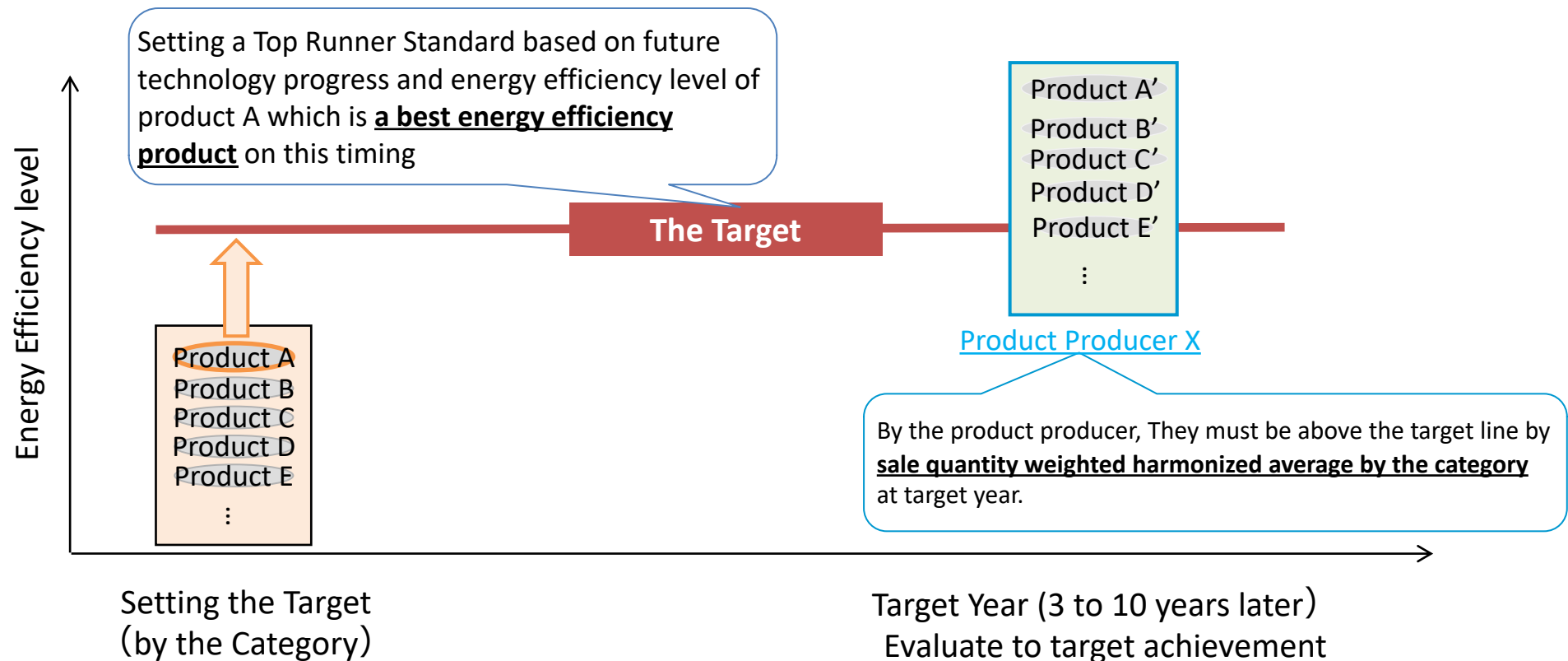
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**on behalf of Energy Conservation division, Agency for  
Natural Resources and Energy (ANRE)**

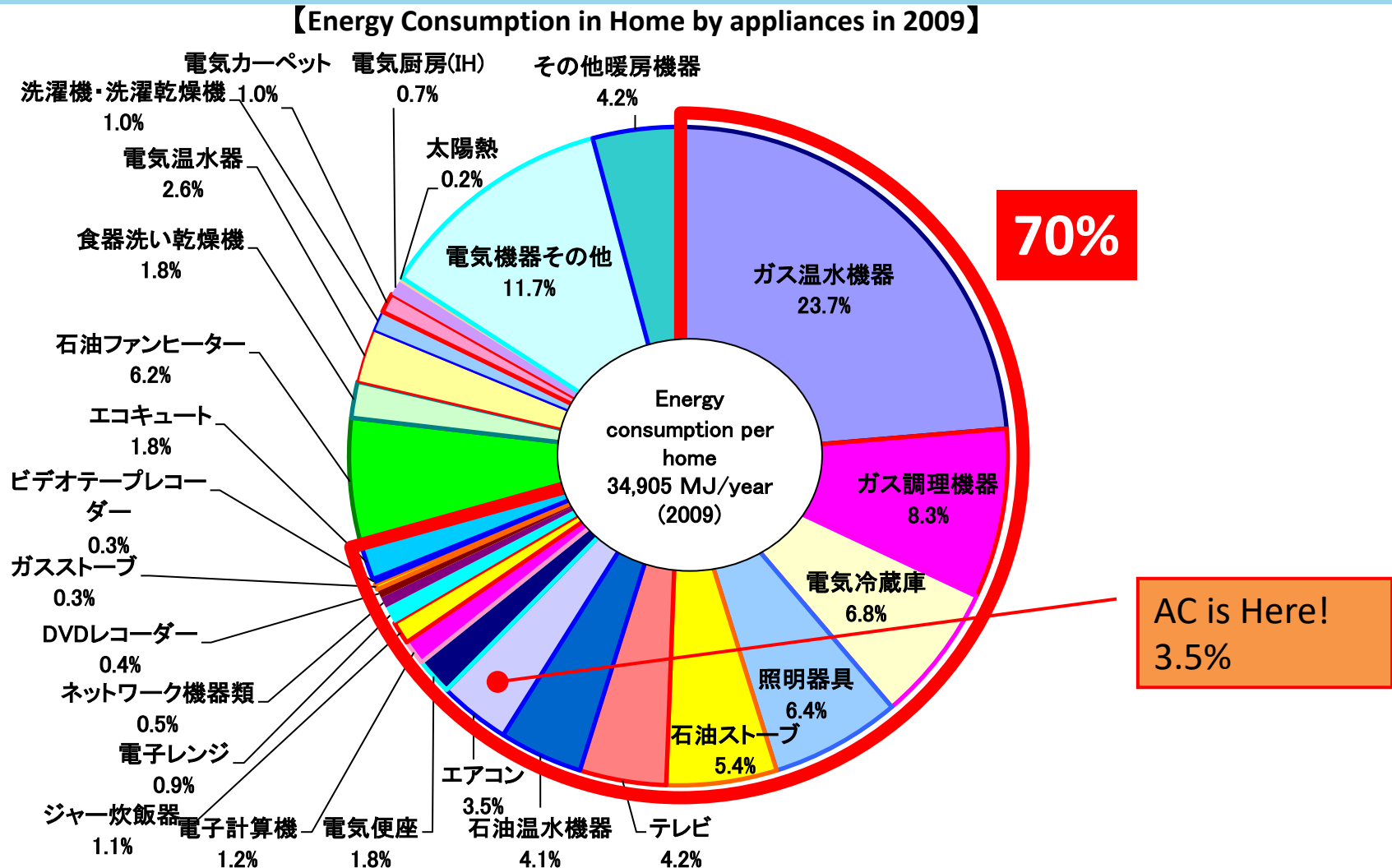
# 1-1. Outline of Top Runner Approach

- In 1998, Government of Japan decided to introduced energy efficiency standard by **Top Runner Approach** for home appliances and Vehicle on the revised Energy conservation law
- Now, this energy efficiency standard are expanding to **32 products** include building materials such as insulation, window which are designated to energy consumption equipment/appliance by the law.
- IF product producer can not achieve the target, And they have to energy efficiency improvement to achieve the target, Government can be take an action for **recommendation, announcement, an order, and penalty (up to million JPY)**.



## 1-2. Top Runner Program for home appliances

- The Top Runner energy efficiency standard products are covered to 70% home energy consumption.



※1. 資源エネルギー庁平成21年度民生部門エネルギー消費実態調査(有効回答10,040件)及び機器の使用に関する補足調査(1,448件)より日本エネルギー経済研究所が試算(注:エアコンは2009年の冷夏・暖冬の影響を含む)。

※2. 本調査では各エネルギー源ともに「MJ」ベースに統一して熱量換算した上で集計・分析を実施。電力は2次換算値。

## 2-1. APF for Air Conditioner

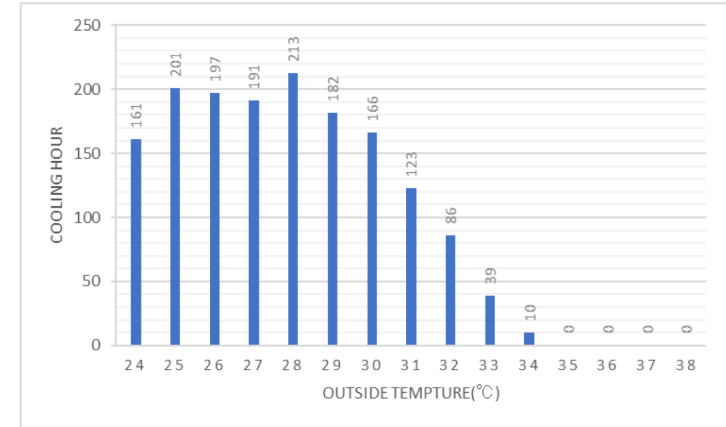
- AC energy efficiency standard defined by the Annual Performance Factor since 2006.

- APF shows cooling/heating capacity (kW) per 1 kW of power consumption.
- JIS C 9612:2005
- Calculation methods matching the Japanese lifestyle and local environment.

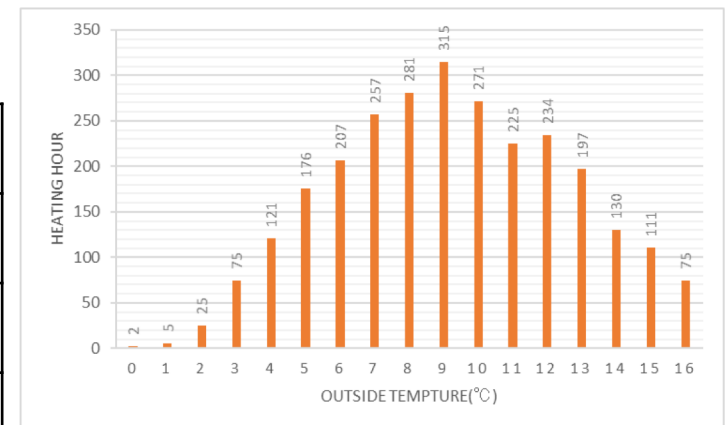
APF = f ( cooling rated COP, cooling half COP,  
heating rated COP, heating half COP,  
heating low-temperature COP,  
duration of outside air temperature )

Standards for calculating duration of outside air temperature (Japan)

Outside air temperature	Japan/Tokyo Meteorological data		Preset temperature	27°C for cooling/20°C for heating
Duration	Cooling	3.6 months June 2 – Sept. 21	Operating hours	18 hours, 6:00 – 24:00
	Heating	5.5 months Oct. 28 – Apr. 14	Type of house	Average wooden house (facing south)
			Room space	Room space matching each machine



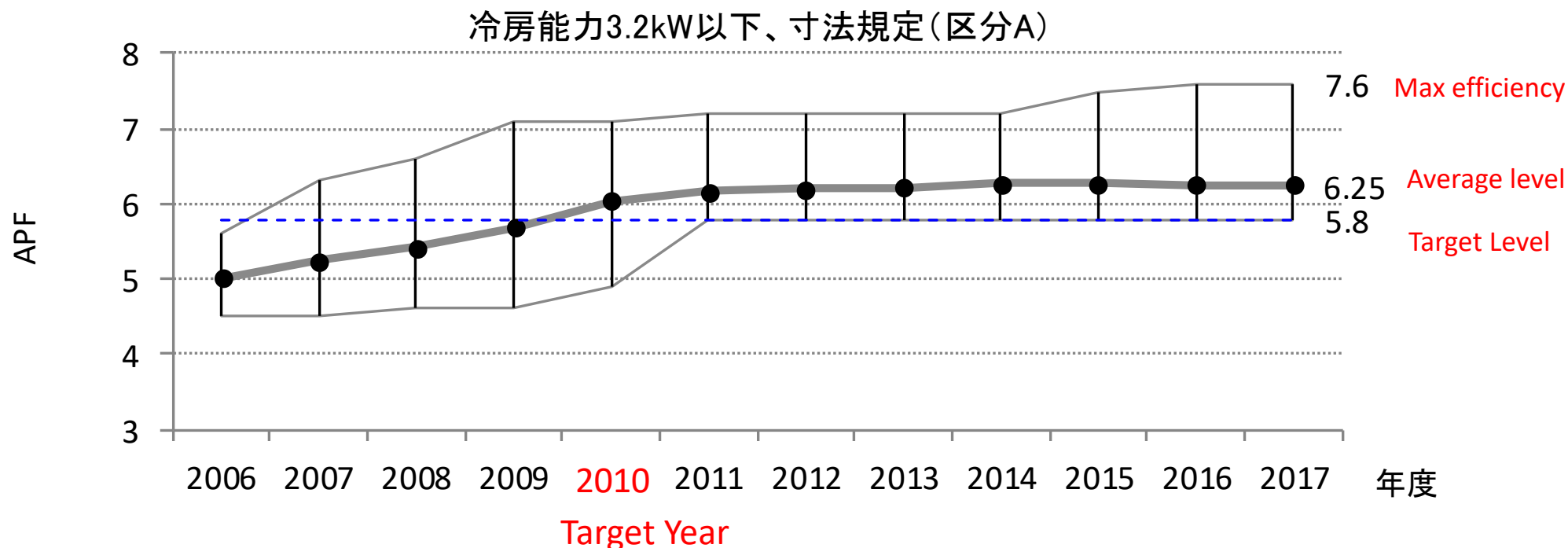
Cooling Hour = 1569 hours



Heating Hour = 2707 hours

## 2-2. target level and achievement of energy efficiency level

- By the energy efficiency product catalogue, room AC (under cooling capacity 3.2 kW on category A) energy efficiency level has been improve year by year.
- After target year as 2010, all of room AC energy efficiency level is achieve the target level, also those products are keep a level.



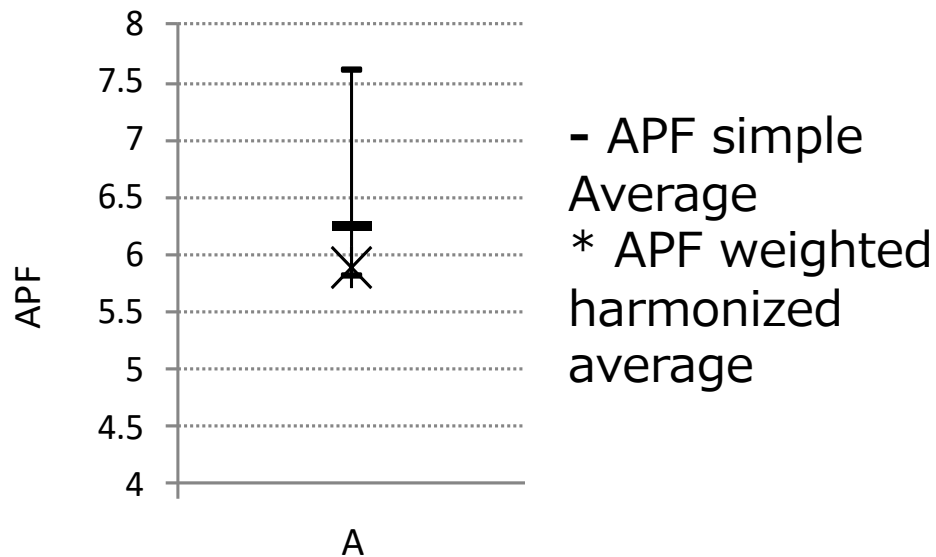
Source: energy efficiency product catalogue

([https://www.enecho.meti.go.jp/category/saving\\_and\\_new/saving/media/index.html](https://www.enecho.meti.go.jp/category/saving_and_new/saving/media/index.html))

And energy efficiency product information (<https://seihinjyoho.go.jp/index.html>)

## 2-2. Compare to average APF in 2017

- A level of weighted harmonized average APF was lower than simple average of APF.
- This means that there are high APF products in the market, however, a share of lower APF AC products is high proportion of product sales by the product producers.



category		A
2017	Max APF	7.6
	Min APF	5.8
	APF simple average	6.25
	APF weighted harmonized average	5.89
Target level		5.8

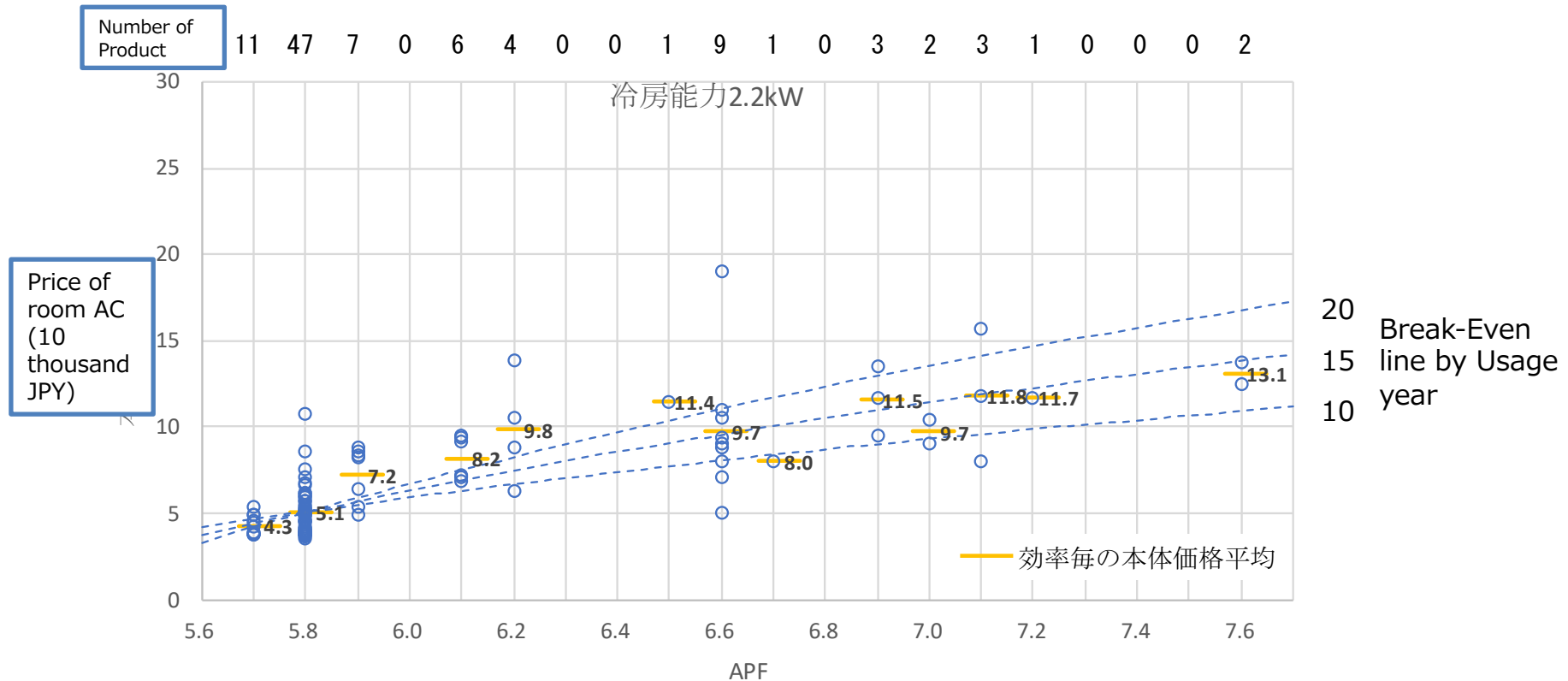
## 2-3. Example calculation of room AC energy consumption and economic feasibility

- Room AC: 2.2 kW (most usual room AC capacity in Japan)

APF 5.8 : 913 kWh ( 24,654 JPY) (same as target level product)

APF 7.6 : 697 kWh ( 18,815 JPY) (most efficient product)

difference : ▲216kWh ( ▲5,839 JPY)



※ 価格.com、エアコンスペック検索において、壁掛けで冷暖房、売れ筋ランキング上位600件を抽出。2018/9/27実施。

なお、機種ごとの市場価格は複数店舗の販売価格から最も安い価格を抽出している。また、一年以上前の型落ち品なども含まれるため、実際の市場価格よりも安いと考えられる。

図中点線は使用年数を10/15/20年、電気代を27円/kWh、買い替えに伴う工事費はゼロ、運転時間をJIS想定とした際に、現行TR基準値5.8の平均本体価格に対して投資回収できるライン。

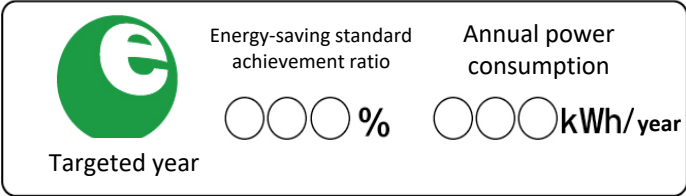
なお、家庭用エアコンの平均使用年数の調査結果は13.5年。(内閣府「消費動向調査」より)

### 3. Public awareness thought Energy saving Label for retailer

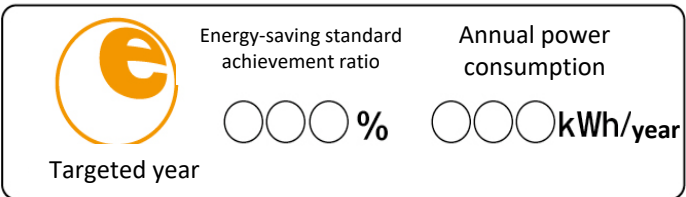
- **「Energy Saving Label」** : This energy saving label show the target year, energy-saving standard achievement ratio, annual power consumption. Also green mean that product achieve the target, orange mean that not achieve.
- **「Unified Energy-Saving Label」** : This label show the relative energy-saving performance of marketed appliances by numbers of stars. 5 star is most efficient product. Also, show with a yearly electricity bill by the standard usage patterns to consider to buy. By this label, Consumers can be recognize and compare to energy efficiency performance for each products by the multistep assessment system. This label attached with Room AC, TV, Electric refrigerator, Electric freezer, Electric toilet seat, Lighting appliance.
- **「Simplified Energy Saving Label」** : This label show the Energy Saving label and electricity bill.

#### Example of Energy Saving label

product achieve the target



product not achieve the target



#### Example of unified energy-saving label





## 4. House Insulation standard

- Energy efficiency standard for house insulation has been strengthening, thus the share of newly housing are increasing in the housing stock.
- It is important things that government/consumer/housing constructor must be consider to select a room ac based on housing insulation improvement by the standard.

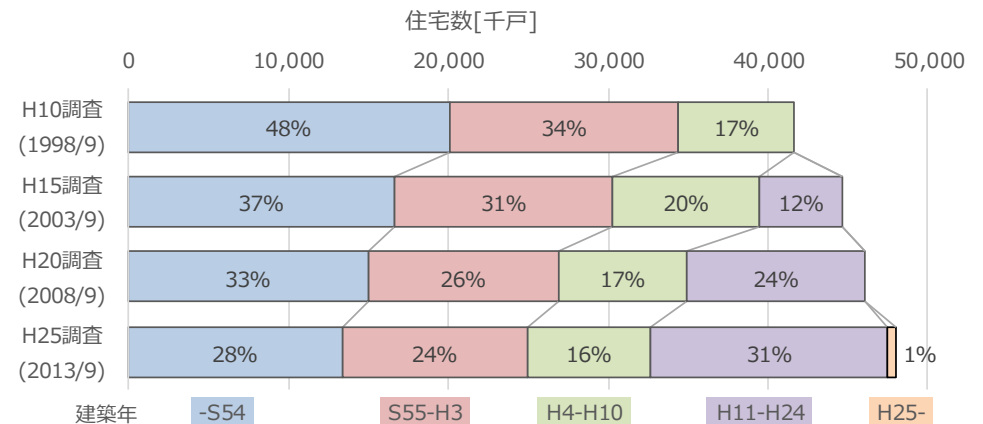
House Insulation Energy Efficiency Standard

(Tokyo Area)

Base Year	Insulation Standard
昭和55年基準 (1980)	Q Value $\leq 5.2\text{W/m}^2\text{K}$
平成4年基準 (1992)	Q Value $\leq 4.2\text{W/m}^2\text{K}$
平成11年基準 (1999)	Q Value $\leq 2.7\text{W/m}^2\text{K}$
平成25年基準 (2013)	$U_A$ Value $\leq 0.87\text{W/m}^2\text{K}$

熱損失係数：Q値 $[\text{W/m}^2\text{K}] = (\text{建物全体の熱損失量}[\text{W/K}]) \div (\text{床面積}[\text{m}^2])$   
 外皮平均熱貫流率： $U_A$ 値 $[\text{W/m}^2\text{K}] = (\text{建物全体の熱損失量}[\text{W/K}]) \div (\text{外皮面積}[\text{m}^2])$   
 出所)「エネルギーの使用の合理化に関する建築主等及び特定建築物の所有者の判断の基準」

Housing stock by vintage



出所) 住宅・土地統計調査より作成

**Thank you for your attention!  
Questions?**

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