

Clean Air for Everyone

-a better environment for the future-

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The Offensive Odor Control Law in Japan

-Aim to preserve the living environment of residents and to contribute to the protection of the health of the people,
Established in 1971, independent of the Air Pollution Control Law

-Restrictions on plants and business establishments that generate malodor

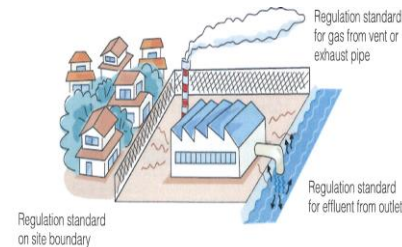
as business activities

-Regulatory standards:

① Regulation by specific malodorous substances

② Regulation by Odor Index

*Odor index = $10 \times \text{Log}(\text{odor concentration})$



3 types of odor emissions from factories and workshops

-Penalty: There are penalty provisions in case of violating regulatory standards

In Asia, odor concentration control already exists in Shanghai, South Korea.

The Offensive Odor Control Law in Japan

EX) Regulation criteria on offensive odors in Tokyo

東京都における悪臭に関する規制基準

◇◇ 東京都では臭気指数規制による悪臭規制を行っています。 ◇◇

悪臭防止法に基づく規制

対象地域
島しょ地域を除く都内全域

対象
工場・事業場（事業活動を営むものすべて。ただし、建築作業は、適用外。）

適用範囲
その不快な臭いにより住民の生活環境が損なわれていると認めるとき（周辺住民からの苦情が発生しているとき）

規制基準
右表のとおり

表 悪臭防止法及び環境確保条例の規定に基づく規制基準

規制場所の区分	敷地境界線	煙突等気体排出口				排 出 水	
		排出口の実高さが 15m 未満		排出口の実高さが 15m 以上			
		排出口の口径が 0.6m 未満	排出口の口径が 0.6m 以上 0.9m 未満	排出口の実高さが周辺最大建物高さの 2.5 倍未満	排出口の実高さが周辺最大建物高さの 2.5 倍以上		
第一種区域	臭気指数 10	臭気指数 31	臭気指数 25	臭気指数 22	$q_t = 275 \times H_o^2$	$q_t = 357 / F_{max}$	臭気指数 26
第二種区域	臭気指数 12	臭気指数 33	臭気指数 27	臭気指数 24	$q_t = 436 \times H_o^2$	$q_t = 566 / F_{max}$	臭気指数 28
第三種区域	臭気指数 13	臭気指数 35	臭気指数 30	臭気指数 27	$q_t = 549 \times H_o^2$	$q_t = 712 / F_{max}$	臭気指数 29

環境確保条例に基づく規制

(都民の健康と安全を確保する環境に関する条例)

対象地域
都内全域（島しょ地域を含む。）

対象
工場・指定作業場（環境確保条例で指定された業種）

適用範囲
工場の設置認可・変更認可
指定作業場の設置届・変更届
の際の審査時
(ただし、島しょ地域については、
苦情が発生している場合にも適用)

規制基準
左表のとおり

Location : Commercial district

Hight of exhaust pipe: less 15m

Regulation

Site boundary : odor index less 12

Exhaust pipe : odor index less 24

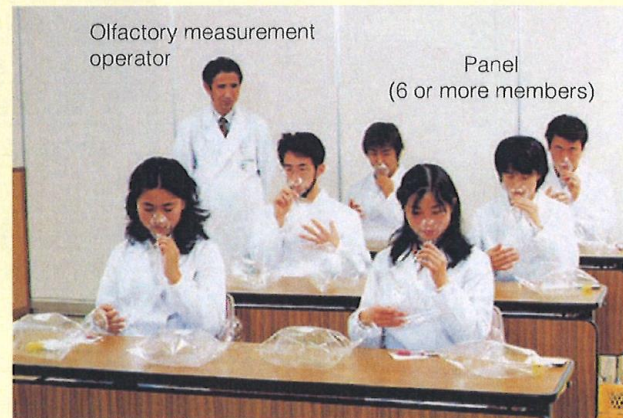
The Offensive Odor Control Law in Japan

Measurement

How to measure the odor index?

Olfactory measurement is used to determine the odor index. The officially adopted method in Japan is the "Triangular Odor Bag Method". In this method, 6 or more members of the panel are given a set of 3 bags; 1 with a sample in it and 2 with odor-free air and asked to choose the odorous bag. The odor is then gradually diluted and the test is continued until it becomes impossible to identify the bag with odor. The odor index is calculated by the dilution rate at which the panel can no longer tell the correct bag.

Scene of olfactory measurement



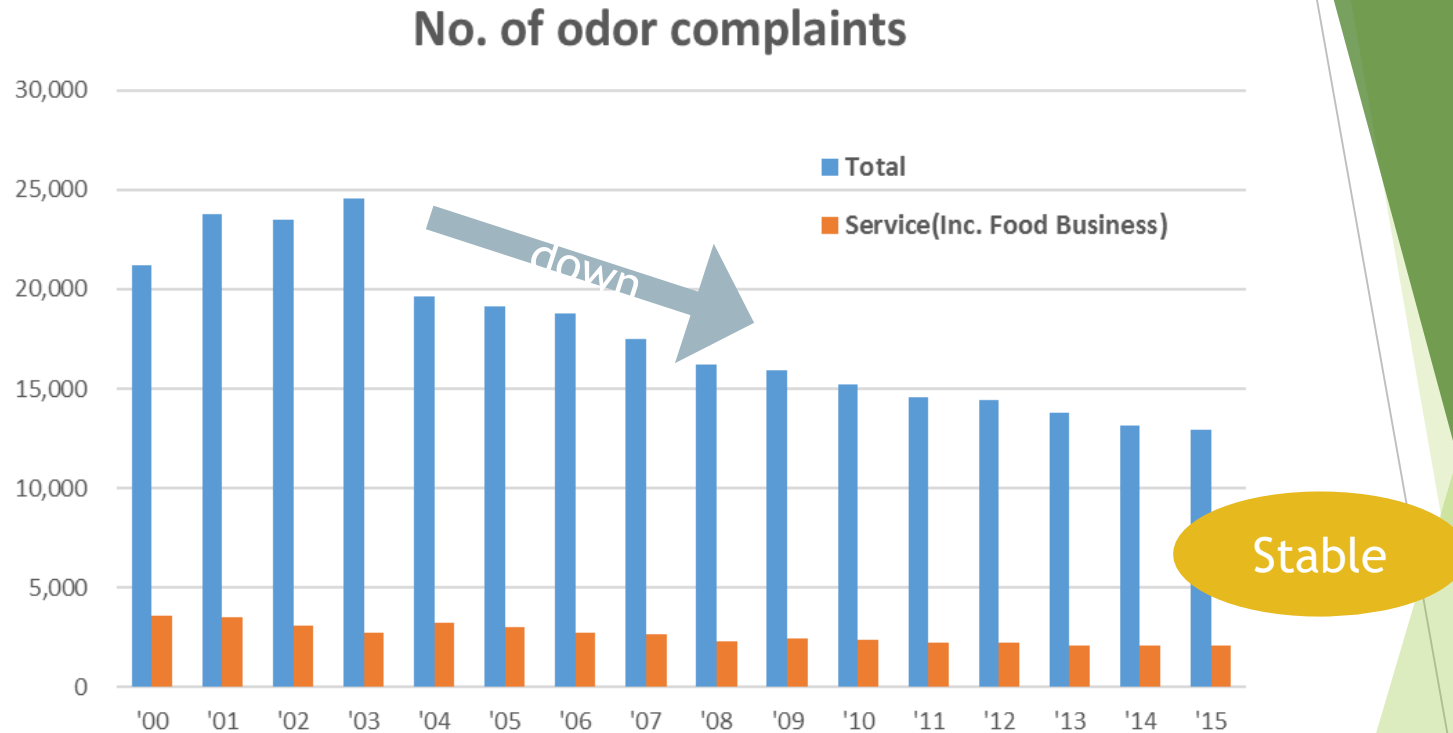
※ For liquid samples, flasks are used instead of bags.

Measurement can also be commissioned to certified corporations or persons such as an Olfactory Measurement Operator



Toyo Kokyo has two odor judges (national qualifications)

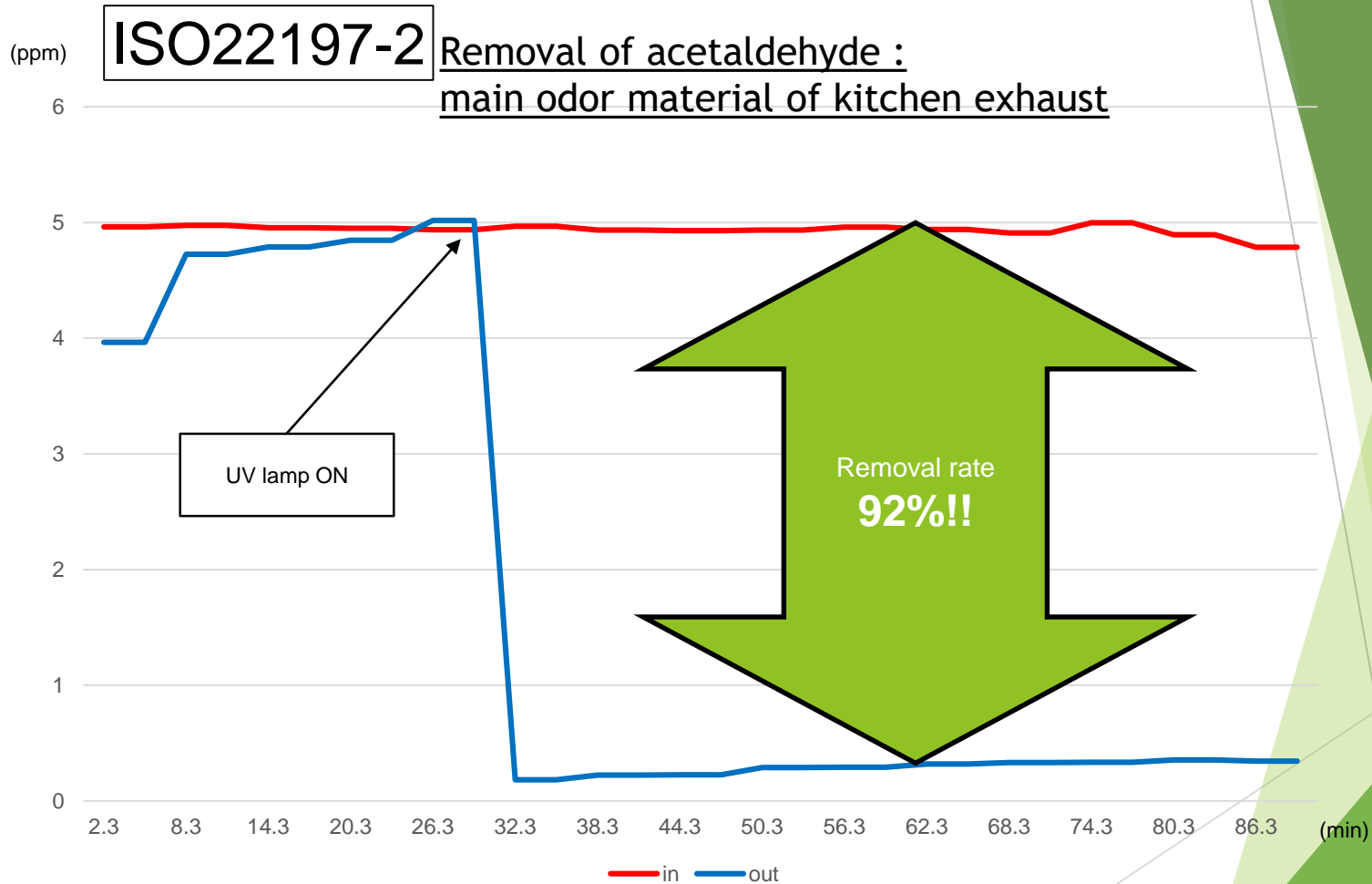
Odor problems in Japan



Why stable in Service category?

- ▶ As more areas become urbanized, more commercial facilities are being built near residential areas.
- ▶ Now, more communities are demanding action on offensive odors especially kitchen exhaust from food service industries.

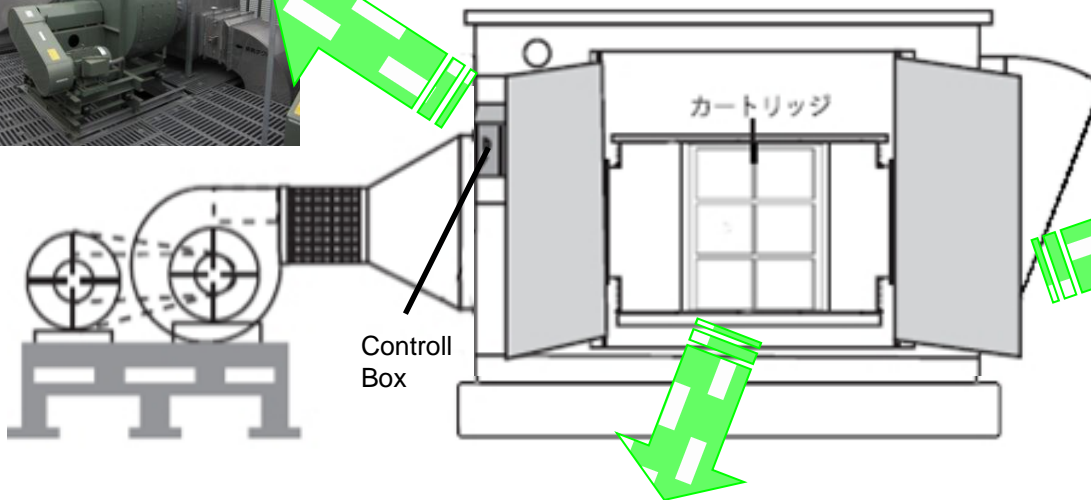
Evaluation of Our Filter



Fine ceramics -Test method for air-purification performance of semiconducting photocatalytic materials

Toyokosho Main Products

For Kitchen Exhaust for restaurants and food service etc.

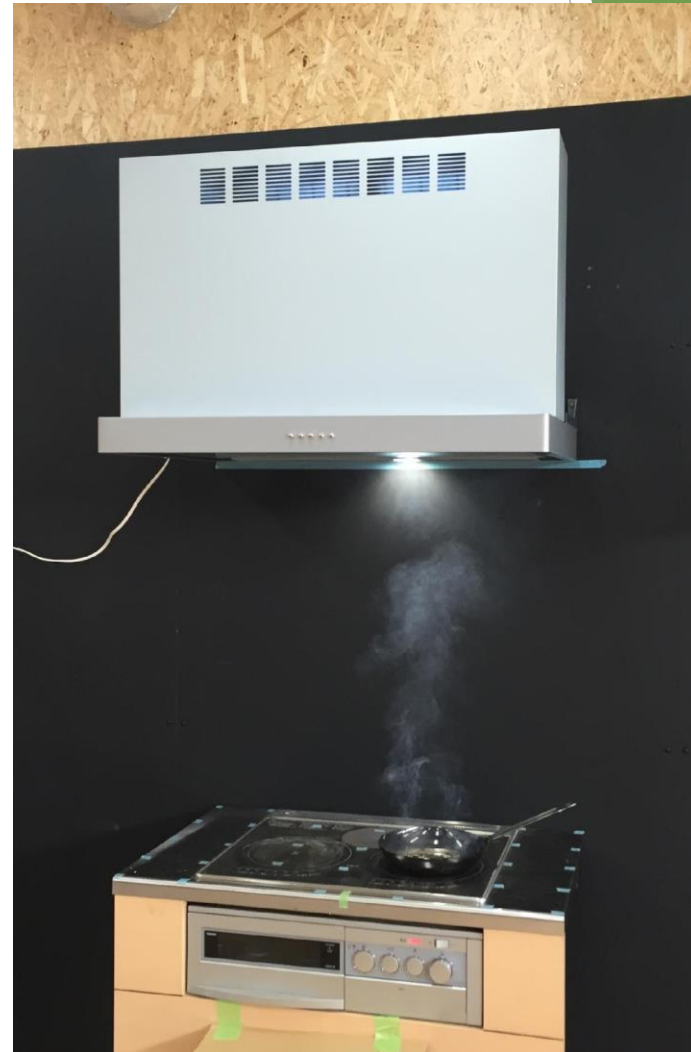


Toyokosho Other Products

Built in Rangehoods

For

- ▶ Convenience stores
- ▶ Kitchen in Condominium



Toyokosho Customers

[Factory]



Osaka

"O Pharmaceutical
Co., Ltd."

[Hospital]



Tochigi

"Kōtsuga Hospital"

[Hotel]



Kyoto

"The · R · Carlton
Kyoto"

[Cultural facilities]



Kanagawa

"F-F-F Museum"

Toyokosho Customers

[Research Centre]



Shizuoka
"K^H Kirin"

[Supermarket]



Shimane
"A Izumo"

[Central Kitchen]



Saitama
"N school central
kitchen"

[School]



Kagoshima
"K University
Ward"

Toyokosho Customers

[Shopping Mall]



Kanagawa
"LL Port Hiratsuka"

[Urban Development]



Kanagawa
"S-Kawasaki Square"

[Condo/Apartment]



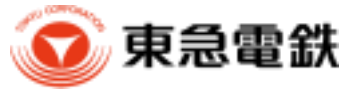
Kanagawa
"P House Yokohama
Shinkoyasu Garden"

[Office Building]



Tokyo
"O-Saki Bright
Tower"

Toyokosho Partners



人を、想う力。街を、想う力。



Today's Work, Tomorrow's Heritage



For a Lively World



Easy maintenance



Cleaning of grease filter (2/Year)

Inversion of photocatalytic filter (1/Year)

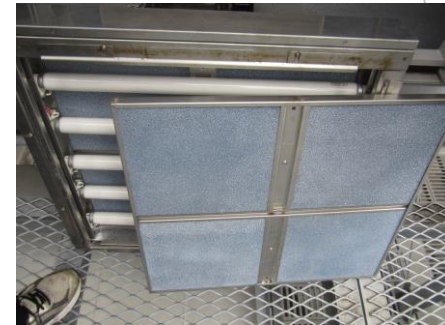
Change UV lamp (1/Year)



Photocatalyst cartridge



Removal of grease filter



Removal of photocatalytic filter



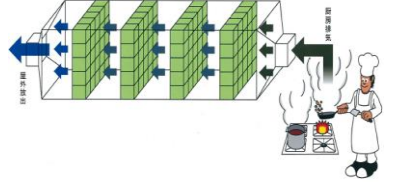
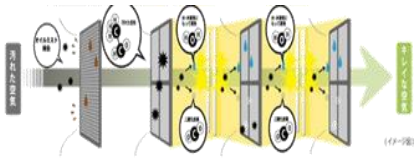
Removal of UV lamp



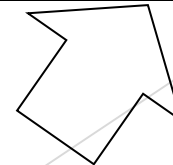
Set of UV lamp



Comparison with adsorption method: 5 years maintenance cost

Air Volume: 450m ³ /min		
	Other	Toyokosho
Method	Adsorption system	Photocatalyst system
Deodorization image		
Deodorization	Adsorption / desorption of odor components	Odor decomposition of odor components
Passage surface wind speed	~4.0m/sec	1.5m~2m/sec
Total filter pressure	300pa	120~150pa
Deodorization efficiency	68~95%(Company data)	Max95%(Third-party)
Lifetime of deodorant material	5~10 years(valuable upto usage)	Semi-permanent (if not damaged)
Possibility of regeneration of deodorant material	No	Yes
initial cost	28,000k JPY/unit	16,100k JPY/unit
Detail of Maintenance	(I)Regular check of filter(every 5 years) 36k JPY/Year	(I)Cleaning of grease filter (2/Year) 70k JPY/Year
	(II)Change filter (2 block every 5 years) 720k JPY/Year	(II)Inversion of photocatalytic filter (1/Year) 39K JPY/Year
	(III)Operation Cost of change filter (every 5 years) 30k JPY/Year	(III)Change UV Lump (12h/day) 40k JPY/every year
	(I)+(II)+(III)= 786k JPY/Year	(IV) Electricity (12h/day/365) 126k JPY/Year
5 years maintenance cost	3,930k JPY/5Years	1,375k JPY/5Years

65% DOWN



Comparison with adsorption method: CO2 emission

Air volume: 630 m³ / min

	Adsorption system	PCF	+/-
Initial pressure loss	300Pa	120Pa	180Pa
Shaft power (35% efficiency)	8.74kW	3.48kW	5.26kW
Power consumption (Operating time: 12 h / day, 365 d / year, UV lamp included)	38,281kW	29,258kW	9,023kW
Used electricity charge (15 yen / kWh / year)	¥574,218	¥438,870	¥135,348
CO2 emissions (years) *	12,977kg	9,918kg	3,059kg

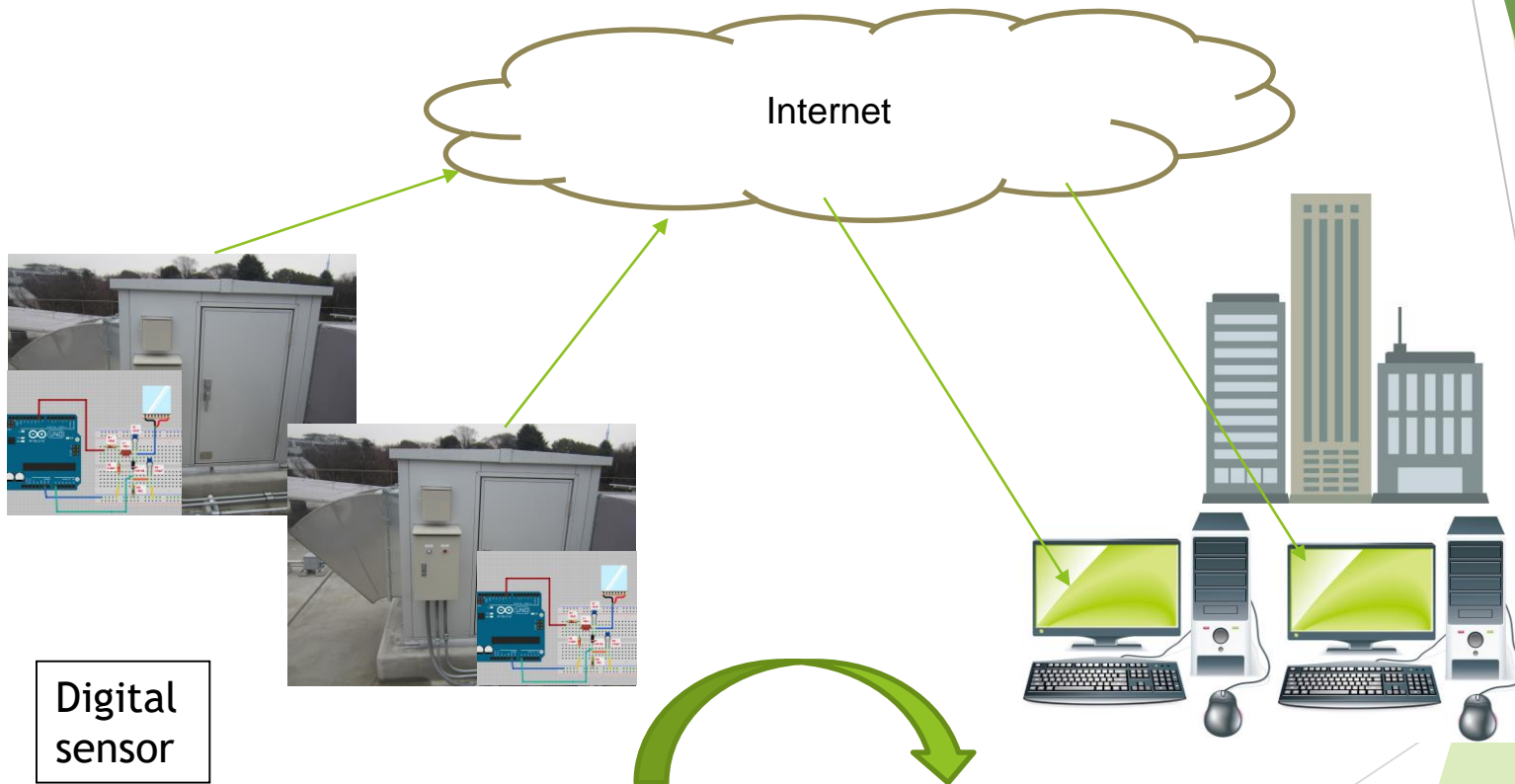
※ CO2 emission factor: 0.339 kg / kWh (TEPCO example)

25% DOWN



Remote monitoring system(Plan)

(IoT solution: under processing to get intellectual right of business model)



Digital sensor

Usage of electric power
Differential pressure of filter
Level of odor

Monthly fee of usage
Timing of maintenance
Control of equipment

We ask your advice!

1. Could this technology be relevant outside Japan?
2. Who should ToyoKosho contact to discuss distribution, installation and partnership?

The Toyokosho Story

- ▶ Founded in 1988
- ▶ Toyokosho has around 20 years of experience in making air quality and purification systems. That makes us one of the top manufacturer & sellers of Photocatalytic air purification systems specialized for industrial exhaust.
- ▶ Shopping malls, schools, laboratories, resort hotels, processing food plants, and school lunch centers use our products. (More than **360** units sold in **170** different entities)
- ▶ Trade mark, several Patent were registered.
- ▶ Toyokosho got the Prize of the Environmental equipment awards in 2010.

Certification



Award



Corporate information

Corporate name	Toyokosho Co., Ltd.
Headquarters	2-60-10, Hamacho Park Building 2F, Hamacho, Nihonbashi, Chuo-ku, Tokyo 103-0007 Japan
Phone	+81 3-3662-5644
FAX	+81 3-3662-6339
CEO	Hiromi Ikuta
What we do	<p>For around 30 years of experience in researching and developing, designing, constructing and selling our product PCF® - photocatalytic air purification make us one of the market leaders in our line of business.</p> <p>Drawing on our extensive experience, scientific knowledge and engineering expertise, we consult and offer the right solutions to control odours.</p> <p>Besides PCF®, we also offer ion-cluster air purification and eco-detergent for our future environment as well as we offer performing measurement odour by licenced operators in accordance with The Offensive Odour Control Law.</p>
Capital	10,000,000 yen