Clean Air for Everyone

-Better environment for our future-

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Attractiveness of Southeast Asian Market

Fifty years have passed since the birth of the Association of Southeast Asian Nations (ASEAN) in 1967. In the future, countries in the region agree in that they aim to establish the Southeast Asian countries (ASEAN + 3 economic integration). "Local public goods" that ASEAN Southeast Asia should cooperate with in the future

① Reduction of income disparity
② Training of small and medium enterprises venture
③ Development of social infrastructure
④ Strengthen financial system, foster bond market
⑤ Maintaining and improving the global environment (food, water, air)
⑥ Other

Attractiveness of Southeast Asian Market

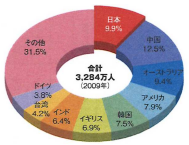
Relationship between Japan and ASEAN

Growth market Southeast Asia

Total population 600 million
Economic growth of 5.6% per annum
Intra-regional free trade
Many parents' countries

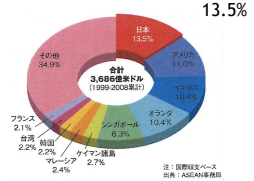
Tourism:
More than 3.2 million Japanese people visit ASEAN annually.

9.9%



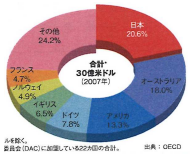
Trade and investment:
Japan and ASEAN need to be a partner

13.5%



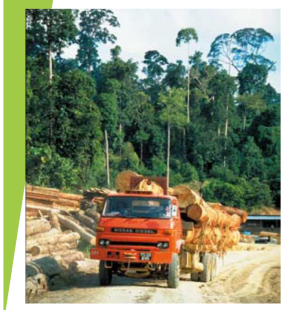
ODA:
For ASEAN Japan, an important ODA support country

20.6%



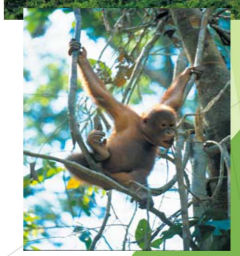
Environmental problems held by ASEAN

Logging trees for export,
Tropical forest disappearing for agricultural development



The mangrove forest will be destroyed when the shrimp farming grows

Living creatures on the planet, protect tropical rainforests where about half of species live



Trend on Maintaining and Improving the Global Environment (Food, Water, Air)

① About food
In many shopping centers, the proportion of eating and drinking space is expected to increase from the present 8% to about 20% by 2025. (Forbes Japan 2017 / July 6 article)
⇒ Expansion of the trade area

② About water
Intensified conflict of interest on securing water sources
⇒ Protection of water resources

③ About air
Request for countermeasure technology (deodorization system) for odor generation in Shanghai city eating and drinking establishment
⇒
① Low cost of deodorizing system with high profitability
② The judgment criteria that are simple are clear
③ Easy to implement Easy to understand and easy to use
④ Easy to apply to the creation of new technologies with progress

Chinese inspection group tour of Toyokosho's equipment

1 Purpose
Acceptance training for China exhaust gas measurement and processing technology dissemination / standardization support project (abbreviated as ENCAE)

2 Implementation date 2017 is Wednesday, February 14 (Tuesday)

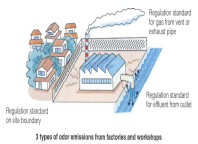
3 Visitors
East China University of Science and Technology 2
Shanghai Municipal Environmental Monitoring Center 3
Shanghai Municipal Environment Protection Bureau 2
Shanghai Chemical Environmental Protection Monitoring Station 3

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 × Log (odor concentration)



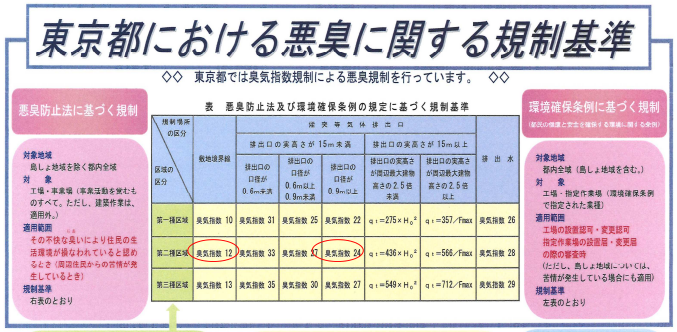
3 types of odor emissions from factories and workshops

-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

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

規制地域の区分 / 区域の区分	敷地境界線	排出口の実高さが15m未満			排出口の実高さが15m以上		排出水
		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	排出口の口径が0.9m以上	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	$q_1=275\times H_e^2$	$q_1=357/Fmax$	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	$q_1=436\times H_e^2$	$q_1=566/Fmax$	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	$q_1=549\times H_e^2$	$q_1=712/Fmax$	臭気指数 29

環境確保条例に基づく規制

Location :Commercial district
Hight of exhaust pipe: less 15m
Regulation
Site boundary : odor index less 12
Exhaust pipe : odor index less 24

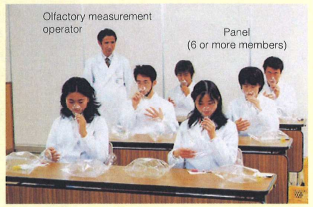
The Offensive Odor Control Law in Japan

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

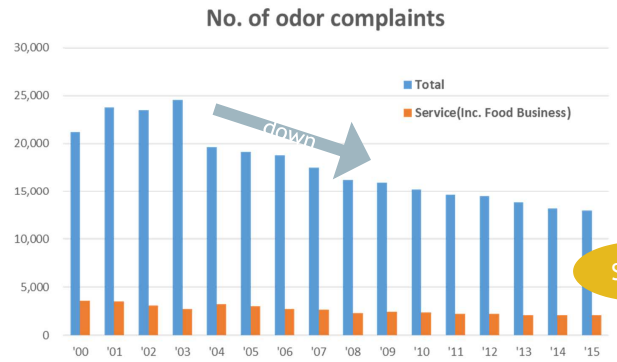


※ For liquid samples, flasks are used instead of bags.

Measurmnt can also be commissioned to certifcated corporations or persons such as an Olfactory Measurment Operator

Toyokosho has two odor judges (national qualifications)

Odor problems in Japan



Why stable in Service category?

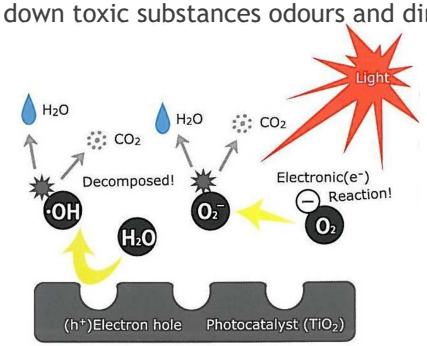
- As more areas become urbanized, more commercial facilities are being built near residential areas.
- Now, more communities are demanding action on offensive odors especially kitchen exhaust from food service industries.

Solution: Photocatalytic Air Purification ~PCF®~

What is photocatalyst?

Discovered in Japan!!

- It's a material that activates its oxidizing power when light is shone on it. Once it's on, it breaks down toxic substances odours and dirt.

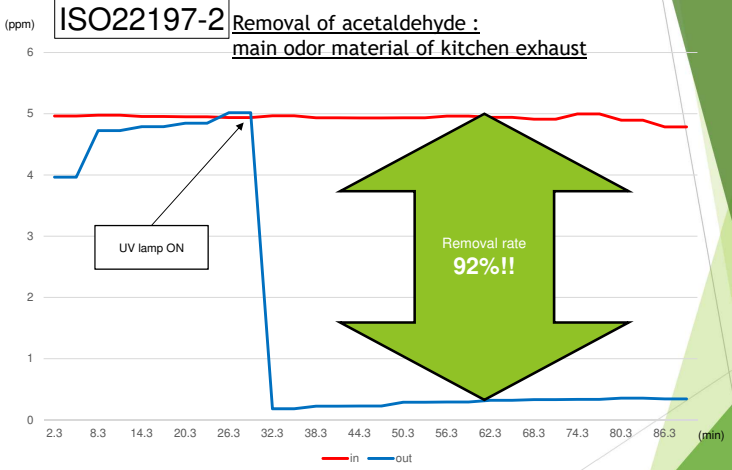


【5 Utilization】

- Deodorization
- NOx Decomposition
- Anti-Bacteria
- Dirtiness Prevention
- Water-Treatment

Evaluation of Our Filter

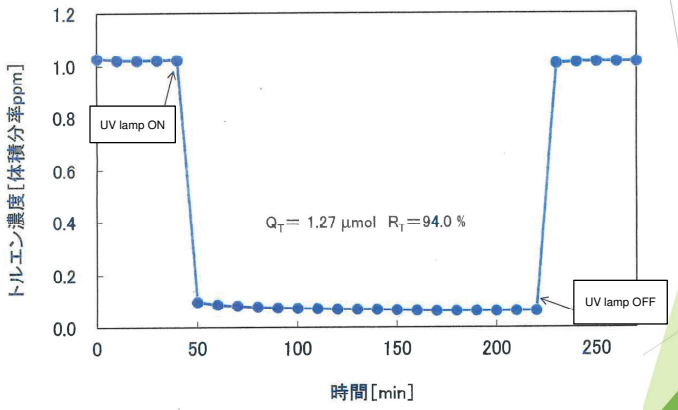
ISO22197-2 Removal of acetaldehyde : main odor material of kitchen exhaust



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

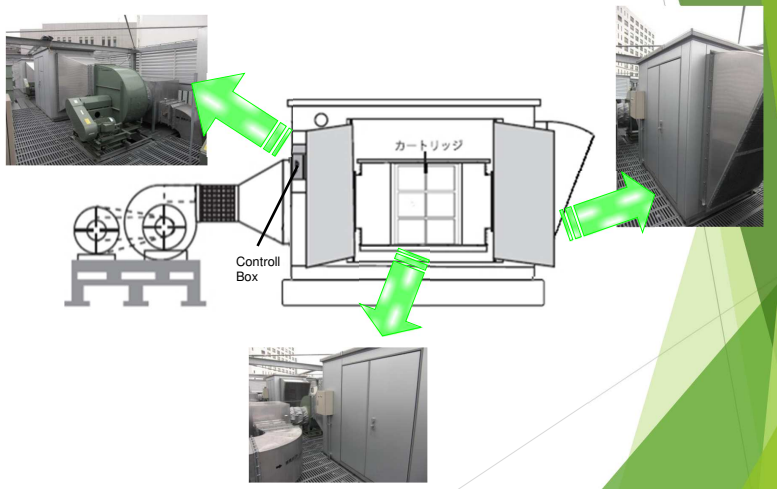
ISO22197-3

Removal of toluene



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
"K□tsuga 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

都市に豊かさと潤いを
三井不動産

東急電鉄

Hankyu 阪急電鉄

人を、想う力。街を、想う力。
三菱地所

株式会社セブン&アイHLDGS.

AEON

Coca-Cola

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Today's Work, Tomorrow's Heritage
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想いをかたちに 未来へつなぐ
TAKENAKA

Daiwa House

産総研
国立研究開発法人 産業技術総合研究所
NATIONAL INSTITUTE OF ADVANCED INDUSTRIAL SCIENCE AND TECHNOLOGY (AIST)

PIAJ 光触媒工業会
Photocatalysis Industry Association of Japan

Easy maintenance

Cleaning of grease filter （2/Year)
Inversion of photocatalytic filter （1/Year)
Change UV lamp（1/Year)

Photocatalyst cartridge

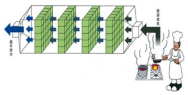
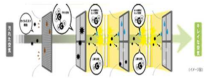
Removal of grease filter

Removal of photocatalytic filter

Removal of UV lamp

Set of UV lamp

Comparison wit adsorption method: 5 years maintenance cost

Air Volume: 450㎥/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	68~93%(Company data)	Max95% (Third-party)
Lifetime of deodorant material	5~10 years (available upto usege)	Semi-permanent (if not damaged)
Possiblity of regeneration of deodorant material	No	Yes
initial cost	28,000k JPY/unit	16,100k JPY/unit
Detail of Mentainance	(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)Chenge UV Lump (12h/day) 40k JPY/every year
	(Ⅰ)+(Ⅱ)+(Ⅲ)= 786k JPY/Year	(Ⅳ) Electricity (12h/day,365) 126k JPY/Year
		(Ⅰ)+(Ⅱ)+(Ⅲ)+(Ⅳ) = 275k JPY/Year
5 years mentainance cost	3,930k JPY/5Years	1,375k JPY/5Years

65% DOWN

Comparison wit adsorption method: CO2 emission

Air volume: 630 m 3 / 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)

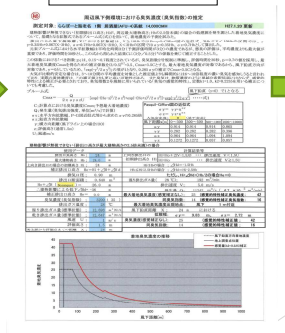
25% DOWN

Consulting Service

Propose the best solution based on the atmospheric dispersion simulation by specialist (National qualification)

Input :
Exhaust point
Exhaust volume
Distance to the target point etc.

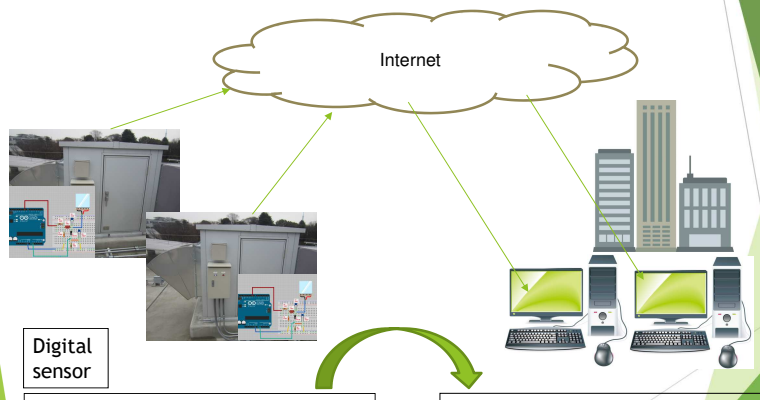
Simulation Repot



Output:
Best solution of equipment

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.
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Phone	+81 3-3662-5644
FAX	+81 3-3662-6339
CEO	Hiromi Ikuta
What we do	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. Drawing on our extensive experience, scientific knowledge and engineering expertise, we consult and offer the right solutions to control odours. 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.
Capital	10,000,000 yen