The Biological Treatment of VOCs Reduction on Paints & Coatings (Propose from Japan)

Clean Air Technology (CAT) Workshop

4-5 November, 2018

Qingdao, Shandong, China

IPCO(International Promoting Council of Industrial Coating Association)

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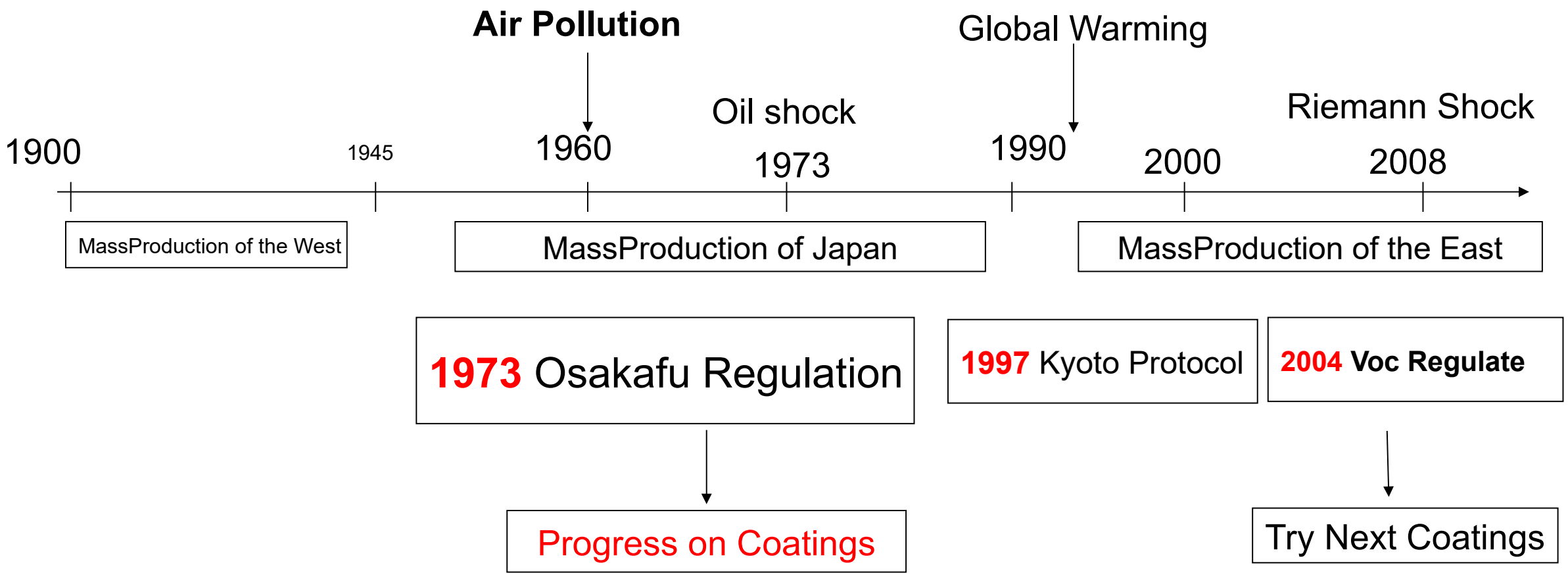
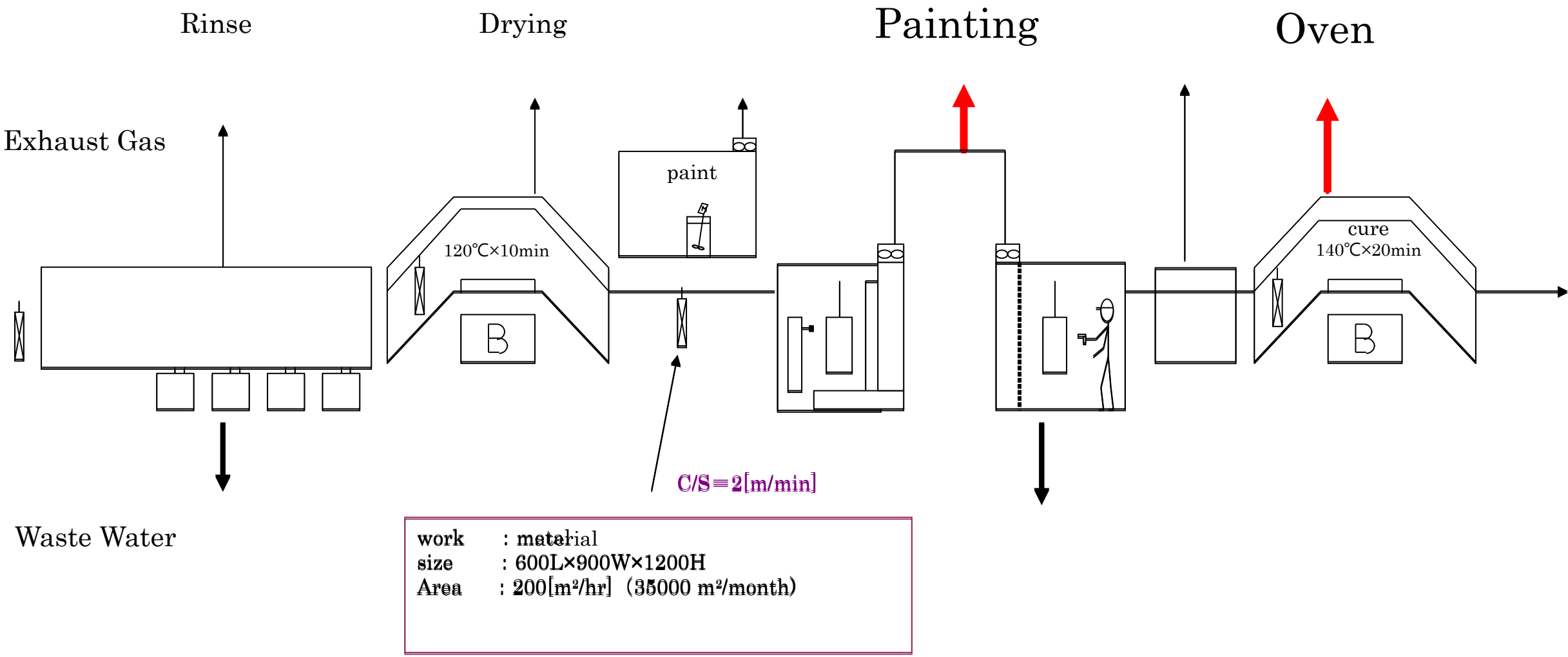
1. History of Japanese air pollution on Paints

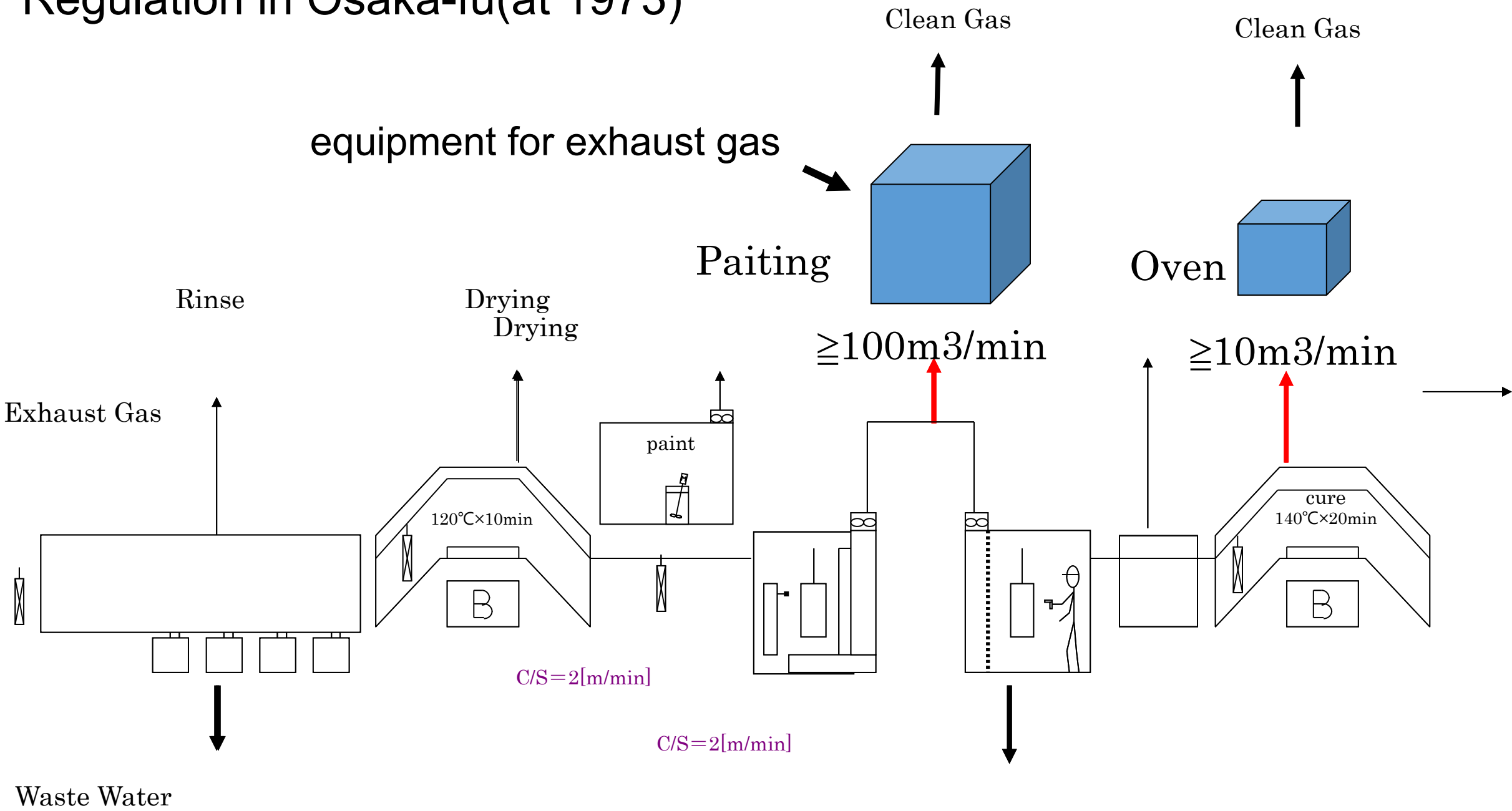


1.1 Industrial Coating Process

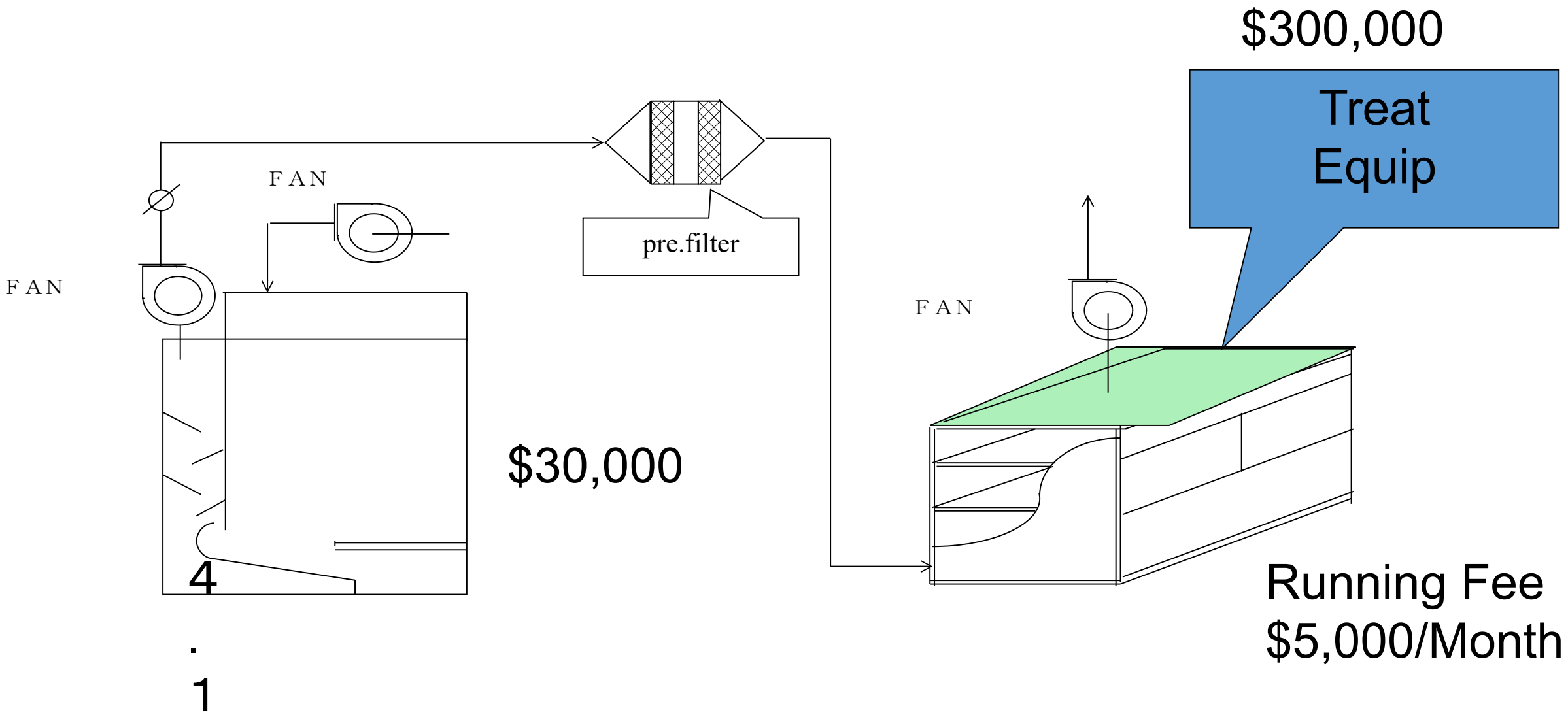


work : material
size : 600L×900W×1200H
Area : 200[m²/hr] (35000 m²/month)

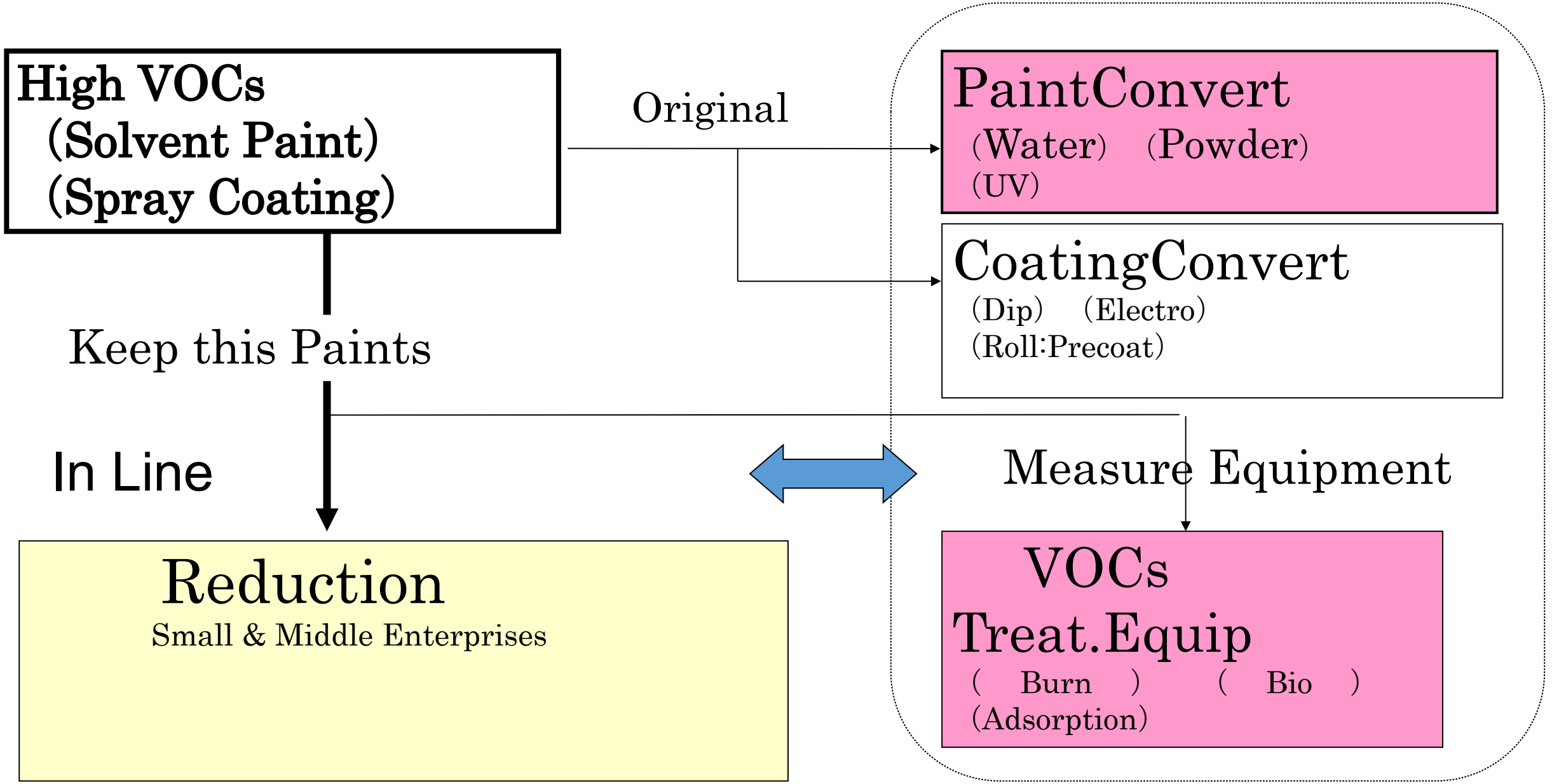
1.2 Regulation in Osaka-fu(at 1973)



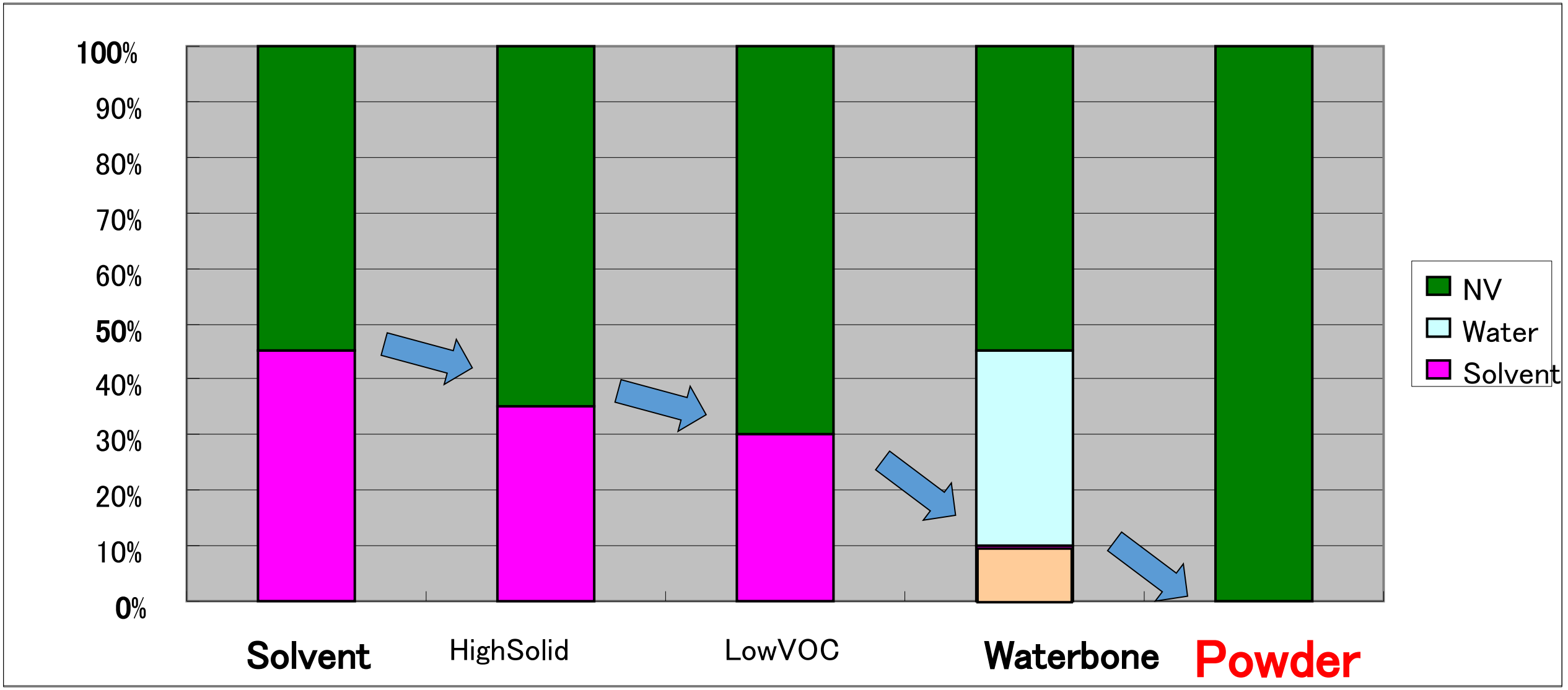
1.3 Exp: Exhaust Gas Treatment Equipment (on Paint Booth)



1.4 Outline of VOC Measures on paintings

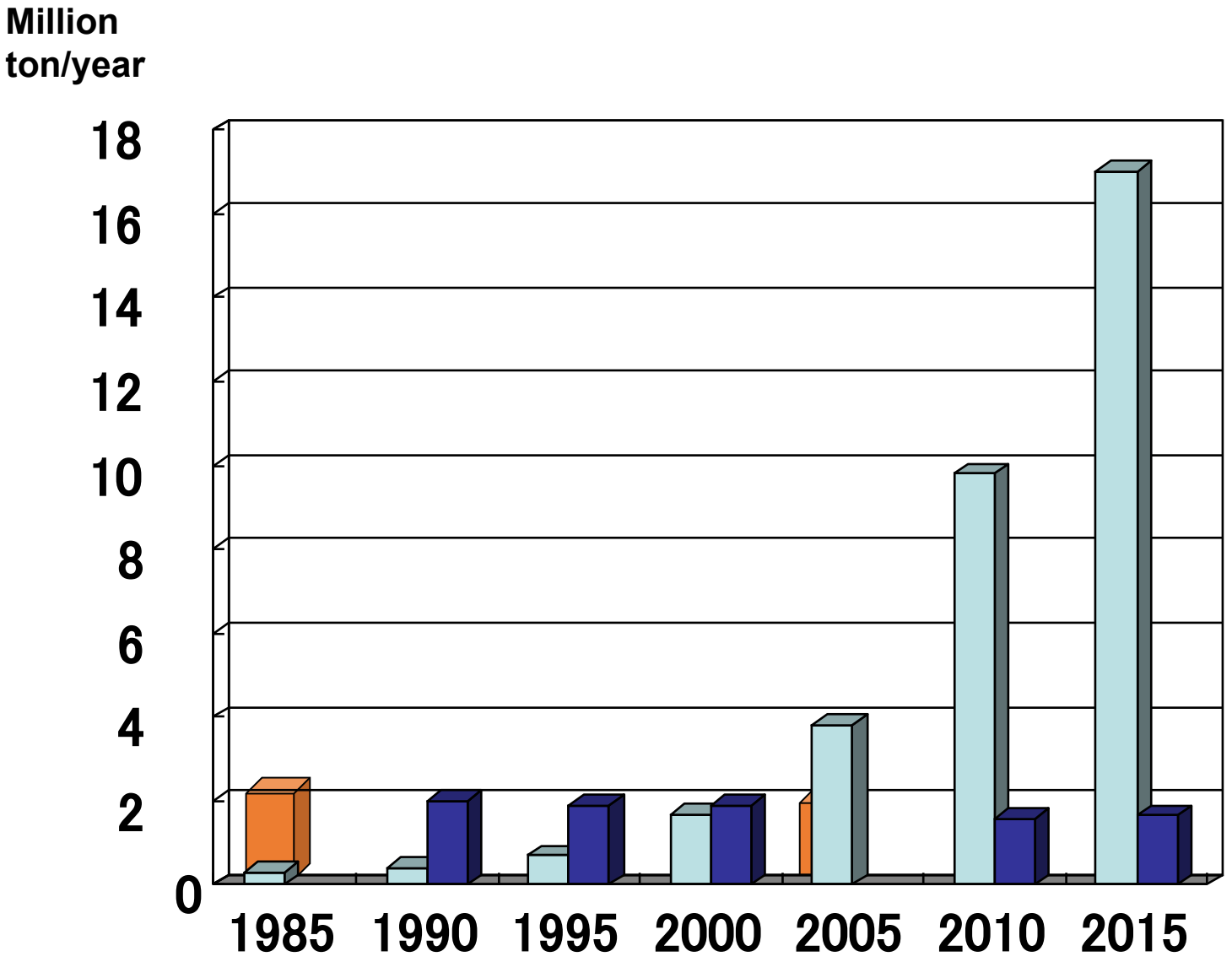


1.5 Paints (Solvent Content)



1.6 Powder Coating

1.7 Production of Paints on Japan/China



20 million ton
/2017
(2m.t：Japan company)

1.65 m.ton/2017

1.8 Results and After

1. Progress on Powder Coatings and Waterbone Coatings

2.Overseas Move of Electric Makers

3.Progress on Study of Exhaust Gas Processor

3.1 Development of Rotary concentrator

3.2 No results of Bio-treatment

2. Global Warming(1997:kyoto Procotol)

IPCC(Intergovernmental Panel on Climate Change)

COP3(at Kyoto,1997)

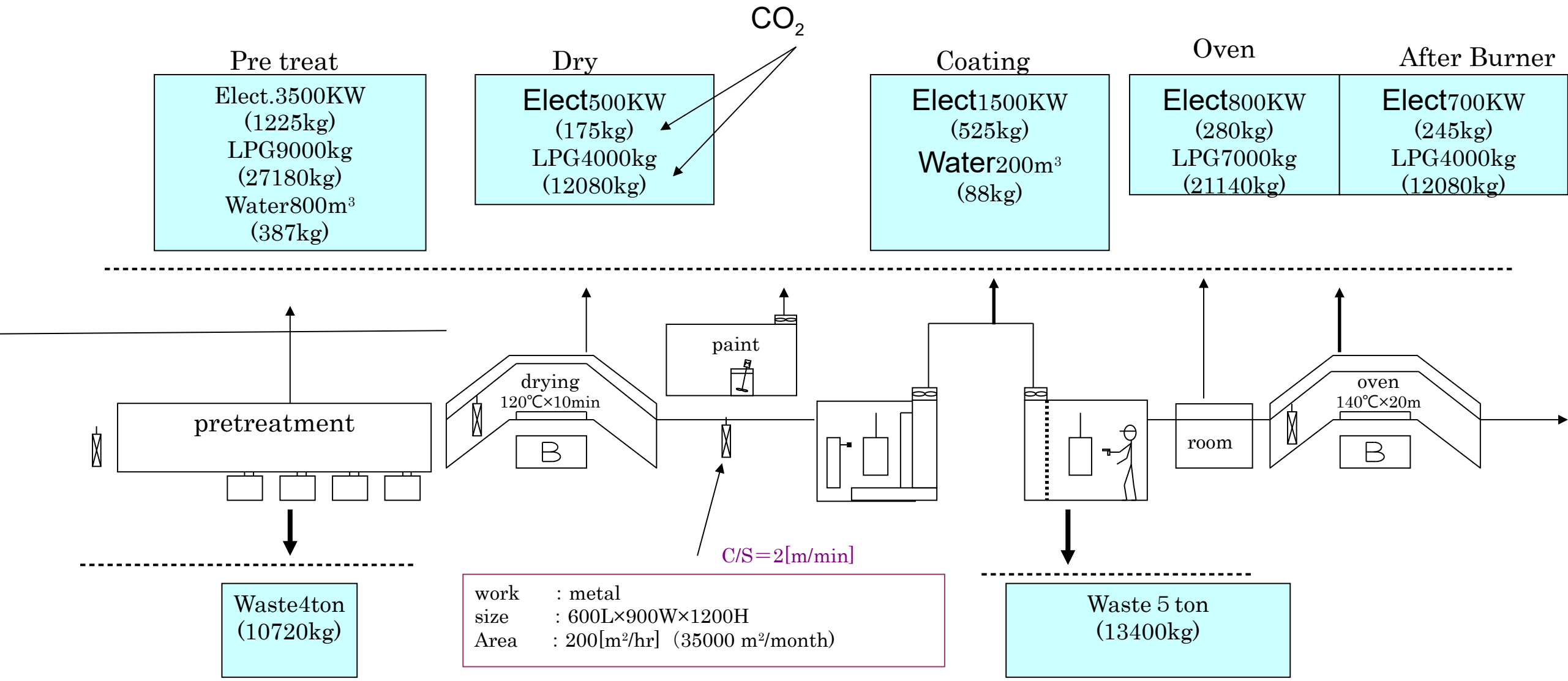
Reduction target of 6 kinds of greenhouse gas

-6%(Japan) :2008~2012

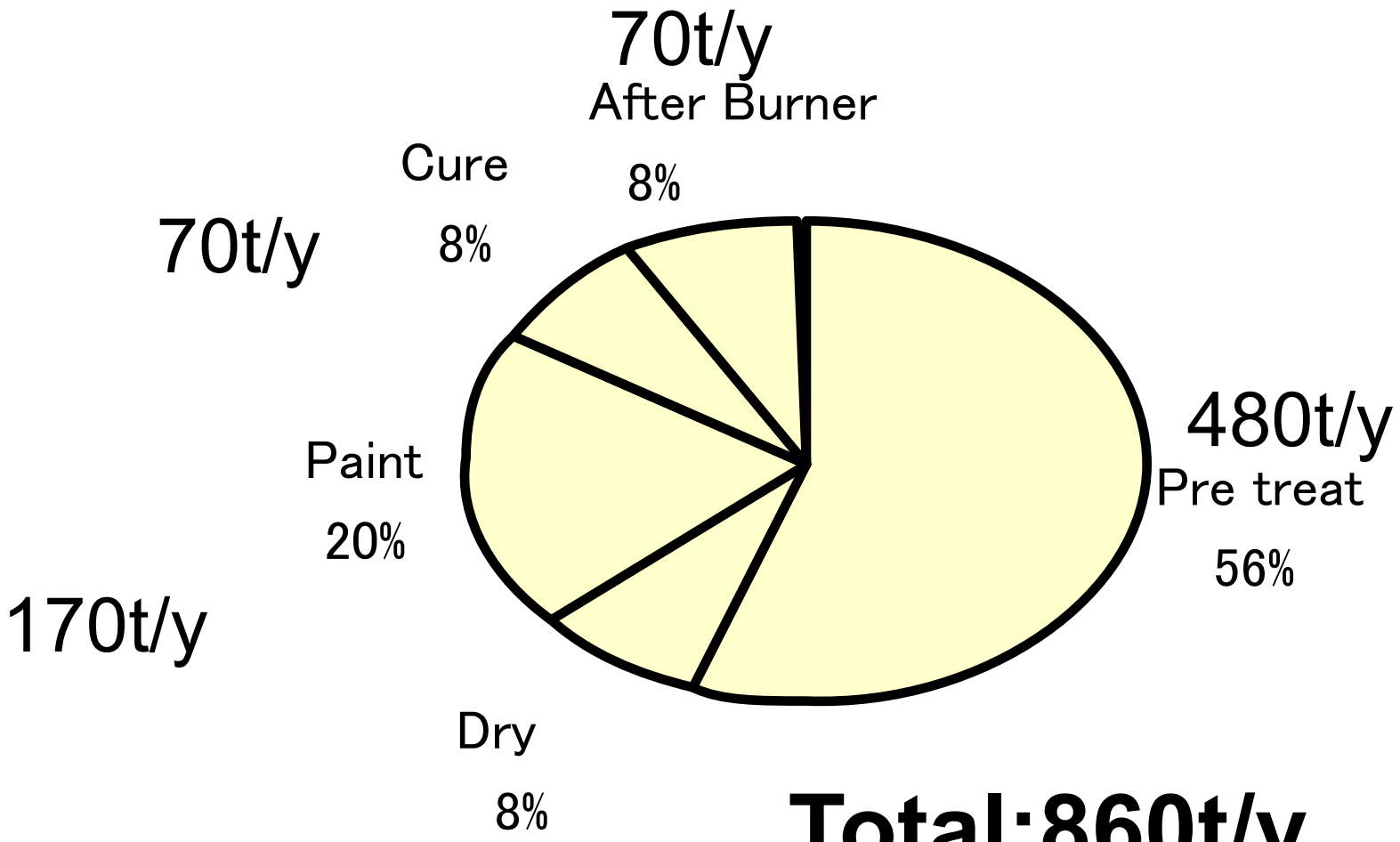
Paints & Coating ?

*__Paris Agreement__(2015COP21):at 2030,26% Reduction on Japan

2．1　CO_2Emission Rate on each Process（kg/Month）



2.2 Coating Line : CO_2/y → 860 ton/year



Total:860t/y

Ref:40,000t/y(one Car. L)

2.3 The Carbon Dioxide (Emission Amount)

- **JAPAN Total: 1,390,000,000ton/year(2015)**

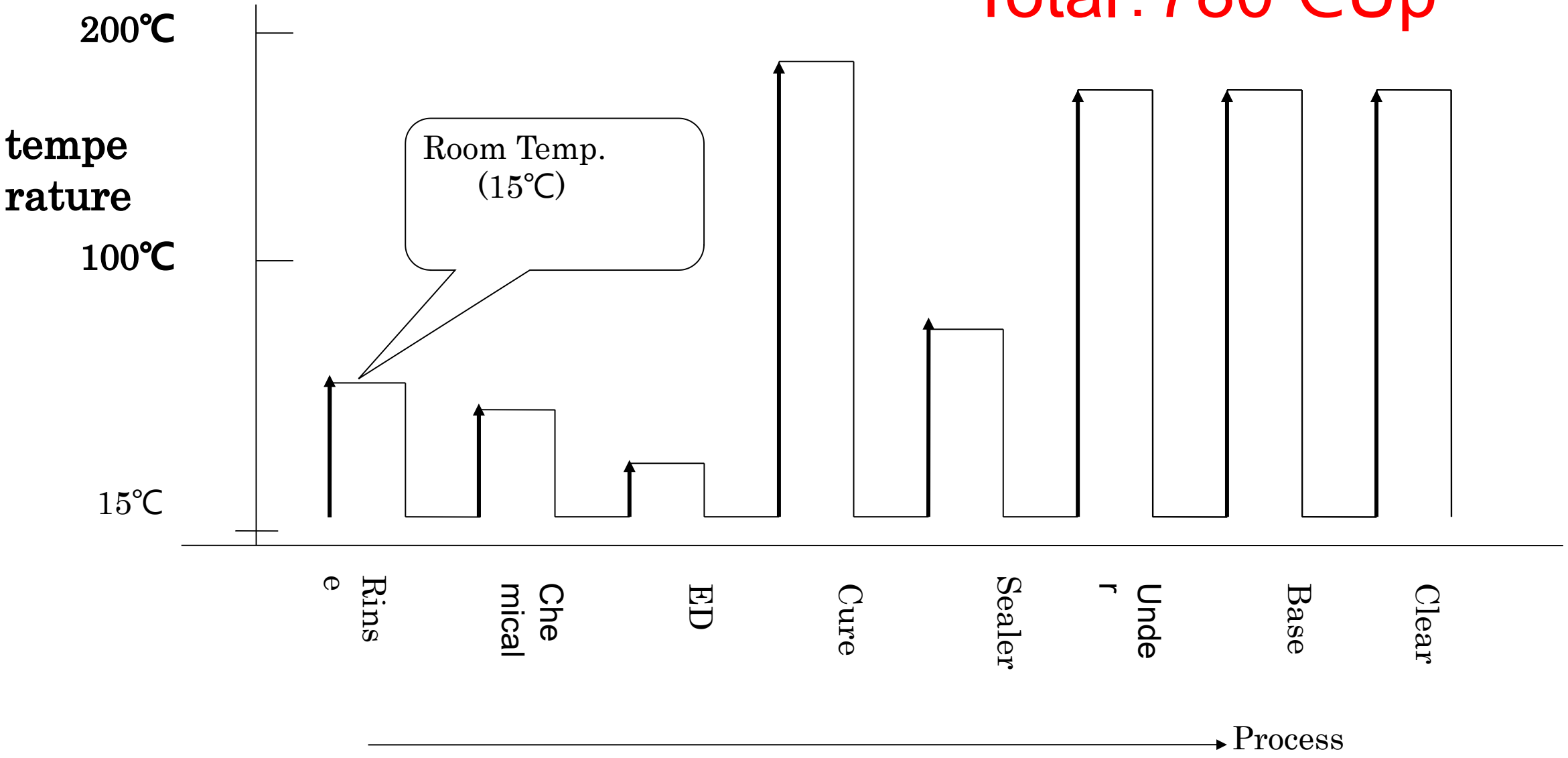
- **From Paints : 4,000,000ton/year (0.3%)**
  from Materials : 3,500,000
  from Factory : 500,000

- **From Coatings : 10,000,000ton/year(0.7%)**
  on Motorcar : 4,000,000
  on Industrial : 6,000,000

≒1%

2.4 Heat of Temperature Up on Coating

Total : 780℃Up



2.5 Problems of Paints & Coatings

Cure of Low Temperature

Development of cold Curetype Resin

Cure of Short Time

Development of New Drying Process
for Short Time Cure

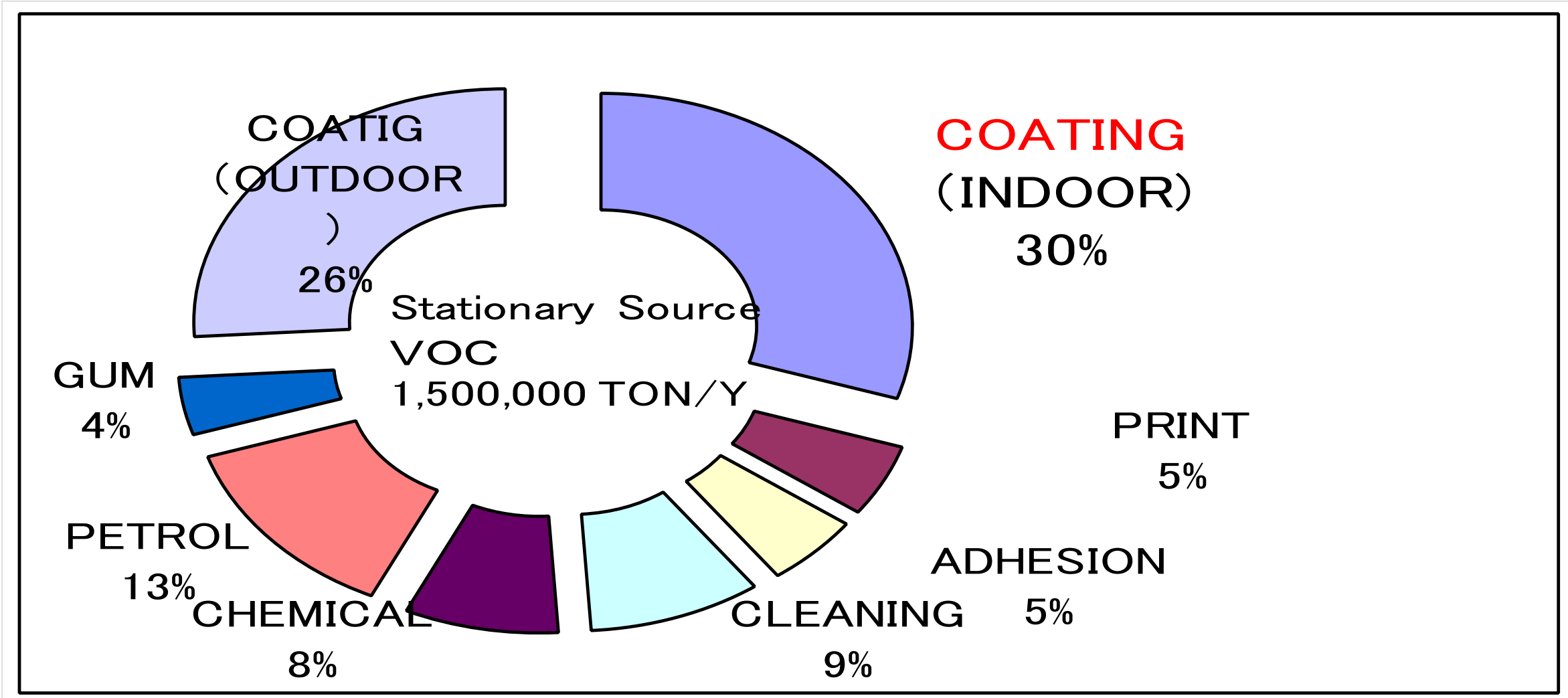
*Radiation
*plasma
*Induction Heating
*UV Cure

Biofuel

BIO-treatment from burning system

3. VOCs Emission at Stationary Source in Japan

(2000th by Ministry of the Environment)

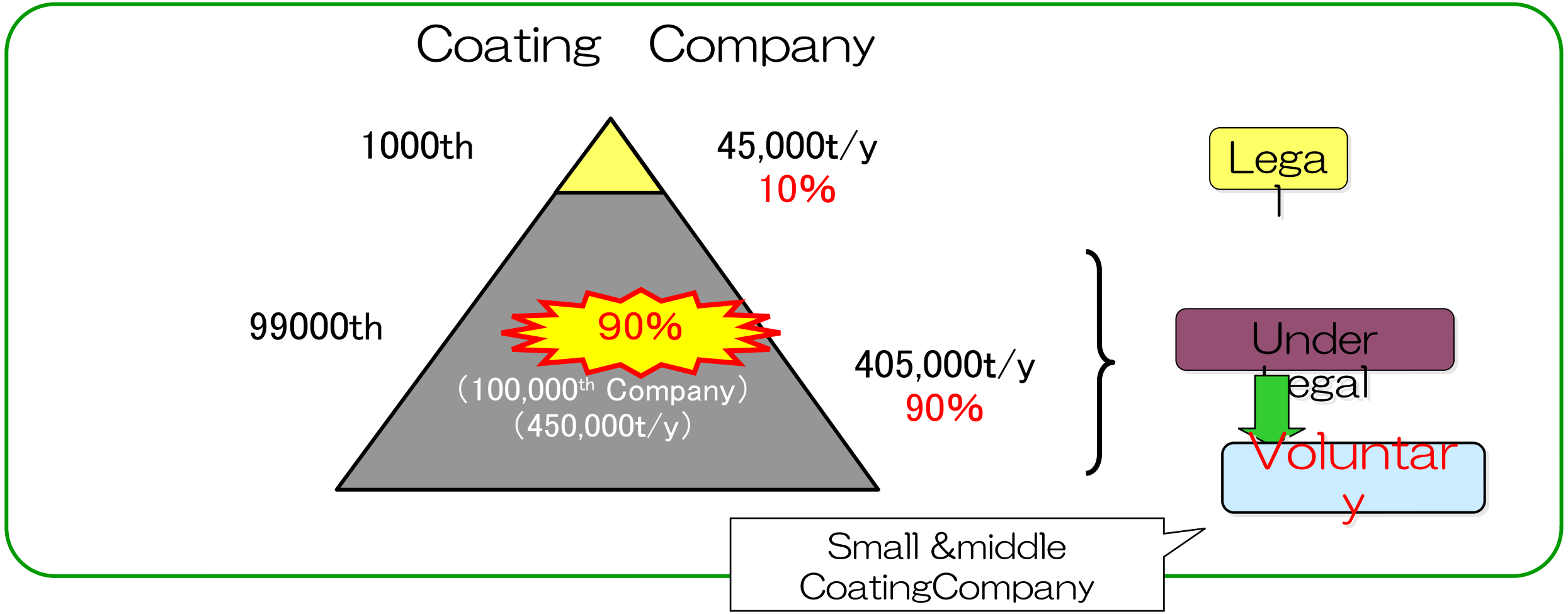


3.1 VOC Regulation (at 2004)

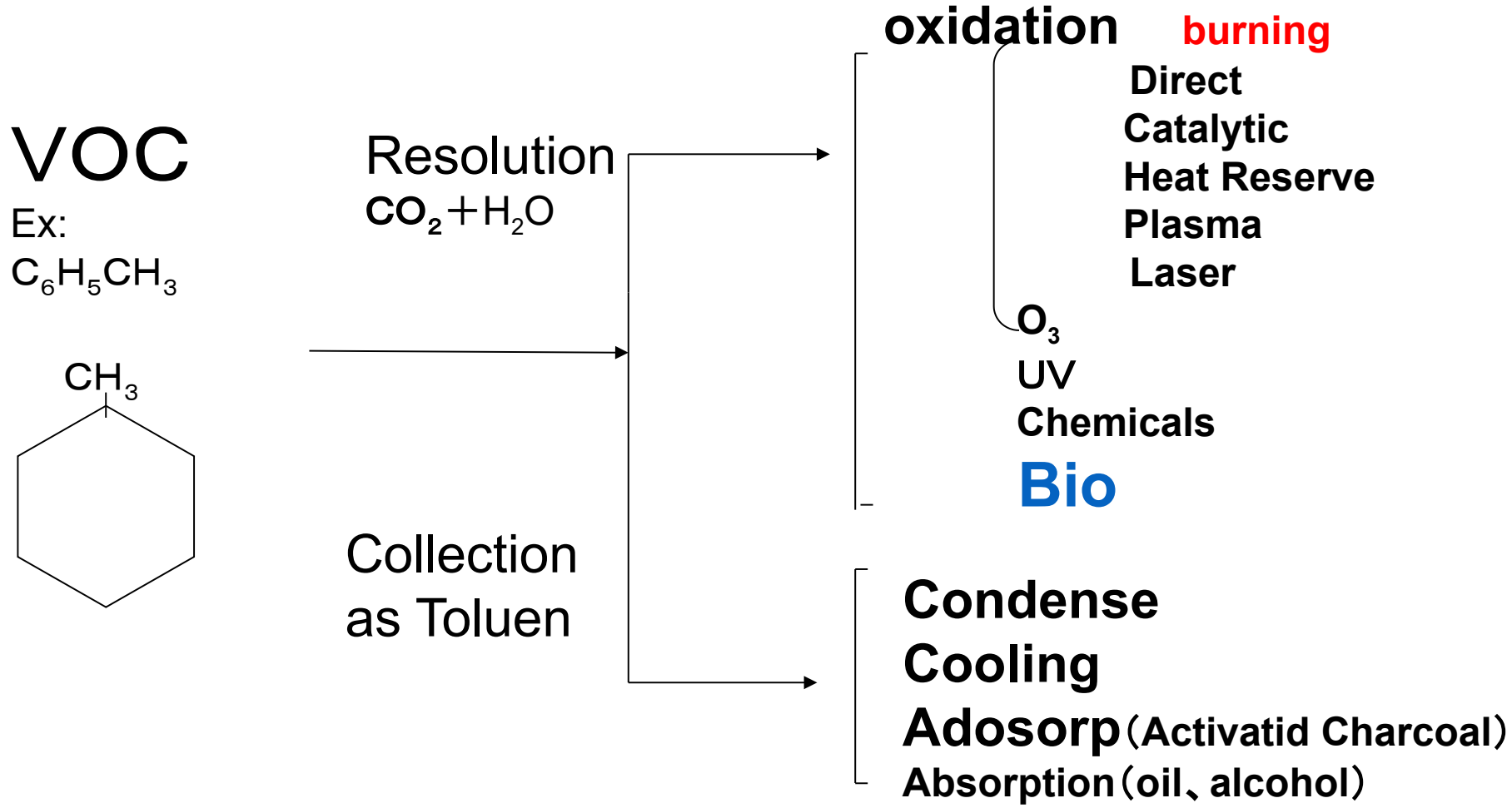
	Under Regulation	Percentage of Control (Amount of Emission)
Booth ≧ 100,000m3/h	767 (0.7%)	30,000ton/y (**9%**) → 91%???
Total number	100,000	350,000ton/year
Oven ≧ 10,000m3/h	533 (0.9%)	5000ton/y (**5%**) → 95%???
Total number	60,000	100,000ton/year

http://www.env.go.jp/air/osen/kotei/h19.pdf

3.2 Voluntary on Coatings in Japan



3.3 Classification of VOC Processing



3.4 Flow of Exhausted VOCs

- In Paint

(liquid : boiling poit 110℃)

Spray Coating

Liquid→ Gas

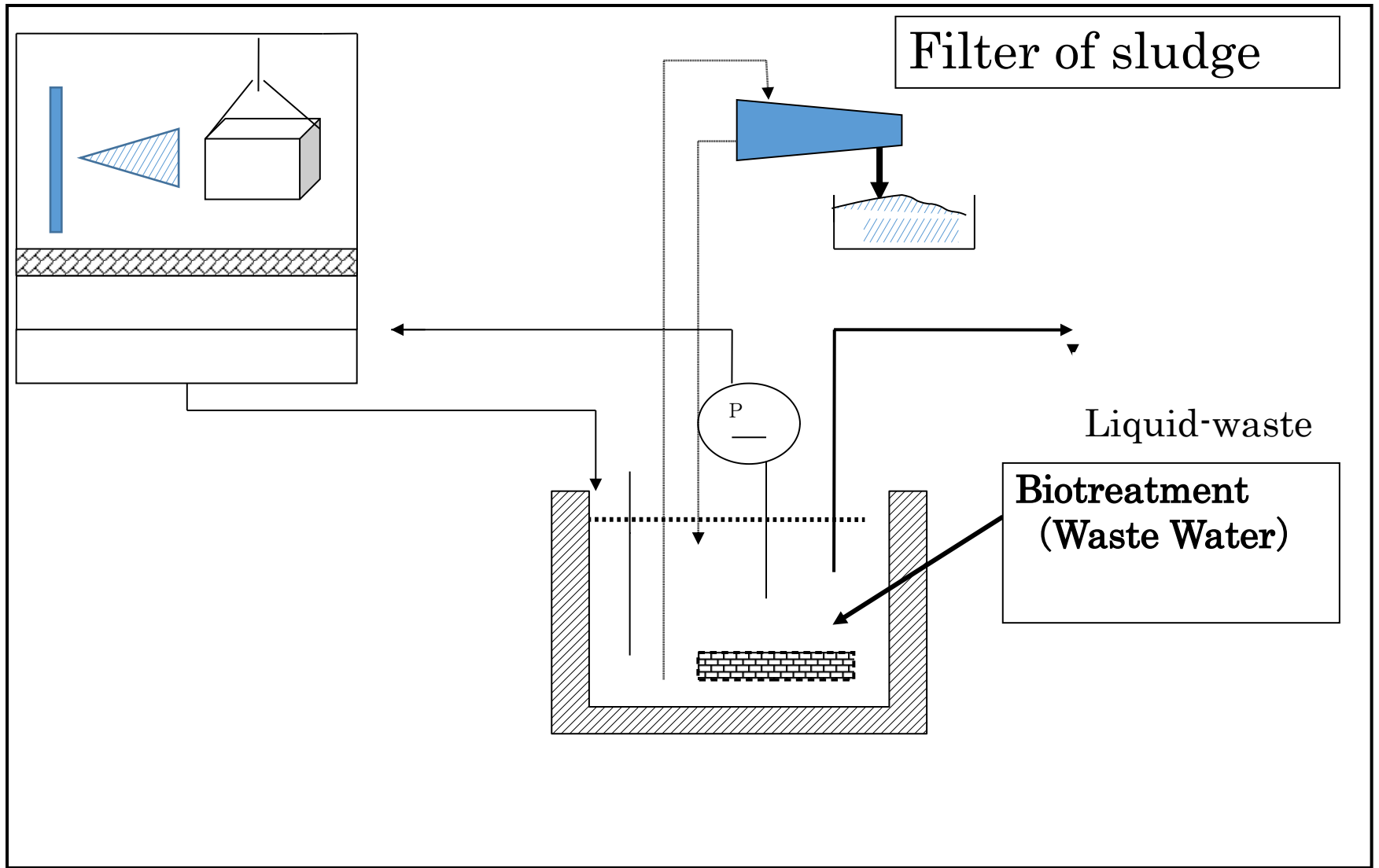
Cooling on earth

Gas→Liquid

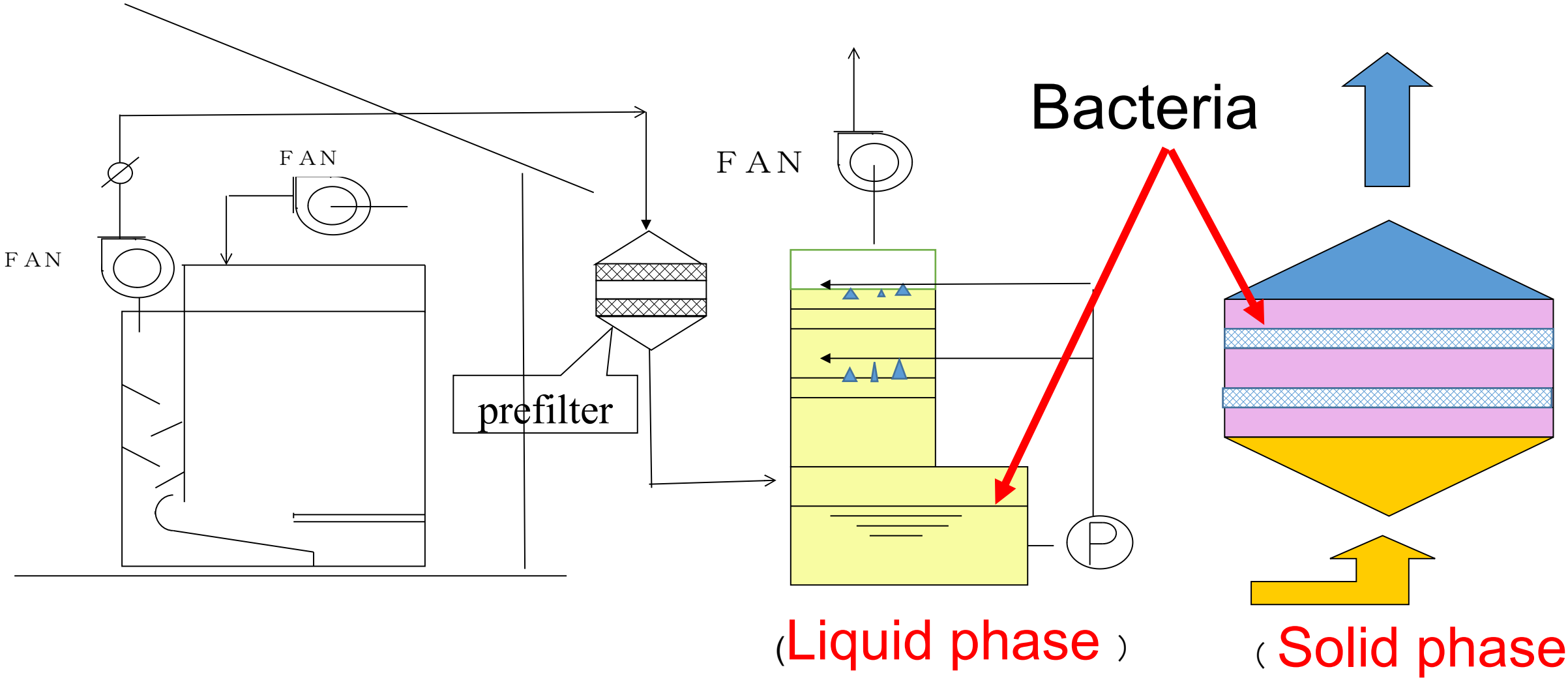
Resolution

Bio Treatment → **CO_2+H2O**

3.5 Biotreatment of Waste Water in Paint Booth(1990)



3.6 **Bio-Treatment** on Coating Booth



3.7 Comparison of the Runningcost with burn-treat 100Nm^3/h(at2000)

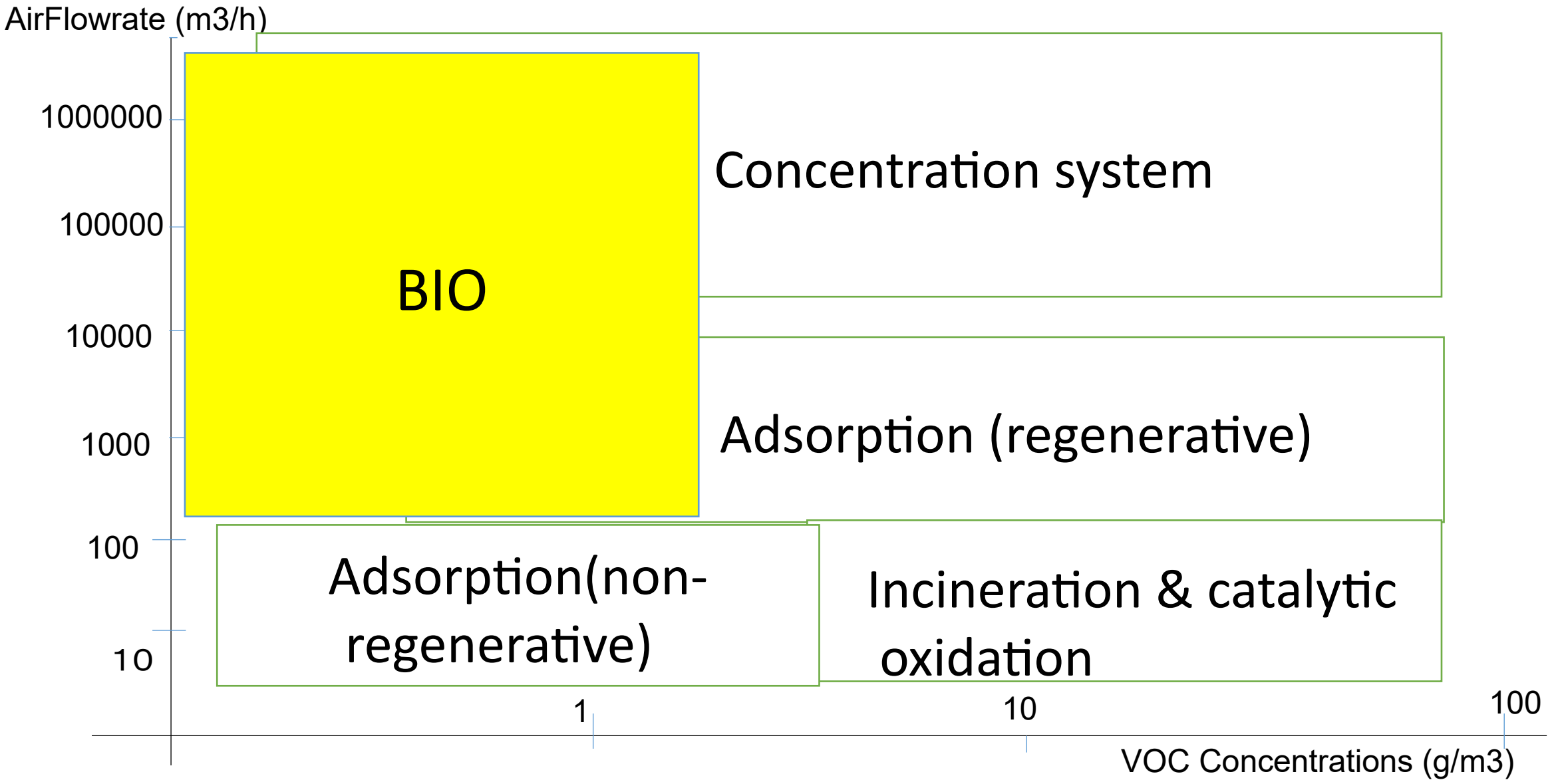
(Japanese yen/h)

	Solid phase	Liquid phase	Burn-treat
Fan Power	64	96	77
Pump power	7	81	
Blower Power	17	81	
Mud disposal		74	
Maintenance	250	11	
Fuel			9372
Total	338	343	9449

3.8 Merit & Demerit of Bio Systems

Merit	Low Cost of Running: Less than 1/5 of burn or absorption
	Easy Maintenance: Supplement of an eutrophic material
	Safety in Fire: No Flammables
	Hot & Mild Climate for Bacteria: More than Japan Climate
Demerit	Space(Solid Phase) Selection of Bacteria (depending on target gas)

3.9 AIR FLOWRATE vs VOC CONC.



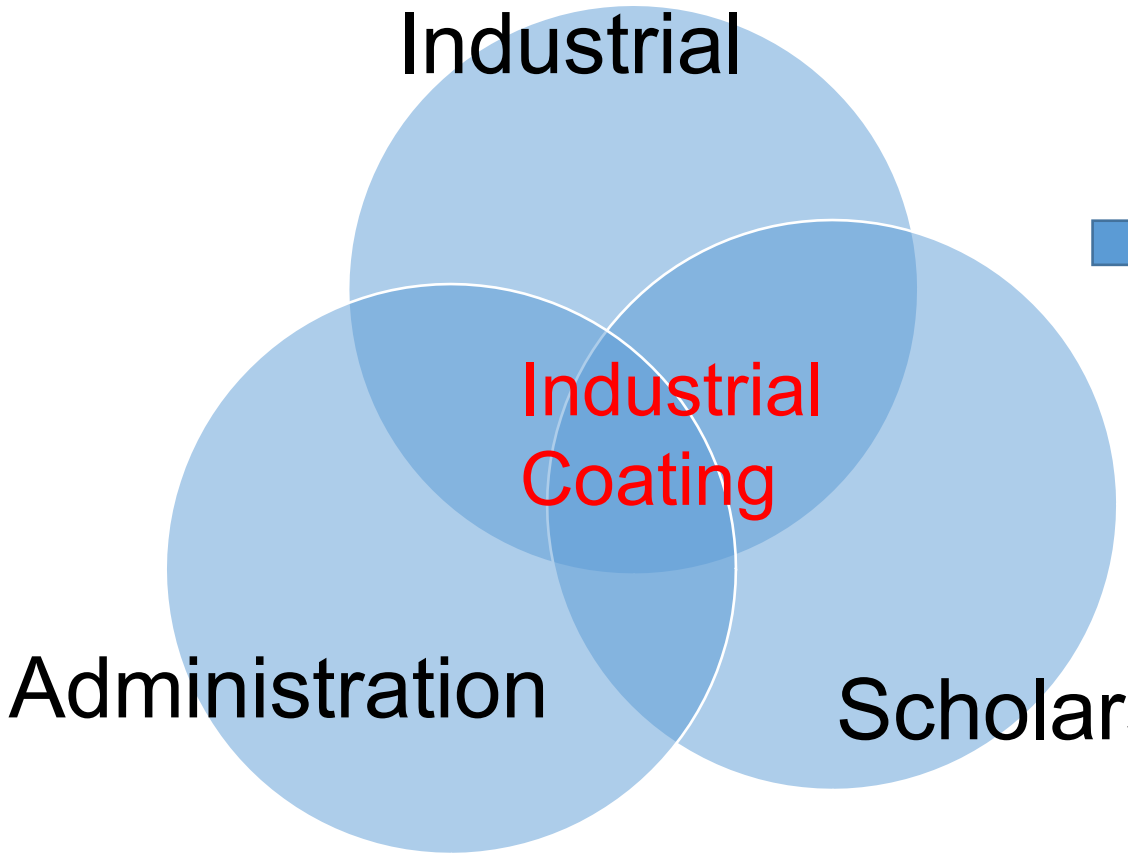
3.10 Problems of Bio Systems

1. Bacterial production suitable for each land
2. Design of a scrubber suitable
   for each coating line
3. Efficient bulking agent
4. The operating condition of the bacteria
   (the temperature. pH)

4. One Morning

4.1 Next Day

4.2 What is IPCO?



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https://www.ipco.or.jp/