

2007 CTCI Foundation Environment & Energy Convention



National Taipei University Of Technology



Feature Research Direction for 3R in Industrial Wastes



Management

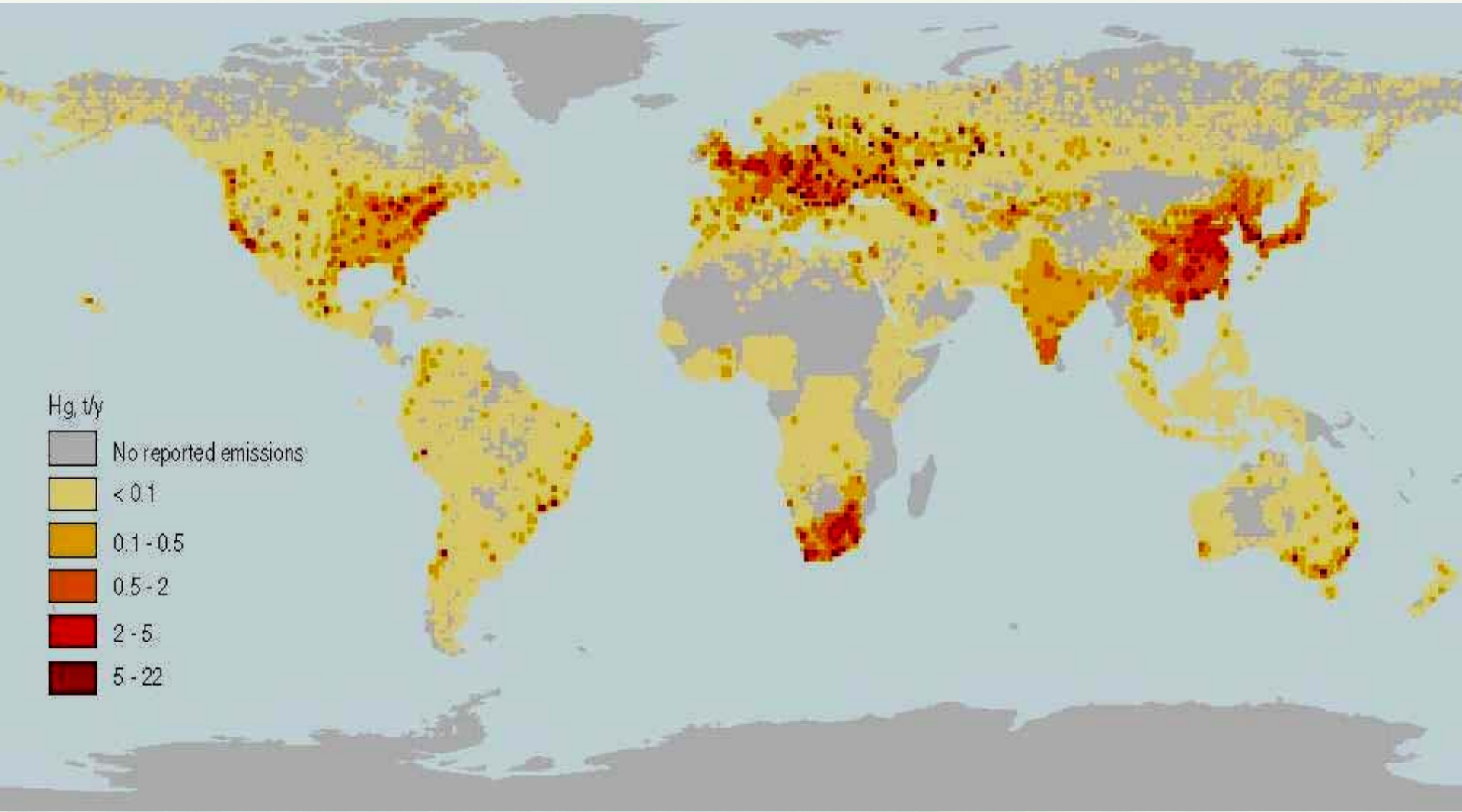
Speaker: Tien-Chin Chang, Professor

Institute of Environment Engineering and management



Jan, 18, 2007

Spatial Distribution of Global Emissions of Mercury to Air



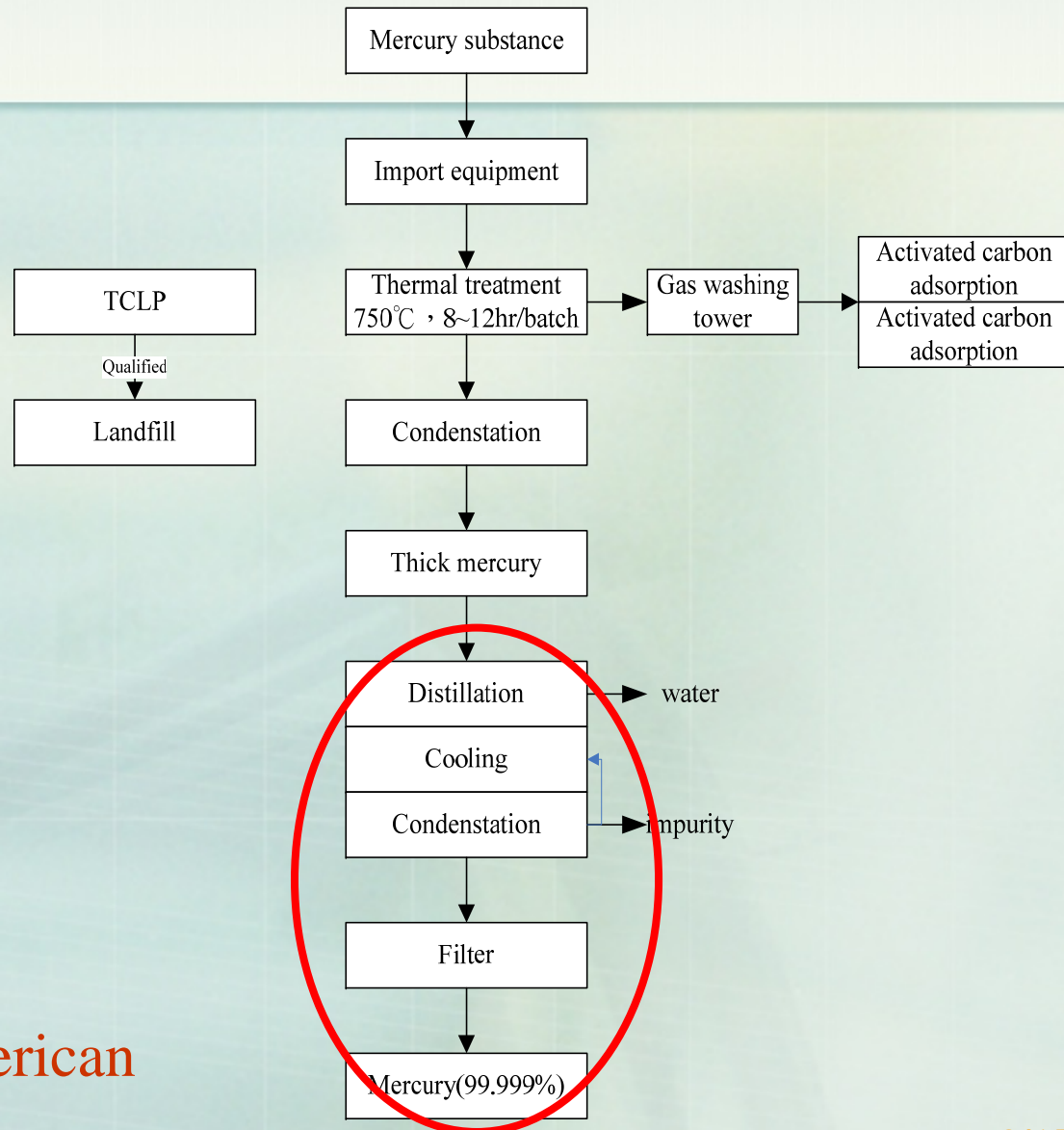
Source: UNEP Global Mercury Assessment, 2002, using J. Pacyna 1995 data, as presented by AMAP (1998).

1. Mercury-Containing Lamp Recovery

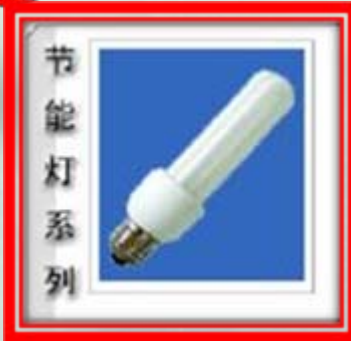


- Production : Pure mercury
- Concentration : 99.999%

AERC, and PA works treatment process in American



2. Mercury-Containing **Script** Recovery



(1) Thermometer

(2) Sphygmomanometer

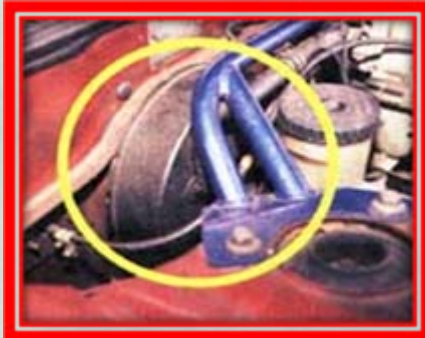
(3) Fluorescent lamp

(4) Cosmetic

(5) Battery

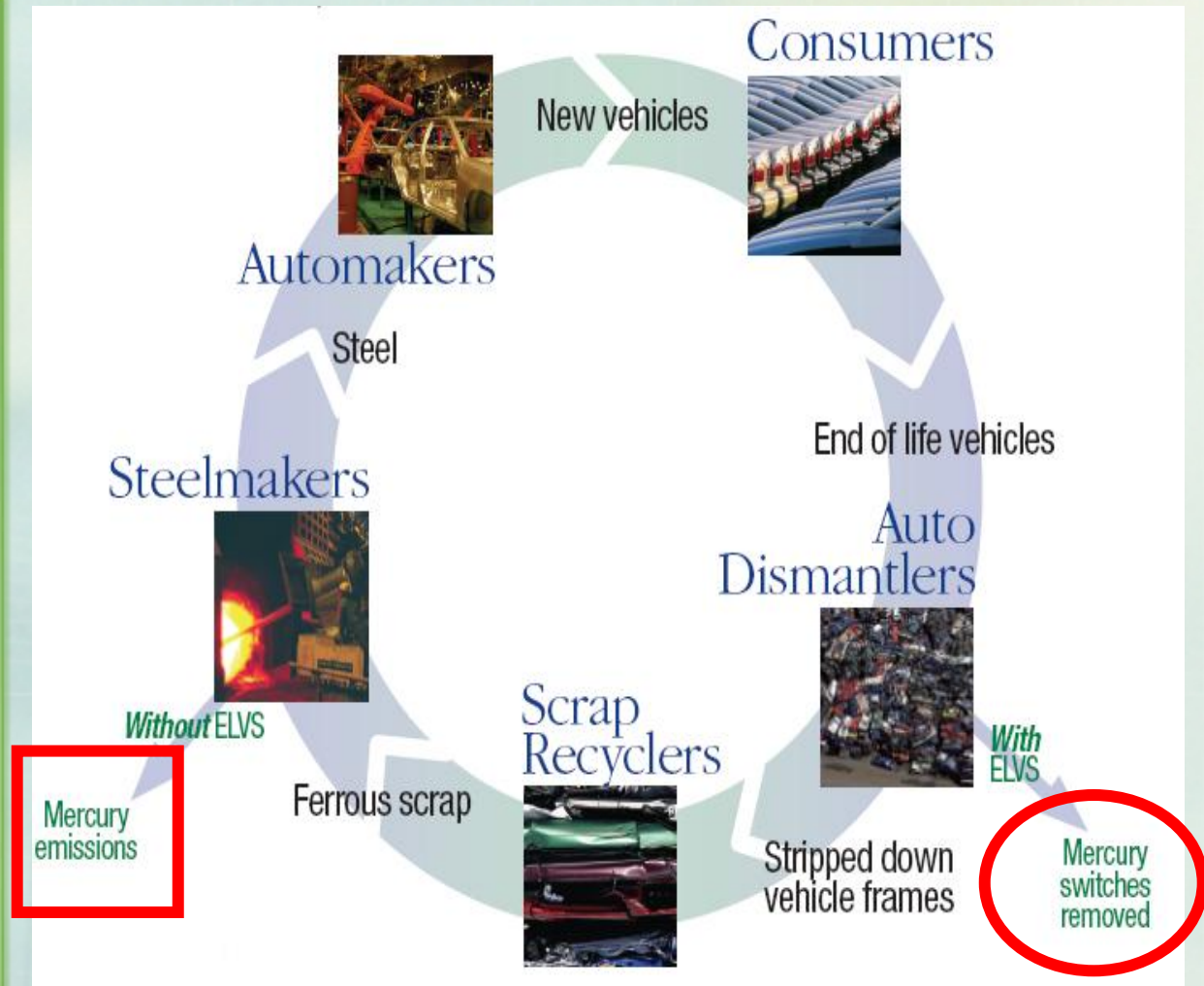
(6) Tooth-filling substance

(7) Motor vehicle switch, ABS



3. Mercury-Containing Motor Vehicle Switch Recovery

- On average each car has 1.06 switch, and each one contain 0.8g mercury.
- Mercury-containing element can be recycled in recycling system.
- (ELVs) ◦
- To avoid 75 ton mercury-pollution emission into air.



4. Electric Arc Furnace Dust Recovery



Electric arc furnace dust consist of lead, nickel, chromium, manganese, and copper.

Landfill

Acid Rain Lead to Dissolved Contaminants

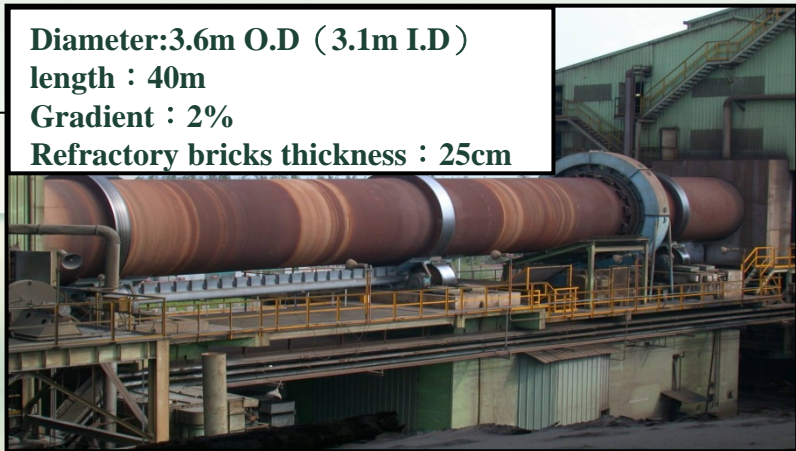
Solidification

Volume Increased

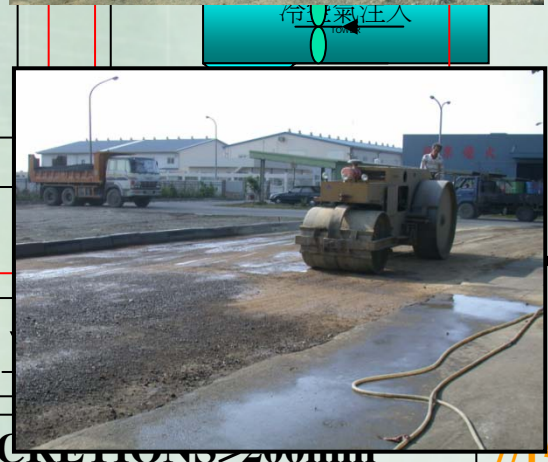
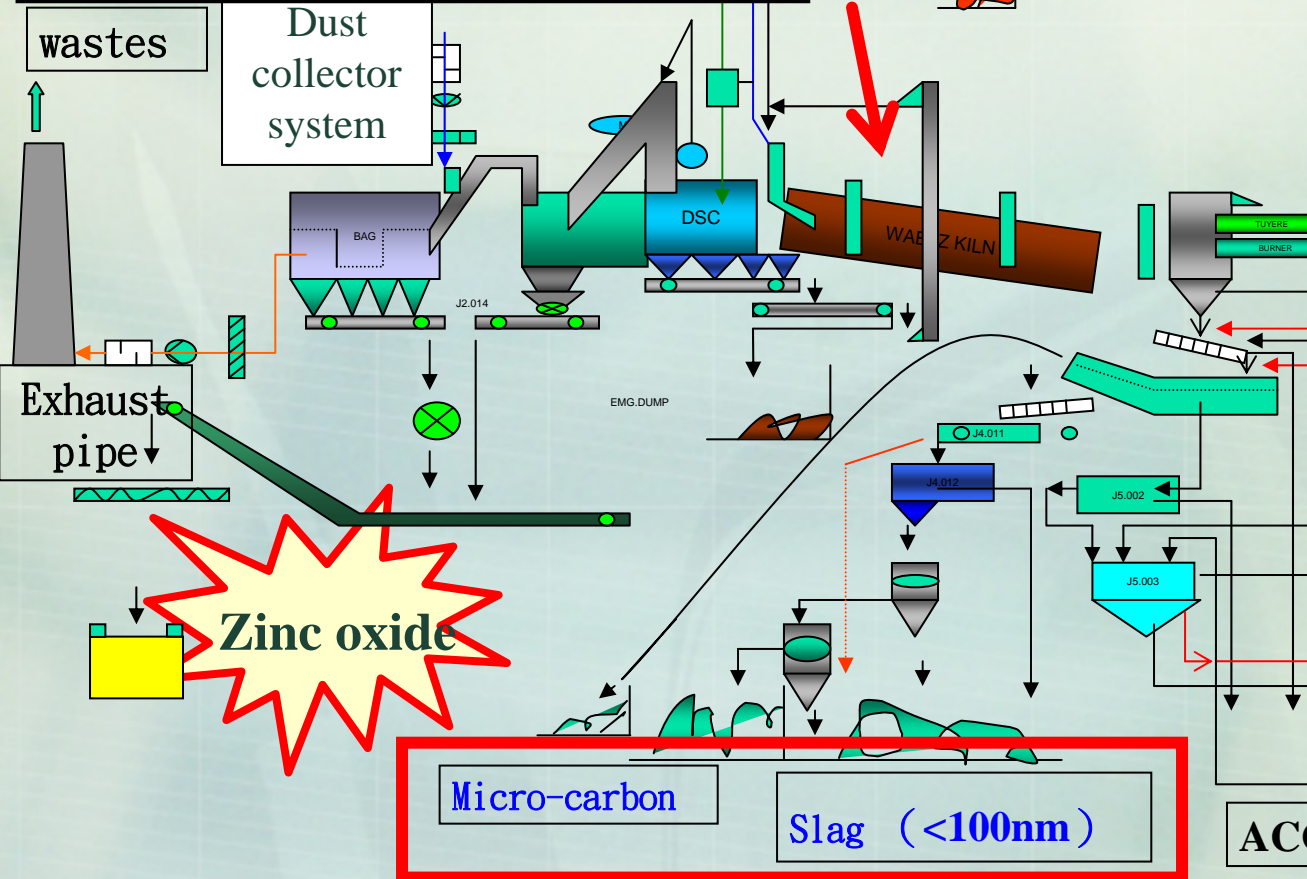
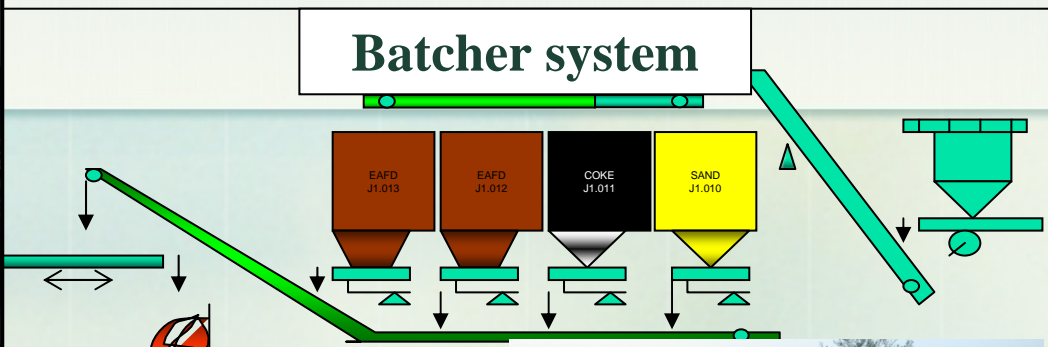
Recycling

**•Condensation and collection
•Cement material**

Diameter: 3.6m O.D (3.1m I.D)
 length : 40m
 Gradient : 2%
 Refractory bricks thickness : 25cm



Batcher system



Zinc oxide

Micro-carbon

Slag (<100nm)

ACCRETIONS > 200mm

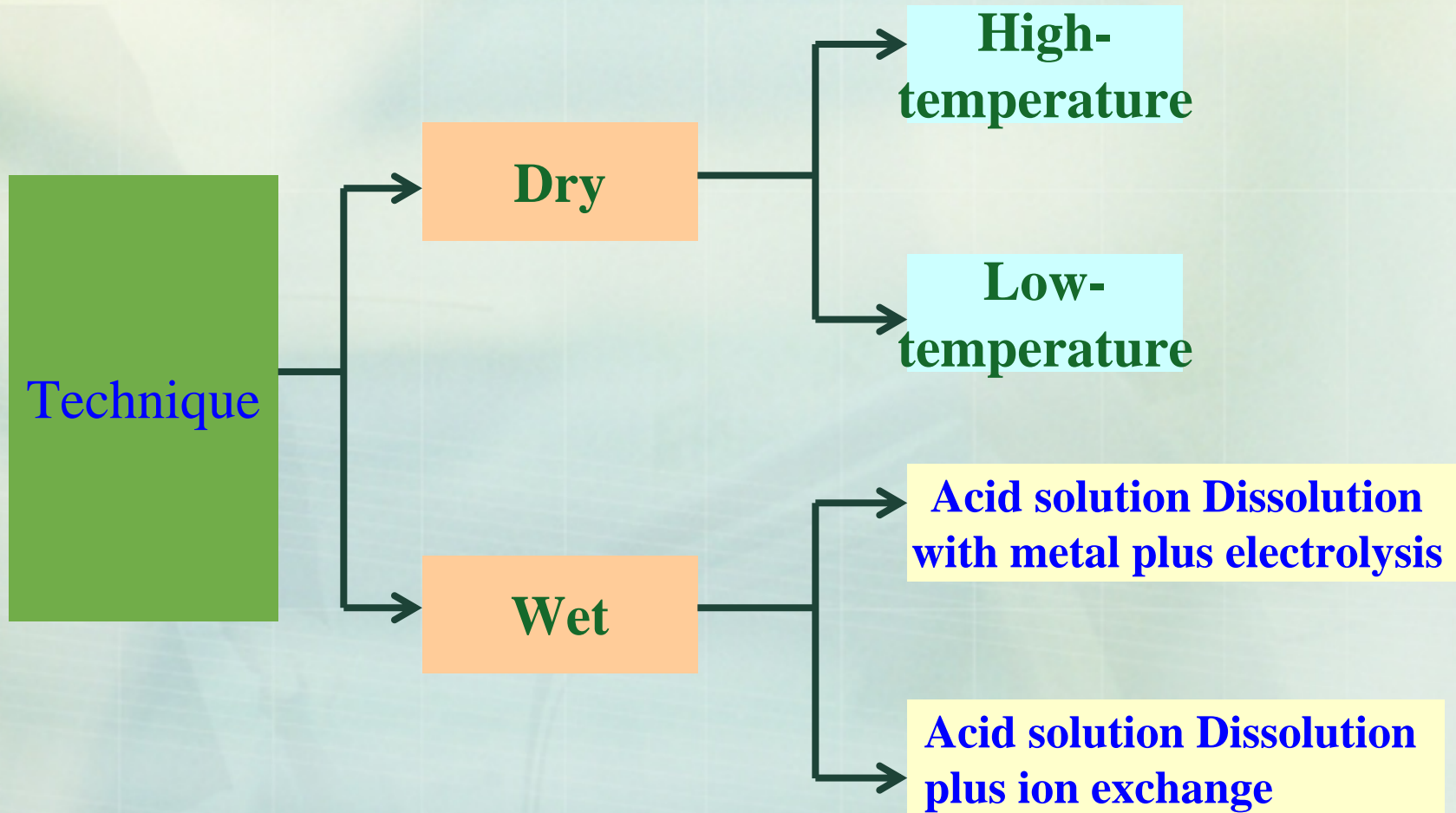
NK

5. Lithium Battery Recovery

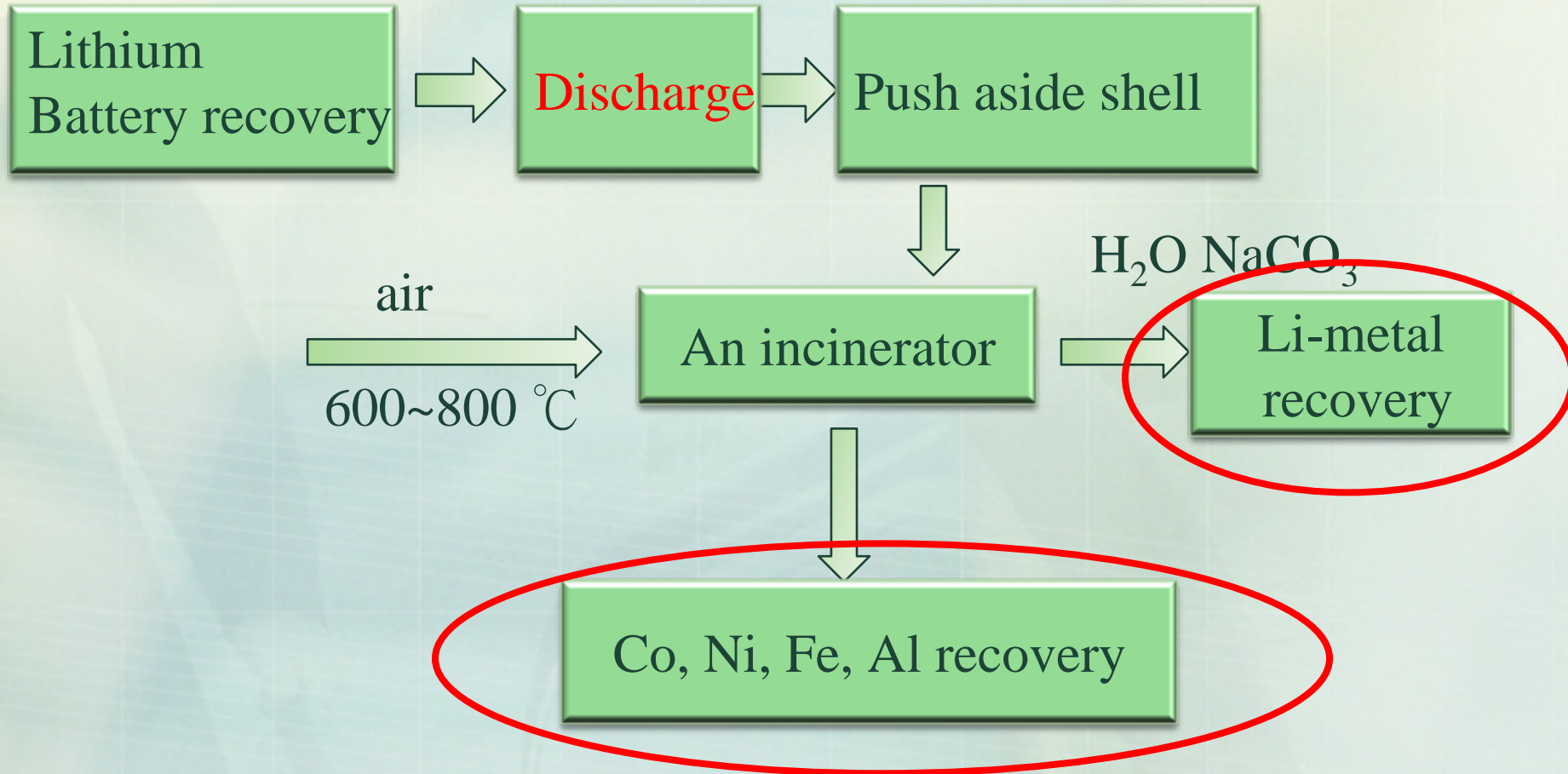
Material	composition	danger
The positive electrode	LiCoO_2	<ol style="list-style-type: none"> 1. A lung symptoms 2. Noxious air will be made
	LiMn_2O_4	
	LiNiO_2	
The negative electrode	Carbon	<ol style="list-style-type: none"> 1. Skin allergy 2. A lung symptoms 3. CO, CO₂
	Black lead	
Electrolyte	LiPF_6	<ol style="list-style-type: none"> 1. HF, and P₂O₅
Dissolvent	EC、PC、DMC DEC	<ol style="list-style-type: none"> 1. CO, and CO₂



5. Lithium Battery Recovery

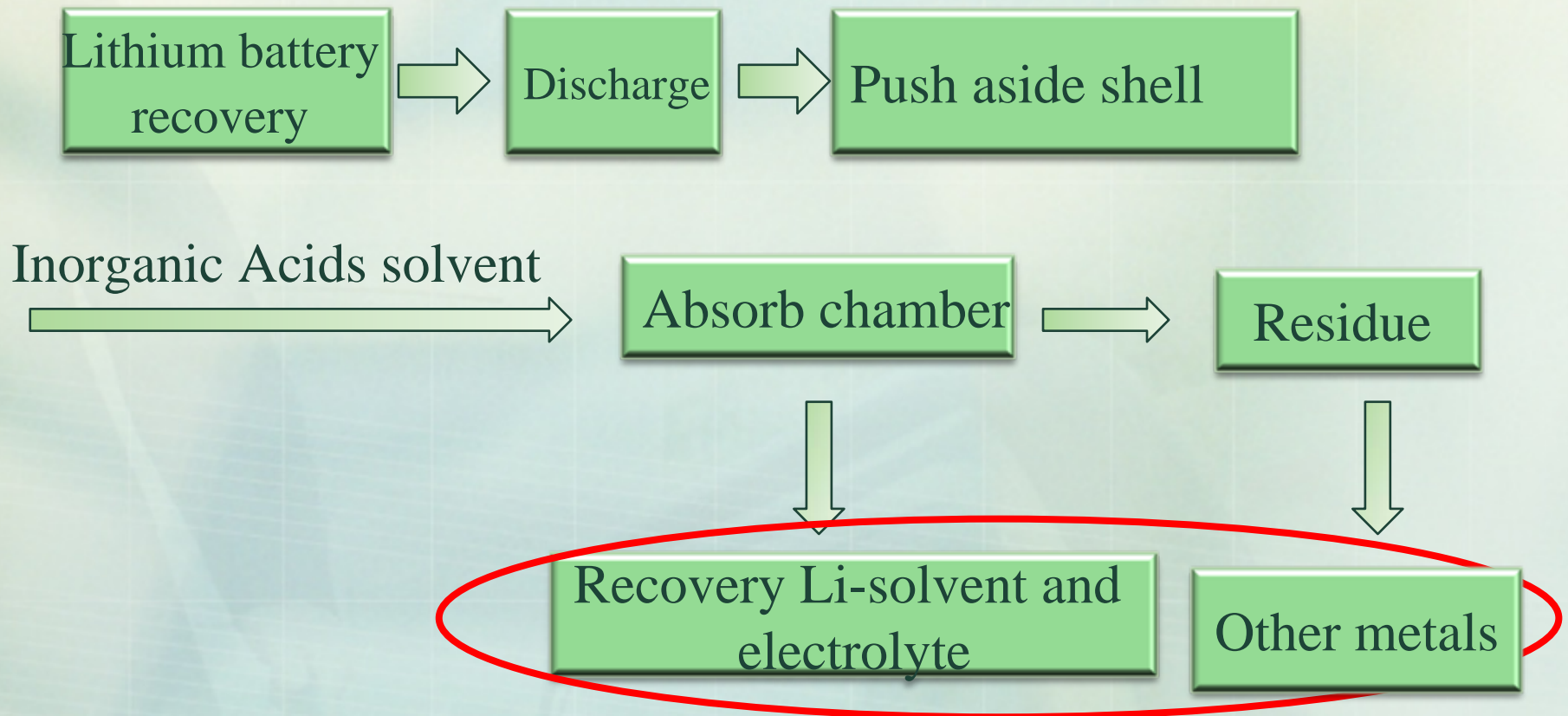


5. Lithium Battery Recovery



Dry processing for Lithium battery recovery

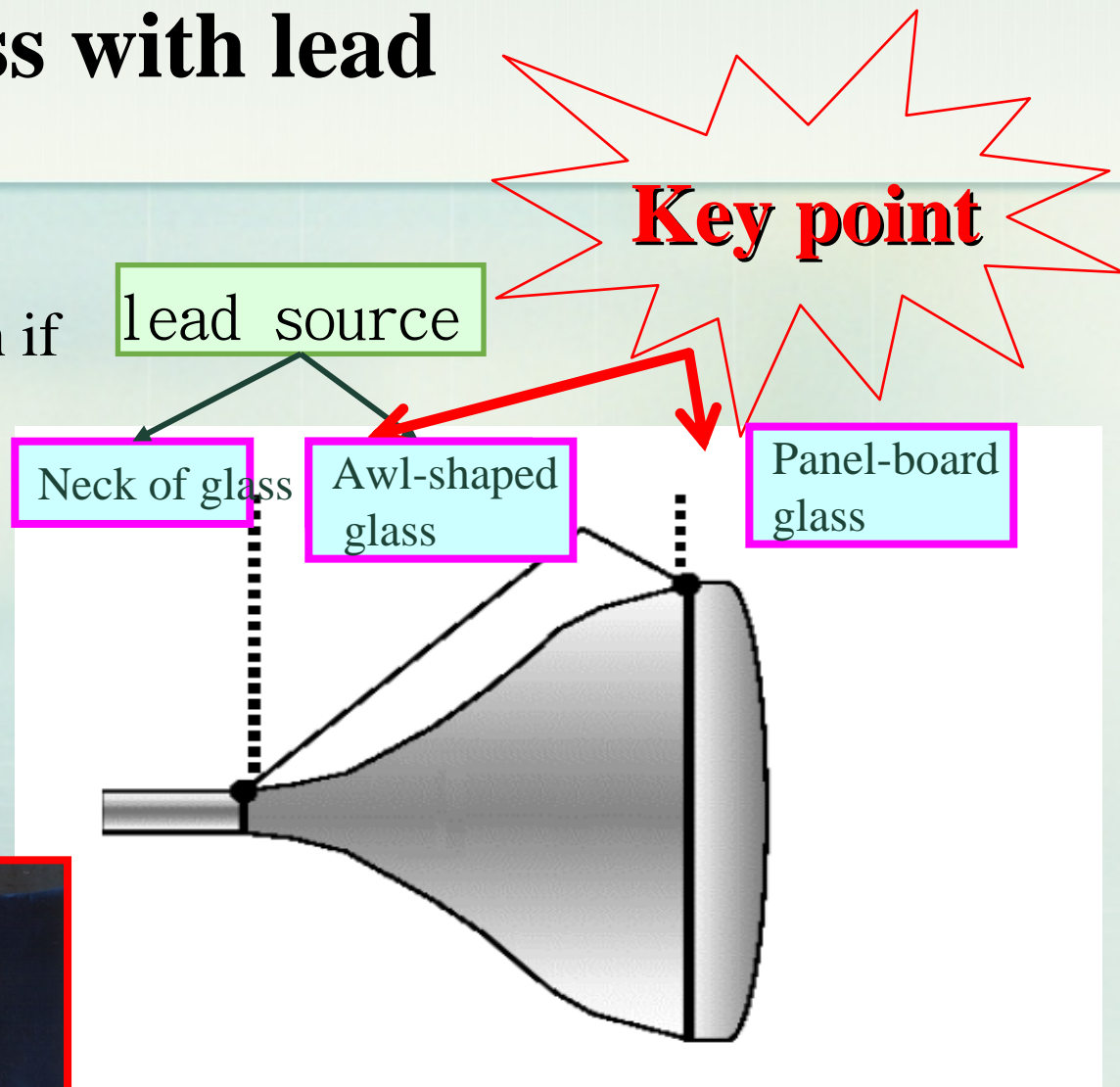
5. Lithium battery recovery



Wet processing for Lithium battery recovery 1/15

6. Recycling glass with lead

- It would lead to air pollution and acid rain if the process were incinerated.
- It would cause serious pollution if glass were buried in landfill.



CRT component

6. Recycling glass with lead

Recycling and Recovery

Waste glass from CRT

Waste CRT	Faceplate of glass	Awl-like glass
Popular kinds	<ol style="list-style-type: none">1. Flux Added for bricks/ceramics2. Used in the process of brick making	<ol style="list-style-type: none">1. Flux Added for Melted2. Used in the process of new CRT3. recycling

Potential Products with 3R

- **Ashes**

- **Sludge**

- **Electrical raff**

- **Heavy metal**

- **Waste Pickling Acid**

Technology used for 3R

•Recycling Waste Incinerator Ashes

•Electrical raff

•Heavy metal slugging

•Technique for cement

•Recovering Waste Pickling Acid

•Recycling Heavy metal