



SF₆ Emission Reduction: What Taiwan is Doing

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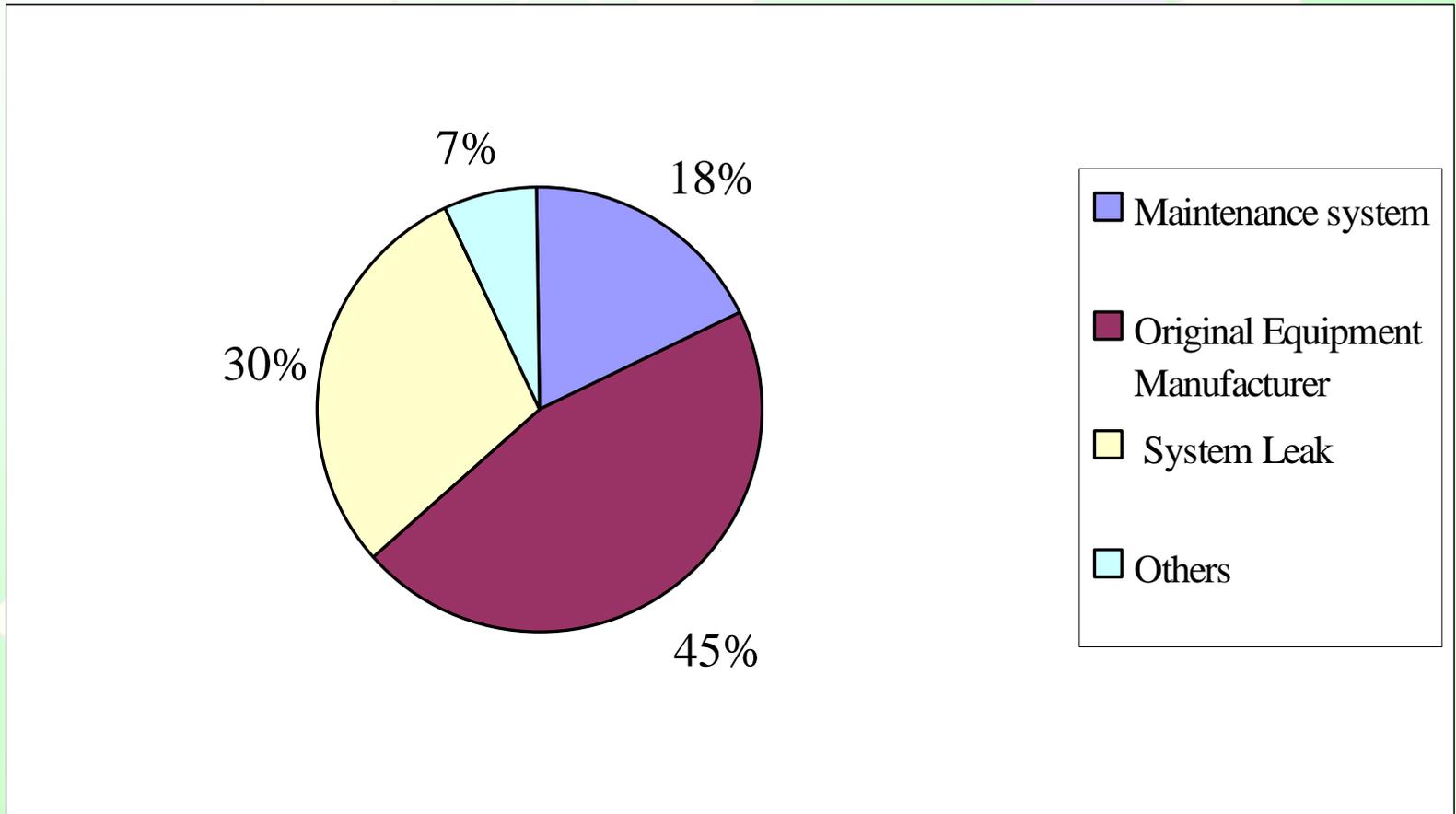


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Outline

- Uses of SF₆ in Taiwan
 - ✓ Electric power industry
 - ✓ Semiconductor industry
 - ✓ TFT-LCD industry
 - ✓ Magnesium industry
- Taiwan's SF₆ Emissions Reduction
- Future work
- Conclusions

Share of SF₆ Emission in Electric Power



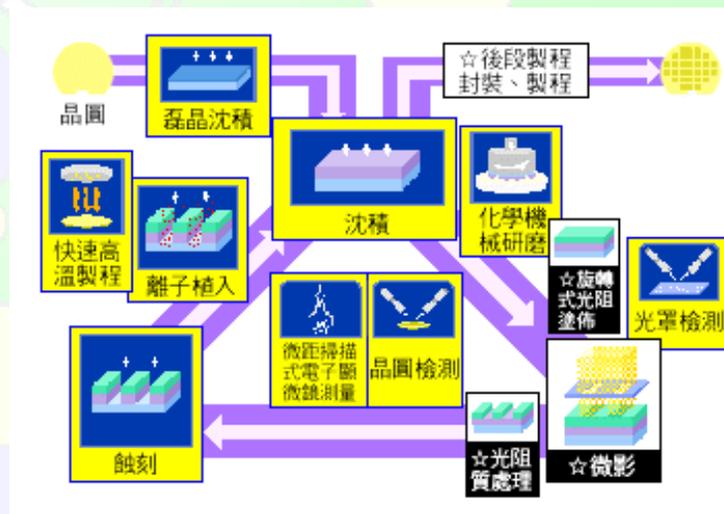
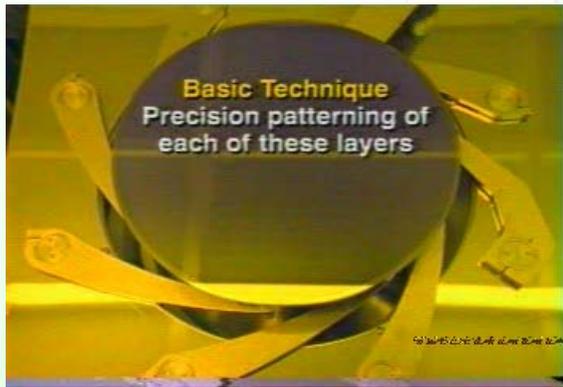
SF₆ Emissions Reduction Strategies for Electric Power Systems

- To set a maintenance center
 - ✓ For small distribution system
 - ✓ For phasing out SF₆
- To recover SF₆ in servicing SF₆ equipment
 - ✓ From international companies using larger system
 - ✓ From Local companies using small/medium system
- To inventory SF₆ emission
 - ✓ To accelerate removal older facility
 - ✓ To Plan to sign the voluntary memorandum for SF₆ emission reduction with Taiwan EPA
 - ✓ To provide the Electric power industry with personnel training through Taiwan EPA

Semiconductors and TFT-LCD SF₆ Use

PFCs: C₂F₆, CF₄, CHF₃, SF₆, NF₃, C₃F₈, C₄F₈

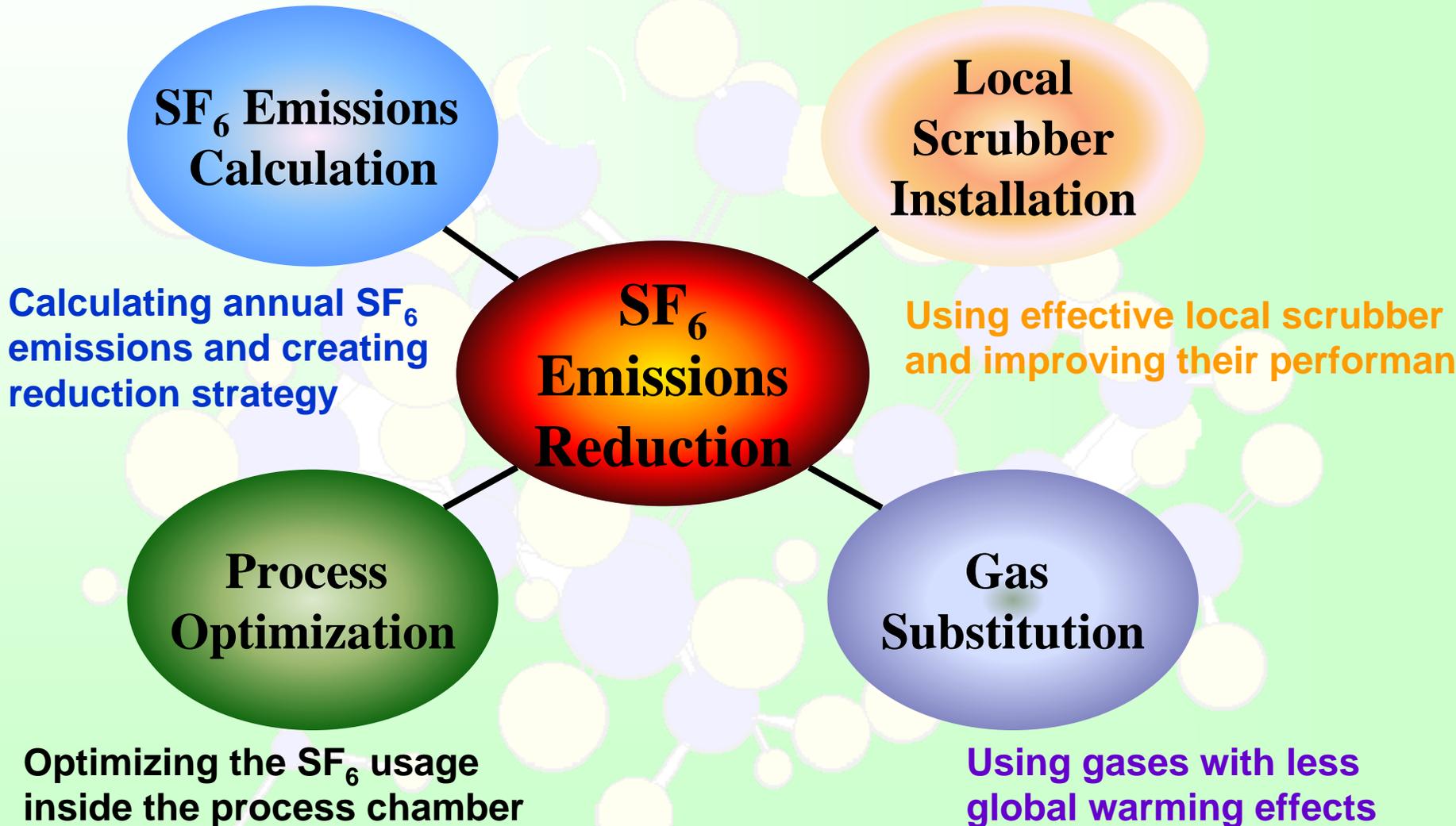
1. CVD chamber cleaning



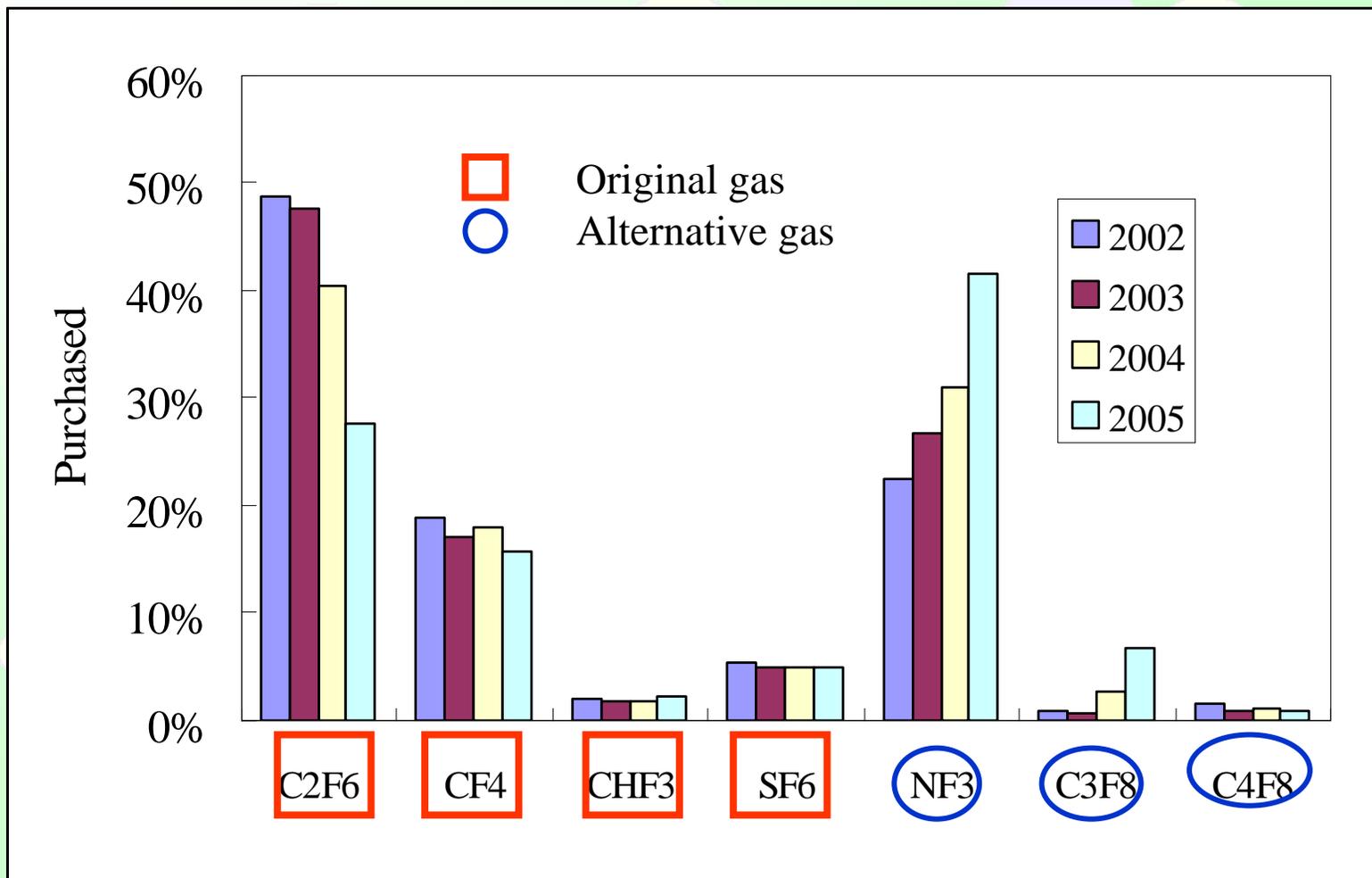
2. Dry-etching processes.



The Technologies of SF₆ Emission Reduction



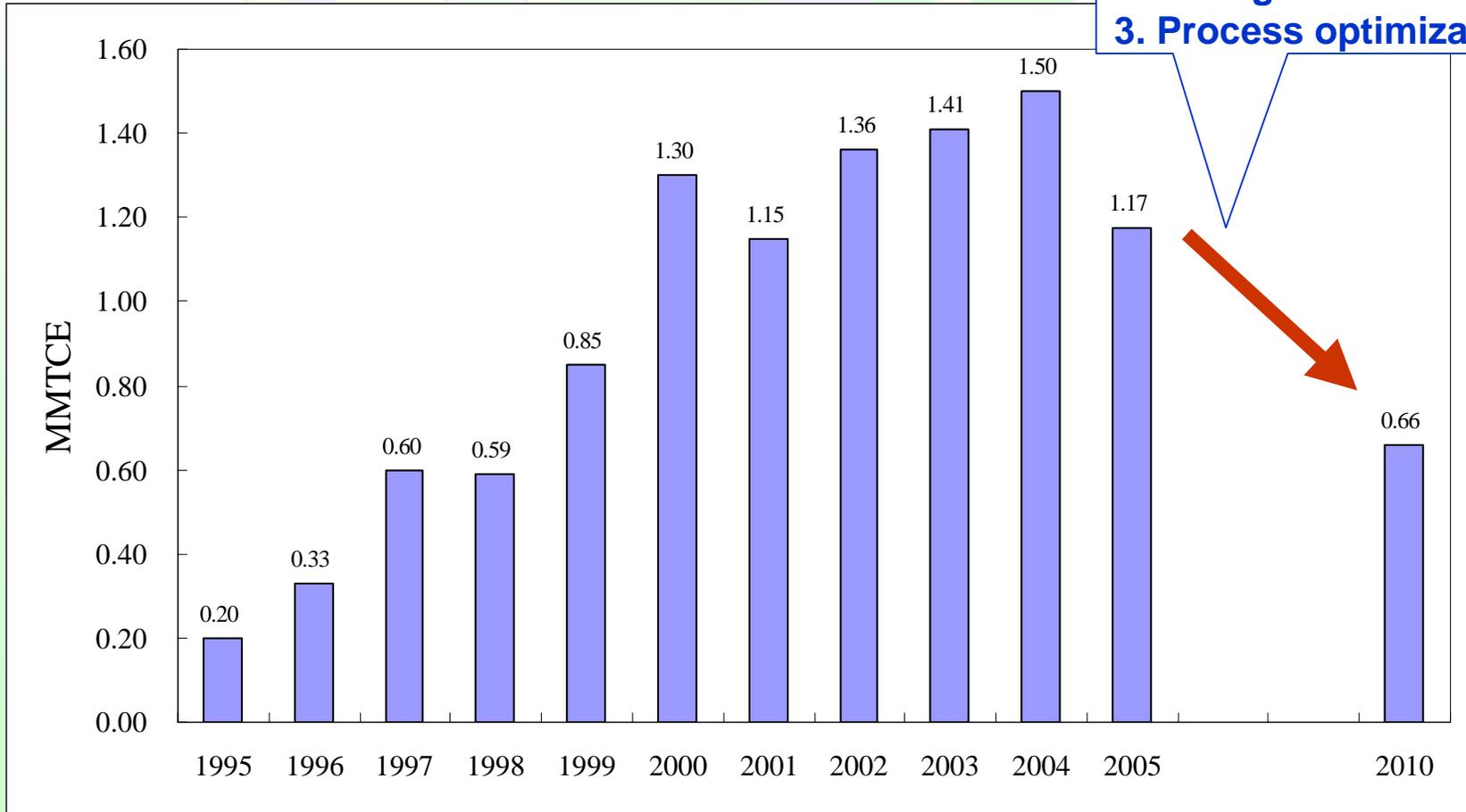
TSIA PFC Gas Purchase Share



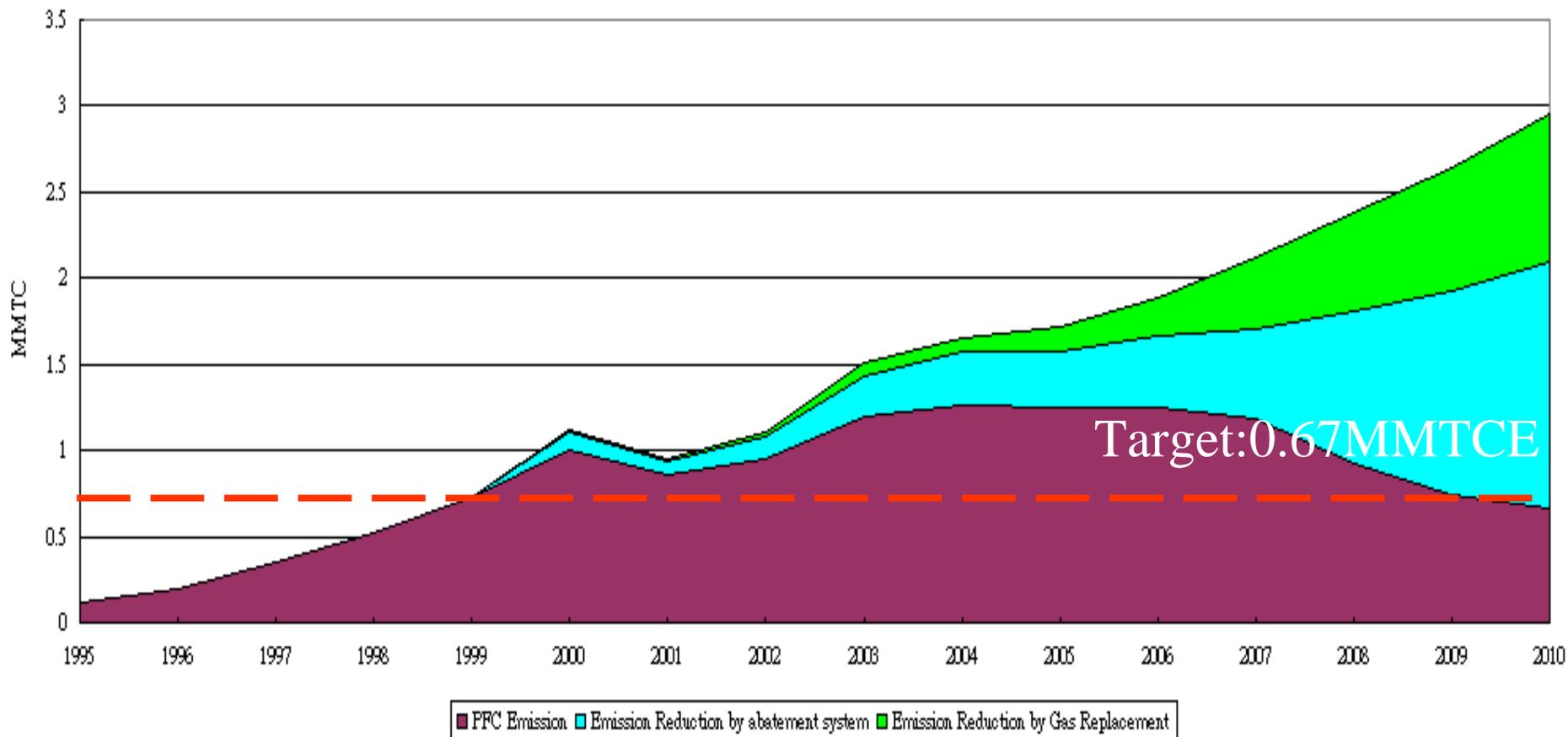
Trend up: NF3, C3F8
Trend down: CF4, C2F6, SF6

TSIA PFC Emission Data

1. Install abatement system.
2. Change chemicals.
3. Process optimization



Achieving the TSIA Emission Roadmap Goal



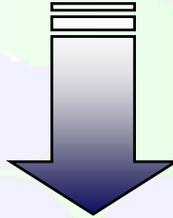
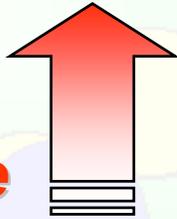
■ PFC Emission ■ Emission Reduction by abatement system ■ Emission Reduction by Gas Replacement

TFT-LCD Products

Small size

Medium size

Large size



Cellular Phone



Digital Still Camera



Portable DVD



Notebook PC



LCD TV

LCD Monitor



PDA



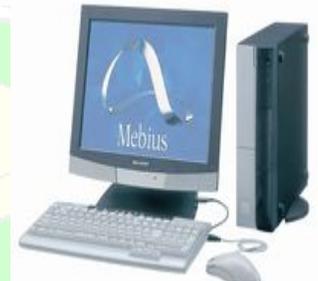
Portable AV



Car Navigation



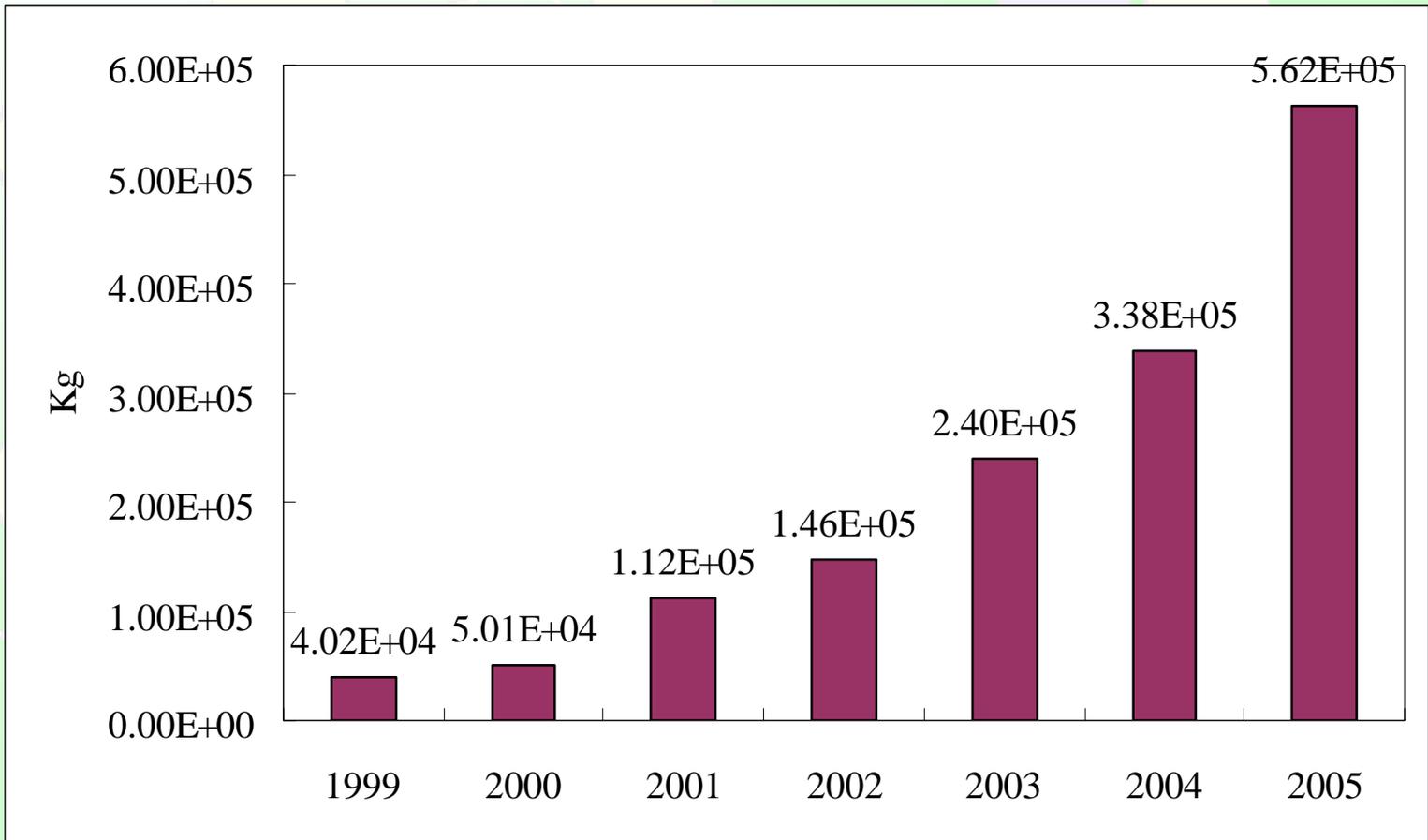
Tablet PC



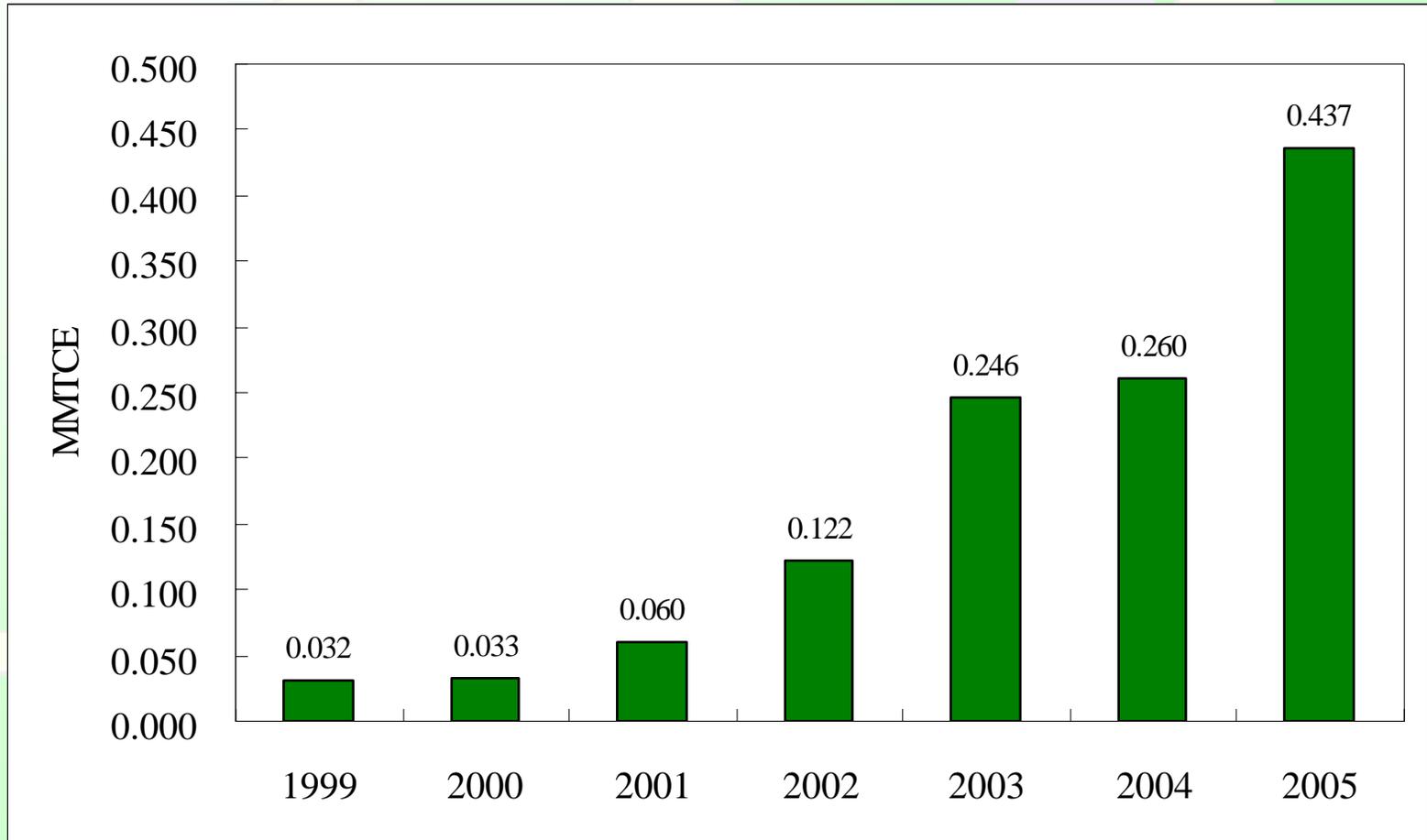
Desktop PC



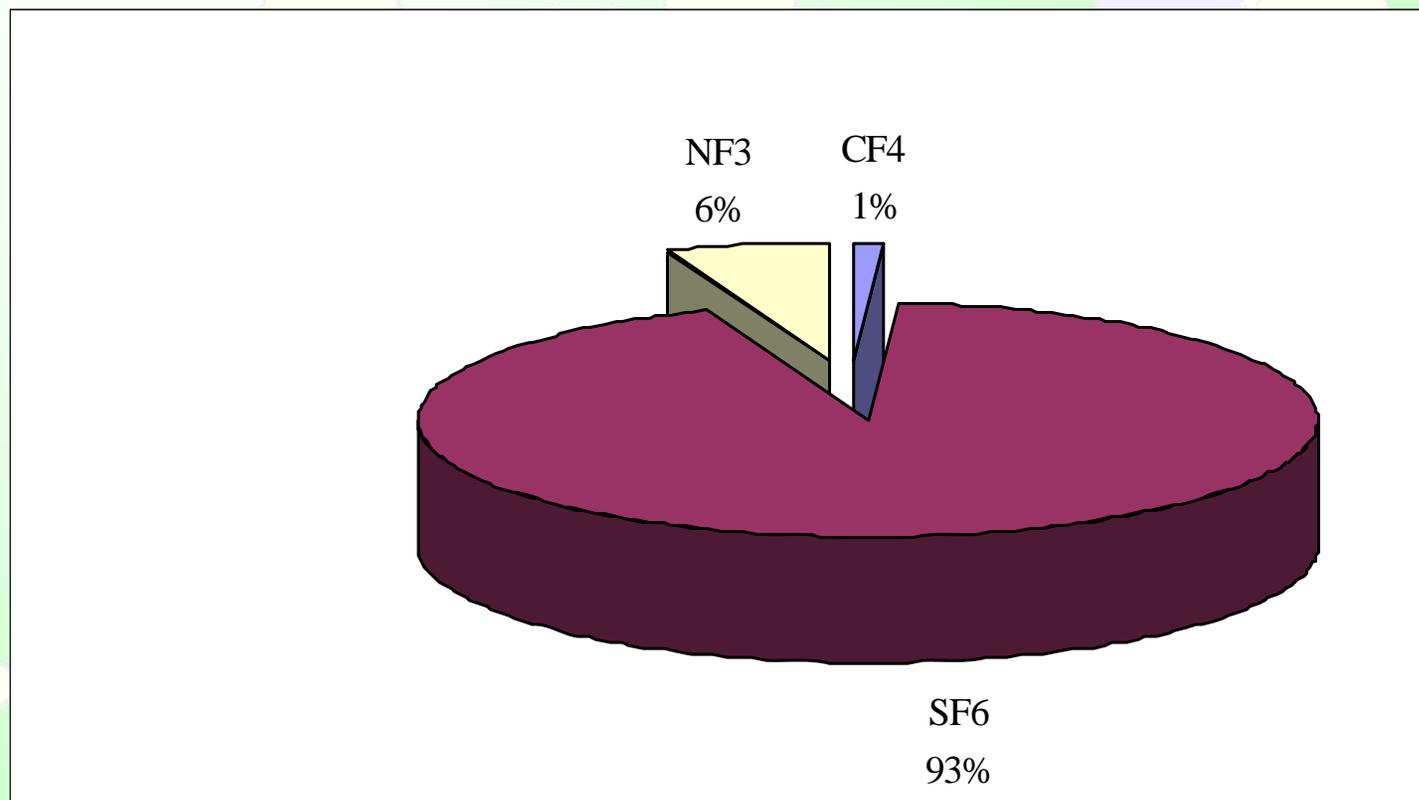
TTLA SF₆ Gas Purchase



TTLA SF₆ Emission



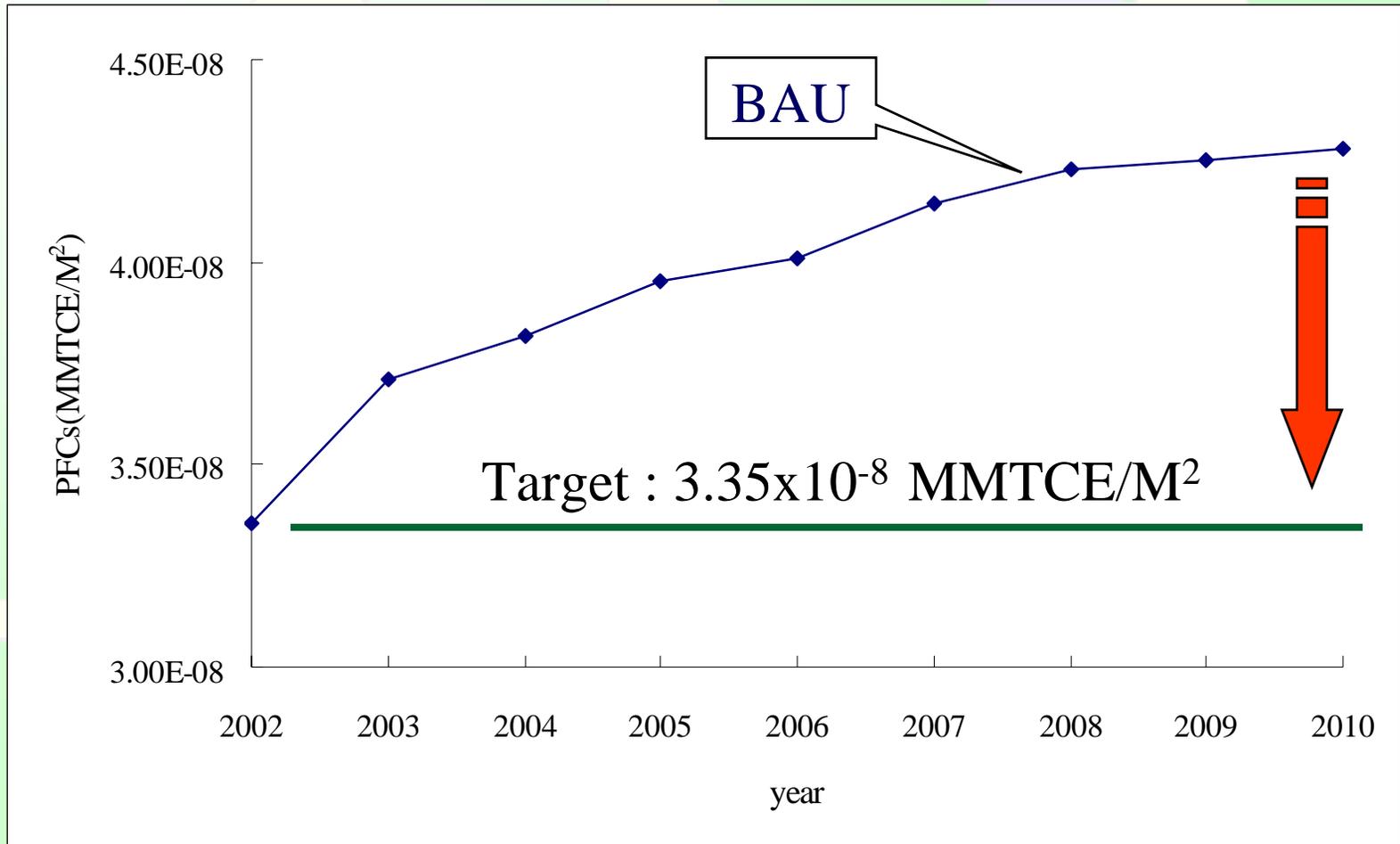
TFT-LCD PFCs Use



The TTLA's total PFCs of emissions was 0.46 MMTCE in 2005

TTLA: Taiwan TFT-LCD Association

TTLA Roadmap for PFC Emission Reduction

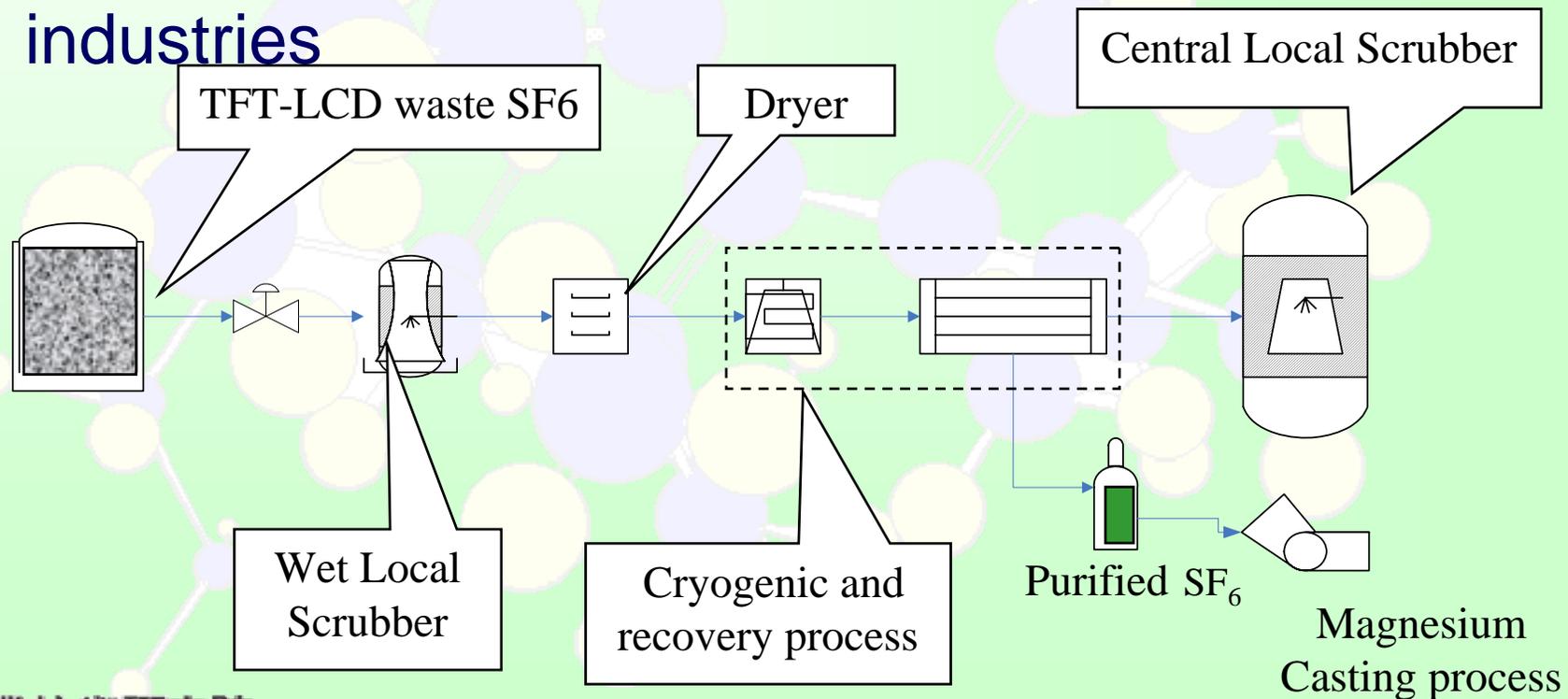


TTLA PFCs Abatement strategy

- To Join World TFT-LCD Association, to achieve the PFCs emission reduction goal for Taiwan, Japan and Korea
- To Sign the voluntary memorandum for PFCs emission reduction with Taiwan EPA
 - ✓ Taiwan EPA will assist TTLA in reporting and checking the PFCs emission amount and provide support
 - ✓ TTLA agrees to choose 2002 as the base year for PFCs emission reduction
 - ✓ To use the PFCs emission intensity 0.0335 Million tonnes carbon equivalent/square meter substrate area used
 - ✓ All new Fabs will set up PFC abatement system after 2003
- Implement reduction measures on the use and emission of PFCs.
 - ✓ Local Scrubber Installation
 - ✓ GHG Emissions Calculation and Verification to seek where PFCs can be reduction emission

Future work for SF₆ reduction emissions

- To Accelerate to set up SF₆ abatement system for old TFT-LCD plants
- To recycle the SF₆ emission transited to other industries



Applications of Magnesium in Taiwan

Supply industry	Products
1. Notebook PC	Casing & Interior framework
2. Consumer Electronic	Camcorders, Digital cameras, PDAs, MDs, LCD projectors, Internet appliances
3. Communication	Mobile phones
4. Automotive Industries	Engine covers, Airbag housings, Steering wheels
5. Bicycle Industry	Fork Sliders, Pedals, Frames, Cranes, Hubs, Stems

TMA SF₆ Abatement Strategy

- There are 19 companies in TMA(Taiwan Magnesium Association) which used SF₆ in 2005
- Taiwan EPA is working with TMA to assess substitute gases in hopes of reducing the use and emission of SF₆.
- Current substitute gases in priority include SO₂, HFC-134a , Novec TM 612 and other cover gases
- TMA will cooperate with TTLA's members to reuse the SF₆ to get Win-Win benefit

Conclusion

- SF₆ emission from Industry is less than 0.1% of greenhouse gases in Taiwan
- The Taiwan semiconductor industry and TFT-LCD industry have signed with EPA MOU to commit to greenhouse gas reduction target
- Power industry and magnesium aluminum alloy industry are working with EPA to recover SF₆ and assess substitute gases in hope of reducing the use and emission of SF₆.
- Taiwan will continue to develop energy saving methods and improve manufacturing processes to reduce the use and emission of SF₆ and to study the post-Kyoto protocol strategy



Thank You