

# **Chemicals management policy issues in China: Social and economic analysis of HBCD as a case study**

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# 中国化学品管理政策问题： 以HBCD社会经济分析为例

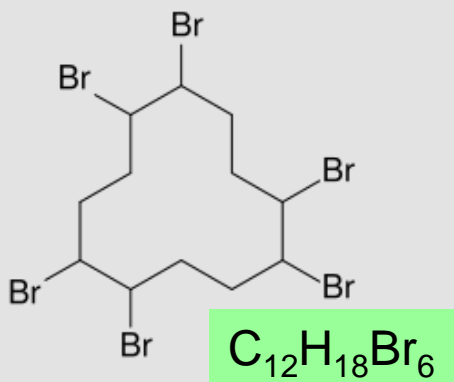
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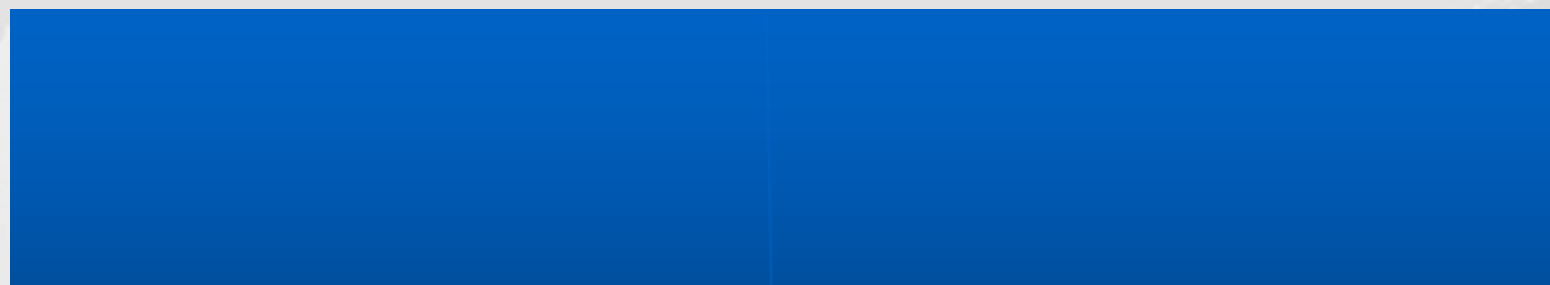
4.21, 2015. 北京

# Background

## ● Hexabromocyclododecane(HBCD/HBCDD)



- ✓ One of the world's Top 3 BFRs
- ✓ Global production at ~28,000 tones/y
- ✓ Mainly used in polystyrene foam(EPS & XPS) for insulation and construction

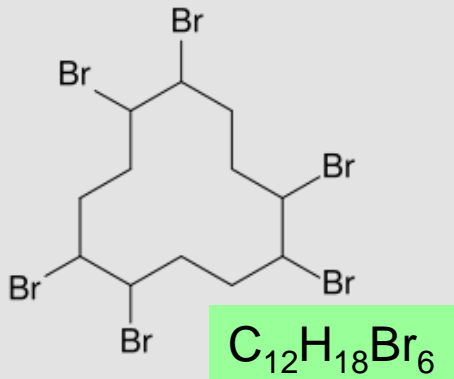


PVC for cable sheatings

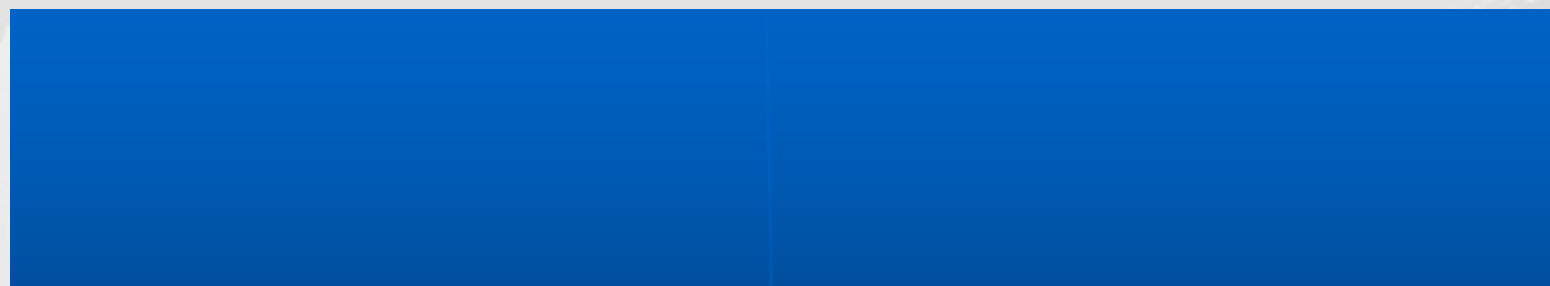


# 背景

## ● 六溴环十二烷(HBCD/HBCDD)



- ✓ 世界三大溴代阻燃剂之一
- ✓ 全球产量约为**28,000** 吨/年
- ✓ 主要用于保温及建筑用途的泡沫聚苯乙烯 (EPS & XPS)



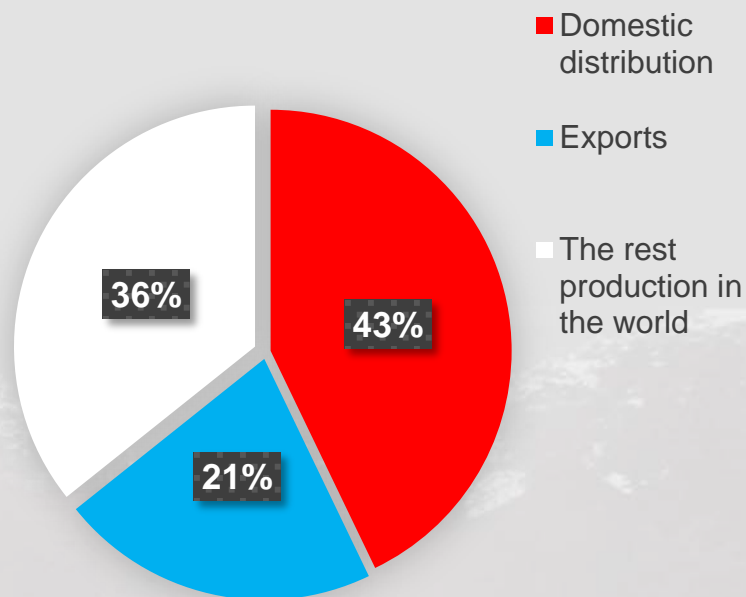
PVC for cable sheatings



# Background

- **China is the world biggest HBCD producer and user**

- ✓ **The HBCD production in China was ~18,000 tons in 2010, accounting for 64% of the total in the world;**
- ✓ **There is a growing trend of the demand of HBCD in the next decade in China.**

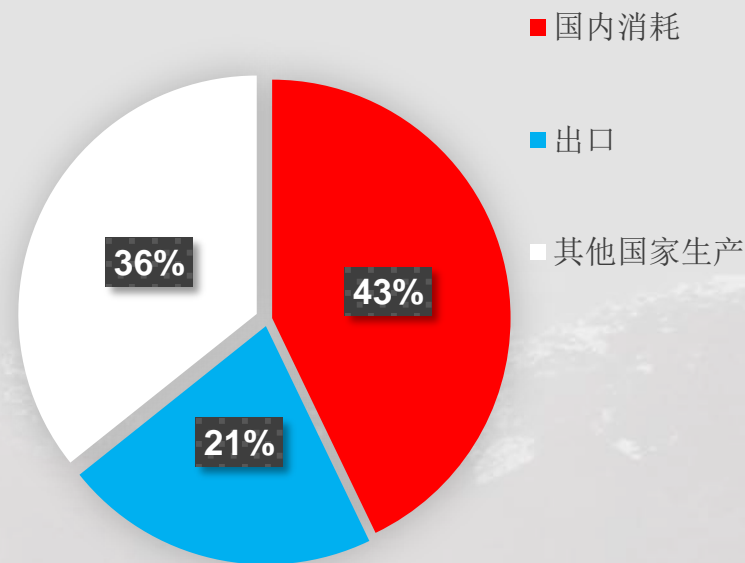


**HBCD production in China and the World in 2010**

(Date source: BIT, 2011; POPRC,2011)

- 目前中国是世界上最大的**HBCD**生产和使用国家

- ✓ 中国**2010年HBCD**的产量约为**18,000吨**，占世界总量的**64%**;
- ✓ 中国未来十年对**HBCD**的需求将保持增长趋势。



2010年中国及世界**HBCD**的生产状况

(Date source: BIT, 2011; POPRC,2011)

# Background

- **HBCD was reviewed as a **POPs** and proposed to be listed in the Stockholm Convention (2008-2012)**



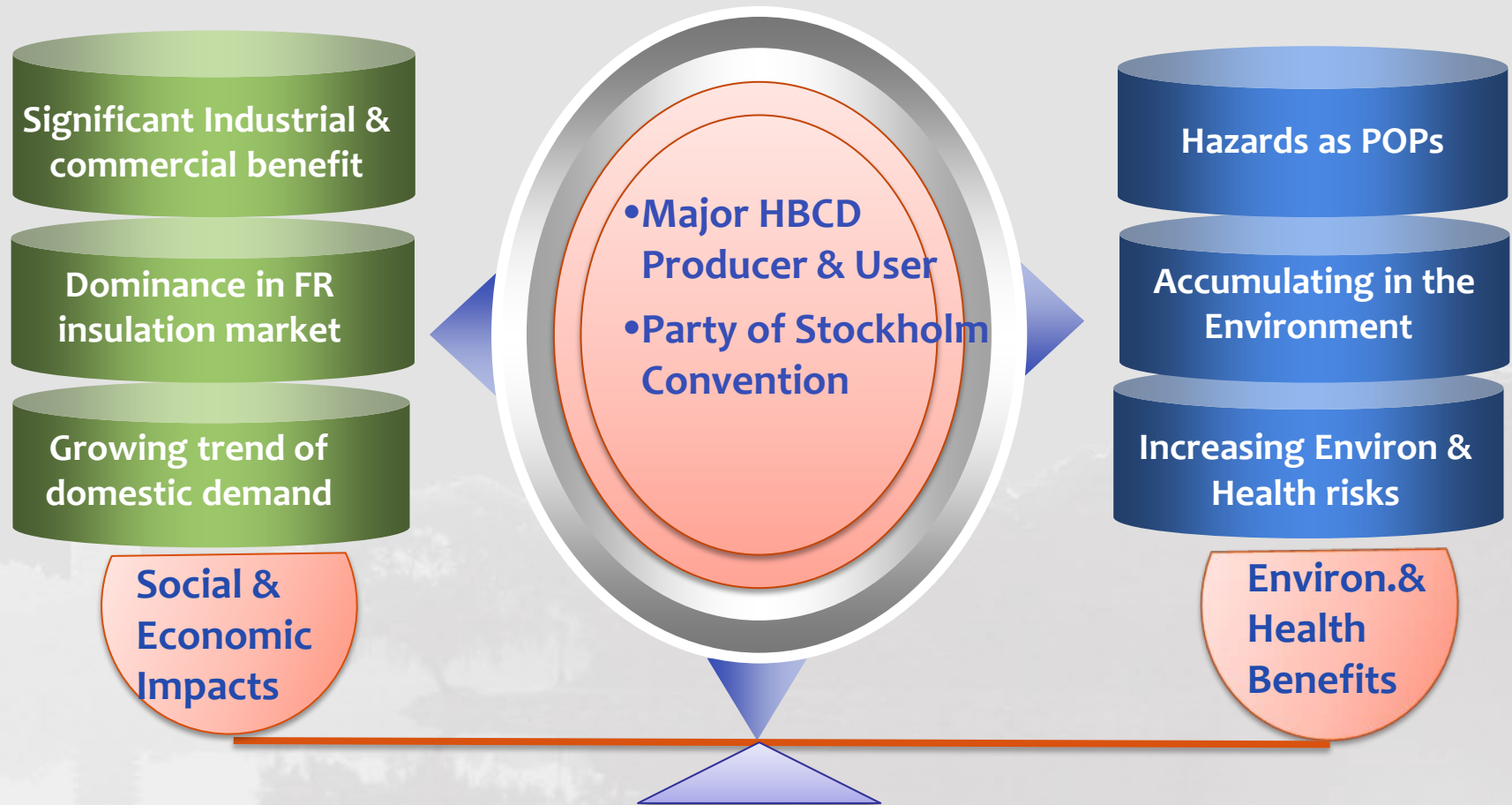
- ✓ Persistent in the environment
  - ✓ Strong potential to bioaccumulate
  - ✓ Potential for long-range environmental transport
  - ✓ Very toxic to aquatic organisms
  - ✓ Neuroendocrine and developmental toxicity
- 
- HBCD:to be phased out of global production&use

- **HBCD 被评估为一种持久性有机物，且被提出增列入 斯德哥尔摩公约(2010-2011)**

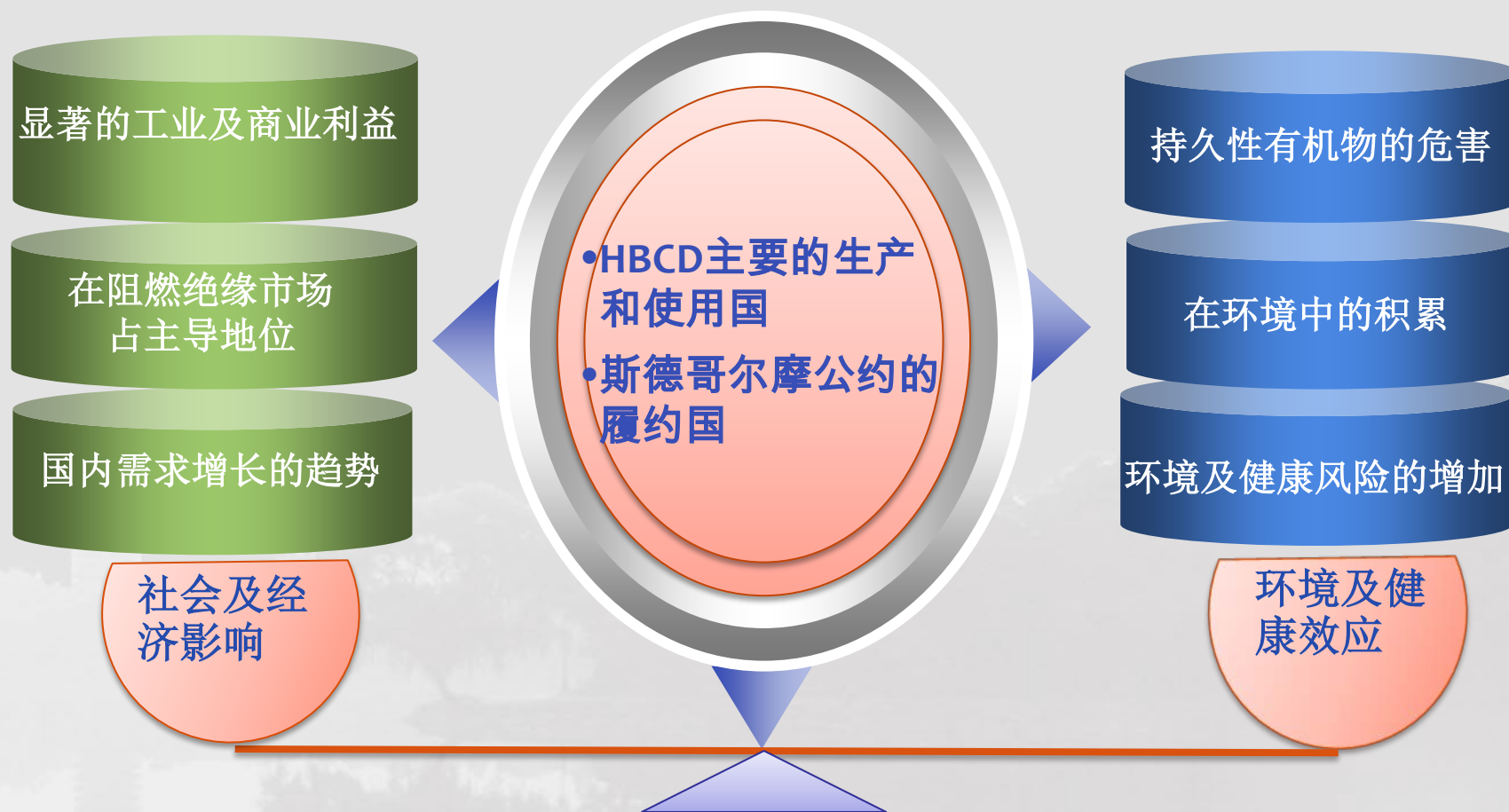
- ✓ 持久性
- ✓ 巨大潜力的生物蓄积性
- ✓ 对水生生物的高毒性
- ✓ 神经和发育毒性



# Chemicals management policy issues in China:



# 中国化学品管理政策问题：



# Social & Economic Analysis (SEA)

- **SEA :**

**A necessary approach to decision-making of a particular risk management action, although approaches to it vary in different countries. (OECD,2000)**

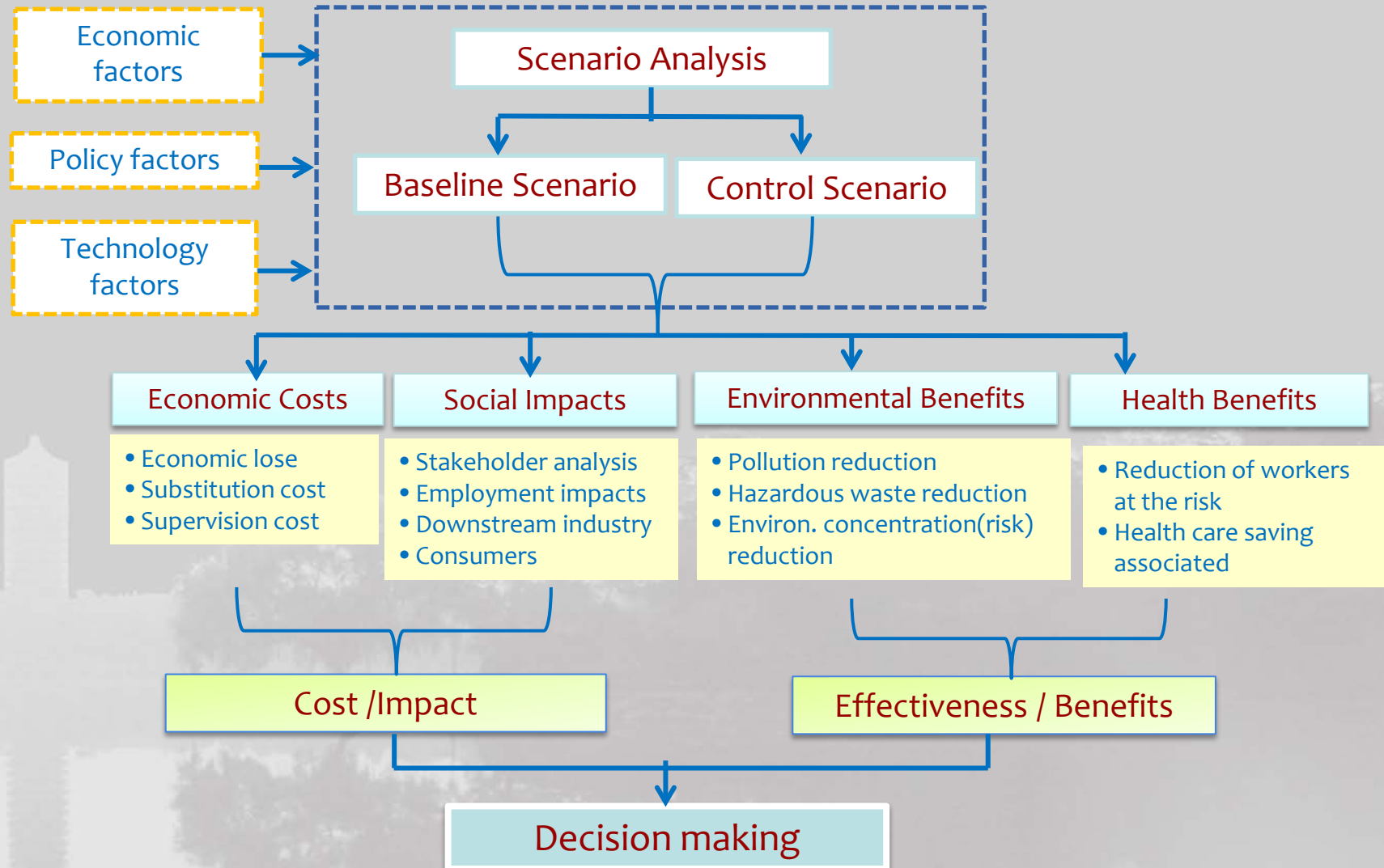
- SEA was emphasized by the emerging regulatory systems chemicals in the world, e.g., EU-REACH

# 社会经济分析 (SEA)

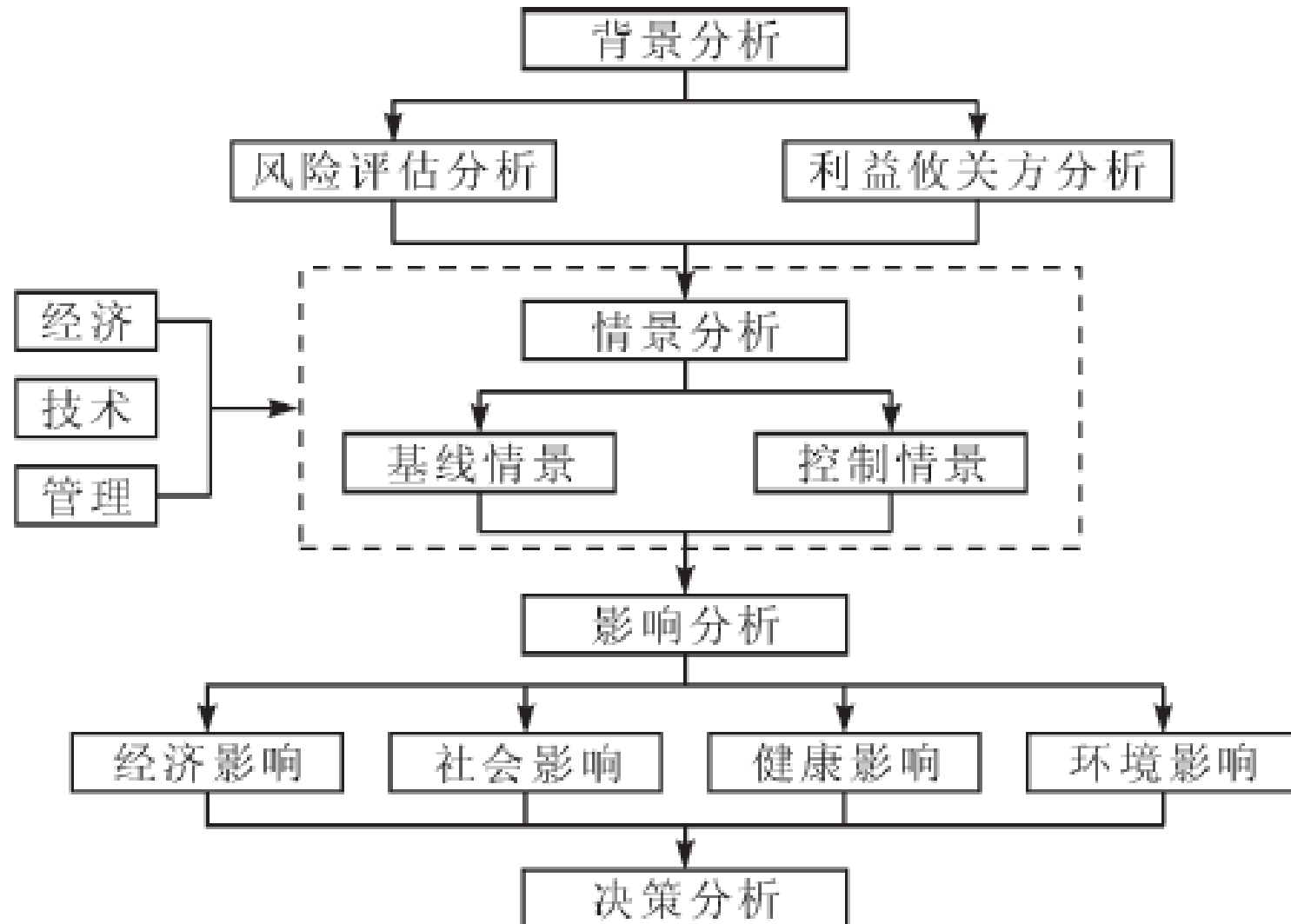
- **SEA :**

对于特定风险管理行为决策的必要手段，尽管在不同国家手段不同。 (OECD,2000)

# SEA approaches in our study



# SEA approaches in our study



# Scenario Analysis

## ● Baseline scenario:

### ➤ Economic factors:

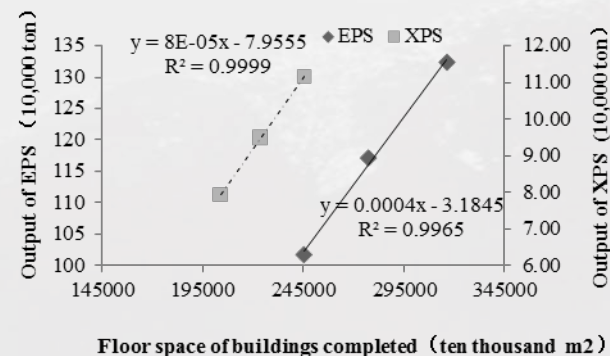
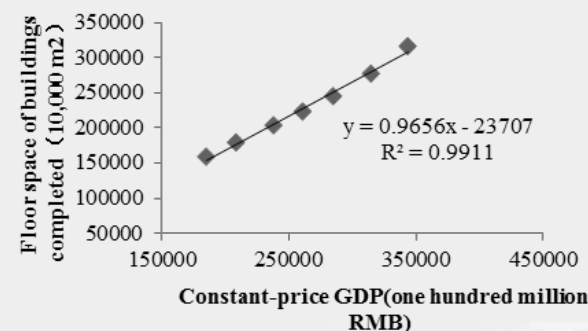
- ✓ Growing house building industry

### ➤ Policy factors:

- ✓ Energy saving plan for buildings
- ✓ Firefighting code for building construction

### ➤ Alternative technologies:

- ✓ Polyurethane (PU)
- ✓ Emerald 3000 (EM 3000)
- ✓ Others: e.g., expanded graphite



- HBCD consumption will keep increasing in the next decade in China if there was no restriction about it

# 情景分析

## ● 基线情景：

### ➤ 经济因素：

✓ 房地产业的发展

### ➤ 政策因素：

✓ 建筑节能规划

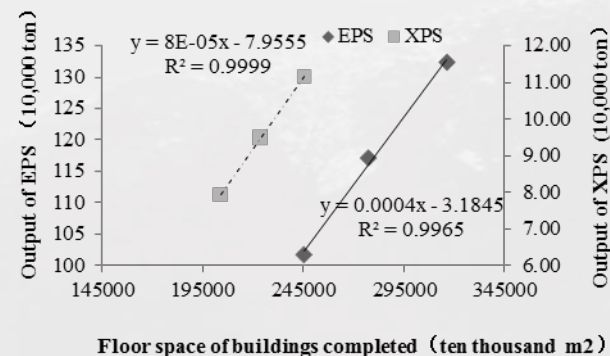
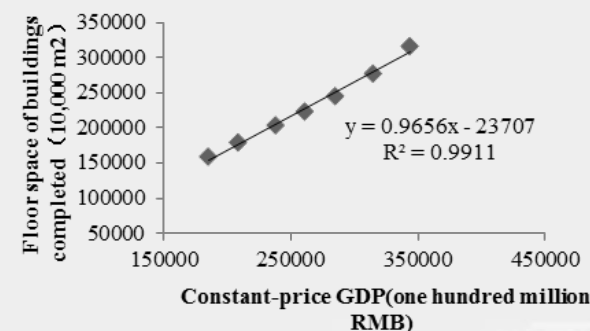
✓ 对建筑的消防规范

### ➤ 替代技术：

✓ 聚氨酯 (PU)

✓ Emerald 3000 (EM 3000)

✓ 其他：e.g., 可膨胀石墨



□ 如无限制性政策，HBCD的消费量在未来十年将持续增长

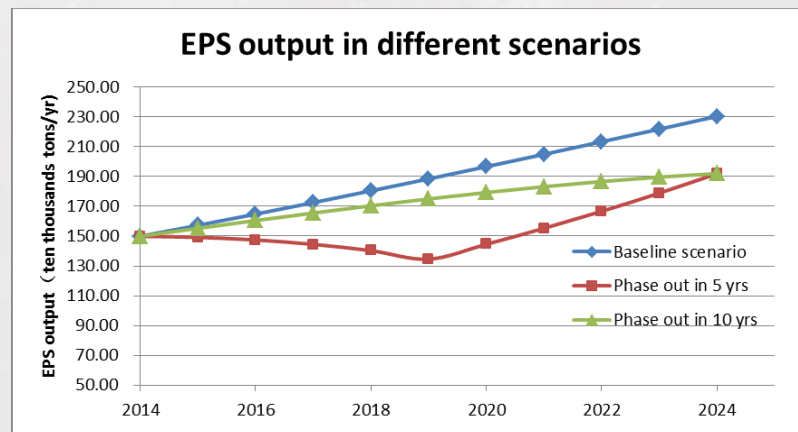
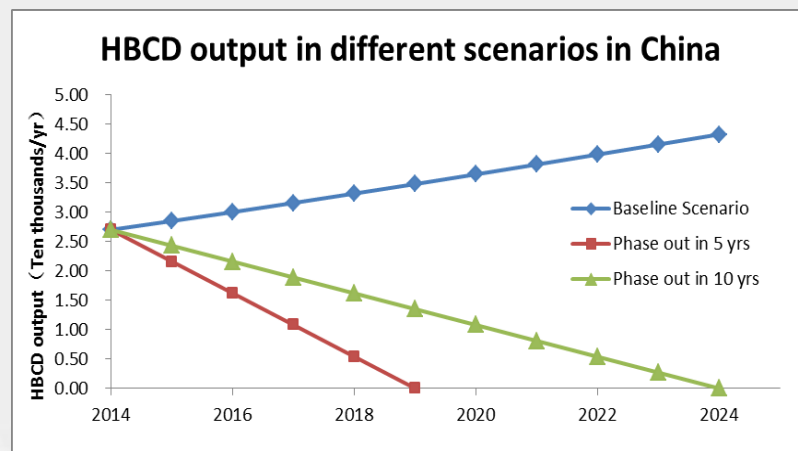
# Scenario Analysis

## ● Control scenario:

### ➤ Scenarios for China to implement the Stockholm Convention

✓ 5 years of specific exemption:

✓ 5+5 years of specific exemption:



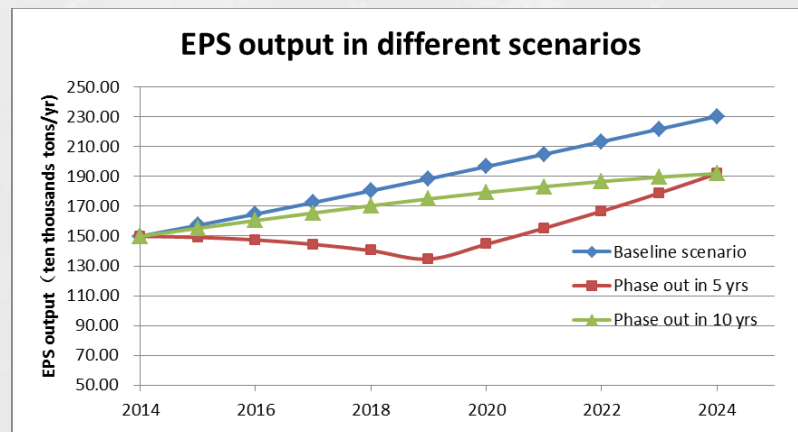
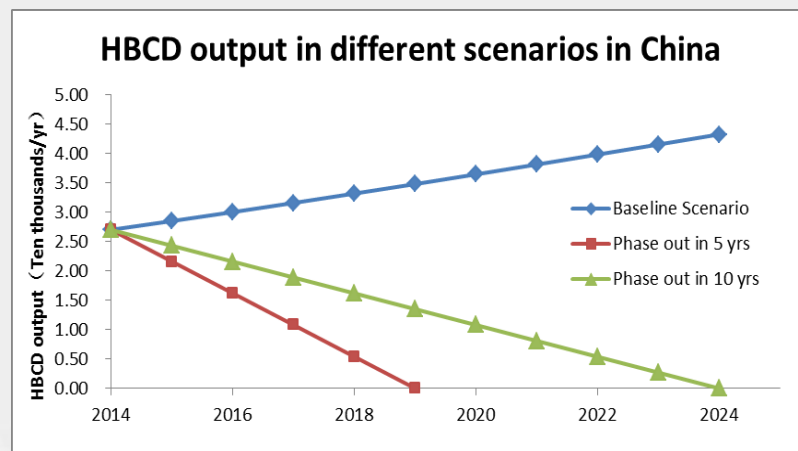
# 情景分析

## ● 控制情景:

➤ 中国履行斯德哥尔摩公约的情景

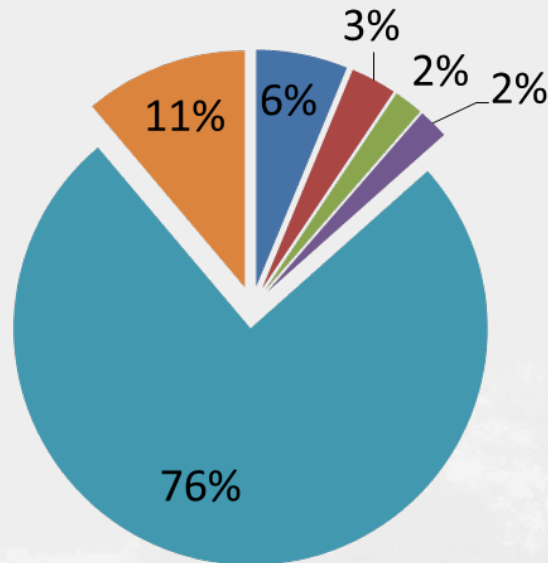
✓ 5年特定豁免：

✓ 5+5年特定豁免：



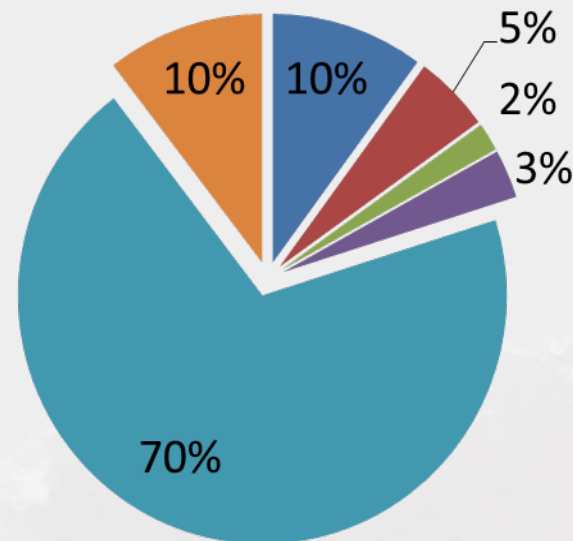
# Economic costs of HBCD phase out in China

5-year phase-out scenario



~19.02 billion yuan in total

10-year phase-out scenario



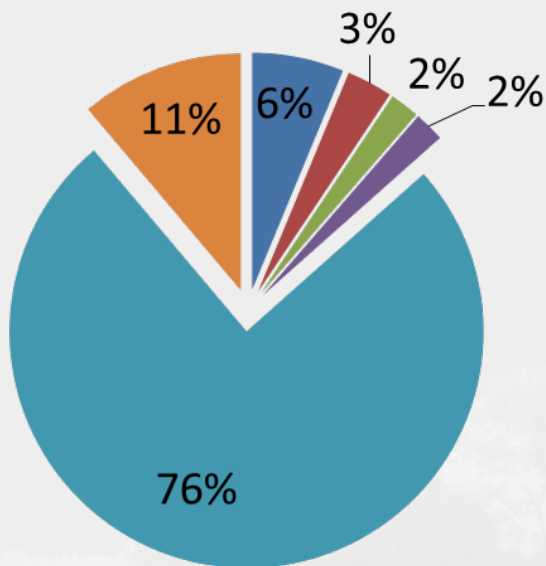
~ 9.03 billion yuan in total

- loss of HBCD domestic sale profits
- loss of HBCD export sale profits
- loss of EPS resin export sale profits
- replacement costs of HBCD
- replacement costs of EPS foams
- replacement costs of XPS foams

■ HBCD phase out in the 10-years scenario has much lower economic costs than that in the 5-years scenario; However, these Econ. Costs could only increase the housing construction cost about 0.007~0.014% per unit area(fairly small)

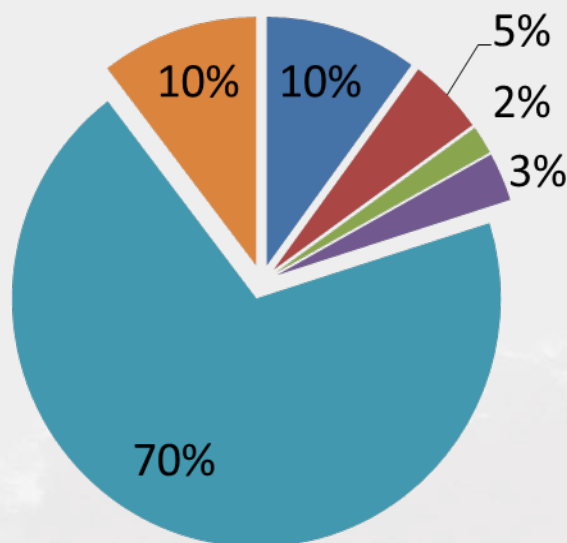
# 中国淘汰HBCD的经济成本

5年淘汰情景



共计约190.2亿元

10年淘汰情景



共计约90.3亿元

- HBCD国内销售利润损失
- HBCD出口利润损失
- EPS树脂出口利润损失
- HBCD替代成本
- EPS泡沫替代成本
- XPS泡沫替代成本

□ 相比于五年情景，十年情景下淘汰HBCD具有更少的经济成本；但是，这种经济成本仅仅将导致房屋建造成本每单位面积增加约0.007~0.014%（相当的小）

# Social impacts of HBCD phase out in China

- **Employment impacts:**

- The action of HBCD phase out could elevate the urban unemployment rate about 0.6% at the worst case(impossible in fact)

- **Impacts on downstream industries :**

- Increase the production cost of FR-EPS/XPS processors about 1.6~3.3%

- **Impacts on end consumers:**

- Increase the cost per unit area of buildings less than 0.4 yuan

□ Social impacts of the HBCD phase-out actions would be small.

# 中国淘汰HBCD的社会影响

- 对就业的影响:

- HBCD的淘汰在最坏情况下（现实中不可能发生）可造成城市失业率提升约0.6%

- 对下游行业的影响:

- 增加阻燃EPS/XPS生产成本约1.6~3.3%

- 对最终消费者的影响:

- 增加建筑成本约每单位面积低于0.4元

- HBCD淘汰的社会影响小

# Environmental benefits of HBCD phase out in China

- **Pollution reduction/prevention:**

- **Reduced HBCD release and hazardous wastes by HBCD phase-out in China from 2015 to 2024 (Unit: 10,000 tons)**

	<b>Reduced HBCD release to the environment</b>	<b>Avoided hazardous wastes* to be generated ( which need to be properly treated in future)</b>
<b>5-years phase-out scenario</b>	0.0029	1468.9
<b>10-years phase- out scenario</b>	0.0023	1141.5

\*POPs (HBCD) contained EXP/XPS construction waste after use

# 中国淘汰HBCD的环境效益

## ● 污染减少/防治:

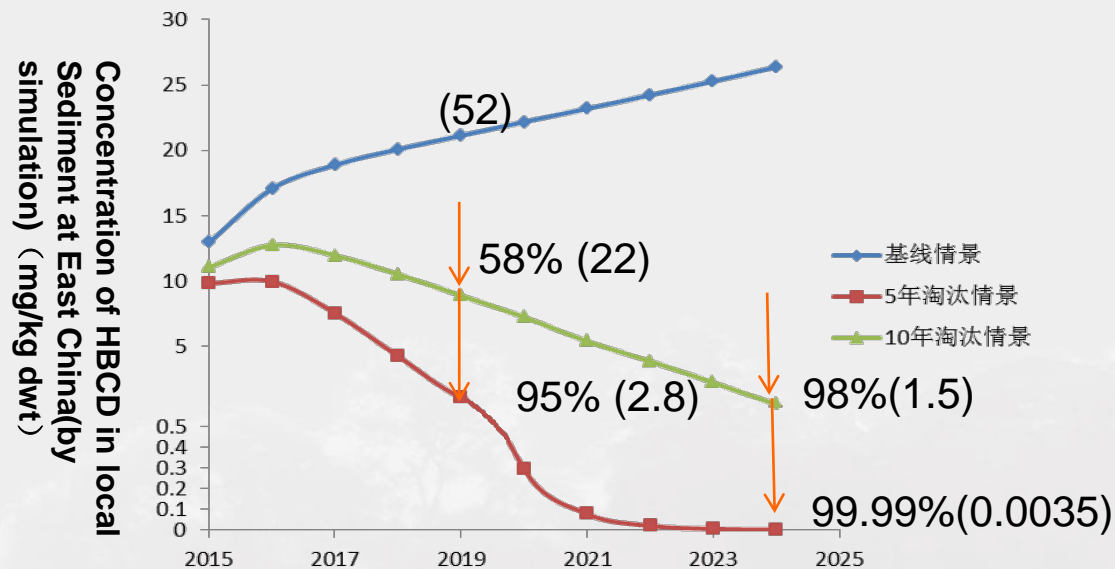
- 通过淘汰HBCD, 在2015-2024期间可以减少HBCD排放和危害废物量: (单位: 10,000 吨)

减少向环境的HBCD排放 避免危险废物*的产生 (将来需要进行处置)		
5年淘汰情景	0.0029	1468.9
10年淘汰情景	0.0023	1141.5

\*使用后的包含EPS/XPS的建筑废物中的持久性有机物 (HBCD)

# Environmental benefits of HBCD phase out in China

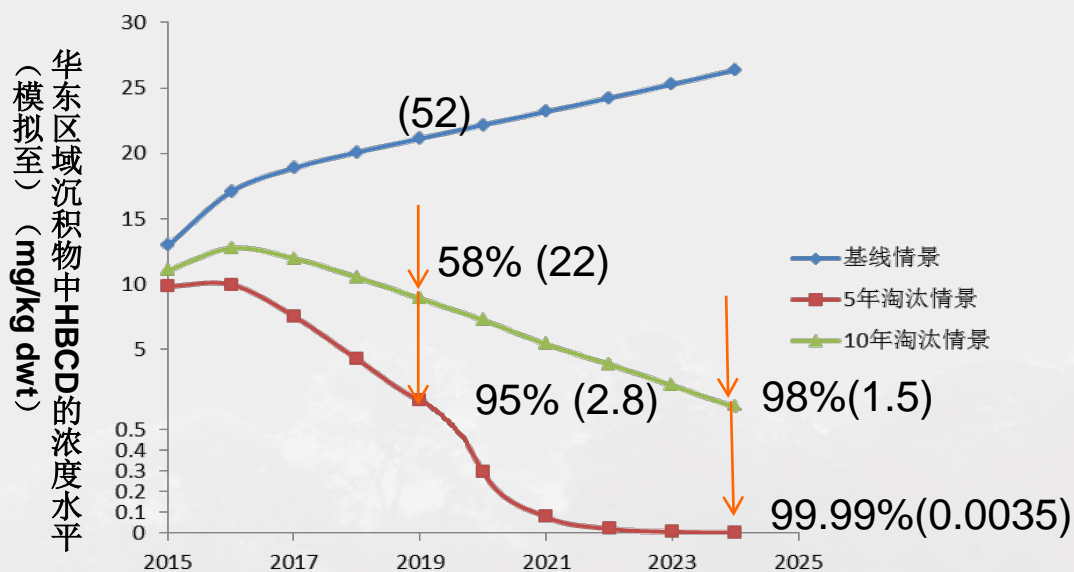
## ● Environmental concentration/risk reduction:



- Environmental benefits in 5-year phase-out scenario would be more significant than that in the 10-year.

# 中国淘汰HBCD的环境效益

## ● 环境浓度/风险的消减:



□ 五年淘汰情景下的环境效益较十年情景更为明显。

# Health benefits of HBCD phase out in China

- **Avoided workers at the risk and health care saving**

	Unit	5-years phase-out Scenario	10-years phase-out Scenario
<b>Avoided workers at risk</b>	Ten thousand	12.8	9.96
<b>Health care saving</b>	Billion RMB	4.033	3.067

- Phasing out HBCD in 5-year scenario would introduce much more significant health benefits than that in the 10-year scenario.

# 中国淘汰HBCD的健康效益

## ● 可避免的处于风险的工人数量及健康效益

- 通过淘汰HBCD，在2015-2024年可避免处于风险的工人数量及产生的健康效益

	单位	5年淘汰情景	10年淘汰情景
避免处于风险的工人数量	百万	0.128	0.0996
健康效益	十亿人民币	4.033	3.067

- 五年情景下淘汰HBCD的健康效益将较十年情景下更为显著。

# Conclusion

- Although the total economic costs of HBCD phase-out for China to implement the Stockholm Convention seems to be significant, it will only have a marginal impact on the house building industry in China;
- On the other hand, the HBCD phase-out may bring out significant environmental and health benefits to the country;
- The case study suggest that phasing out HBCD in 5-year scenario will be a better policy choice for China to implement the Stockholm Convention.

# 结论

- 尽管中国履行斯德哥尔摩公约淘汰HBCD造成的总经济成本貌似显著，然而对中国房地产行业仅造成边际影响；
- 另一方面，淘汰HBCD将带来显著的环境和健康效益；
- 本案例研究建议中国履行斯德哥尔摩公约淘汰HBCD五年情景将是更好的政策选择。

## Acknowledge:

Fund from Ministry of Environmental Protection of China(MEP), supports from China Flame Retardant Society (CFRS) and the China Plastics Processing Industry Association(CPPIA), Prof. Zheng-Mao Zhou & Prof. Li-Jun Qian of CFRS, etc.

Thanks for your  
attention !

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