

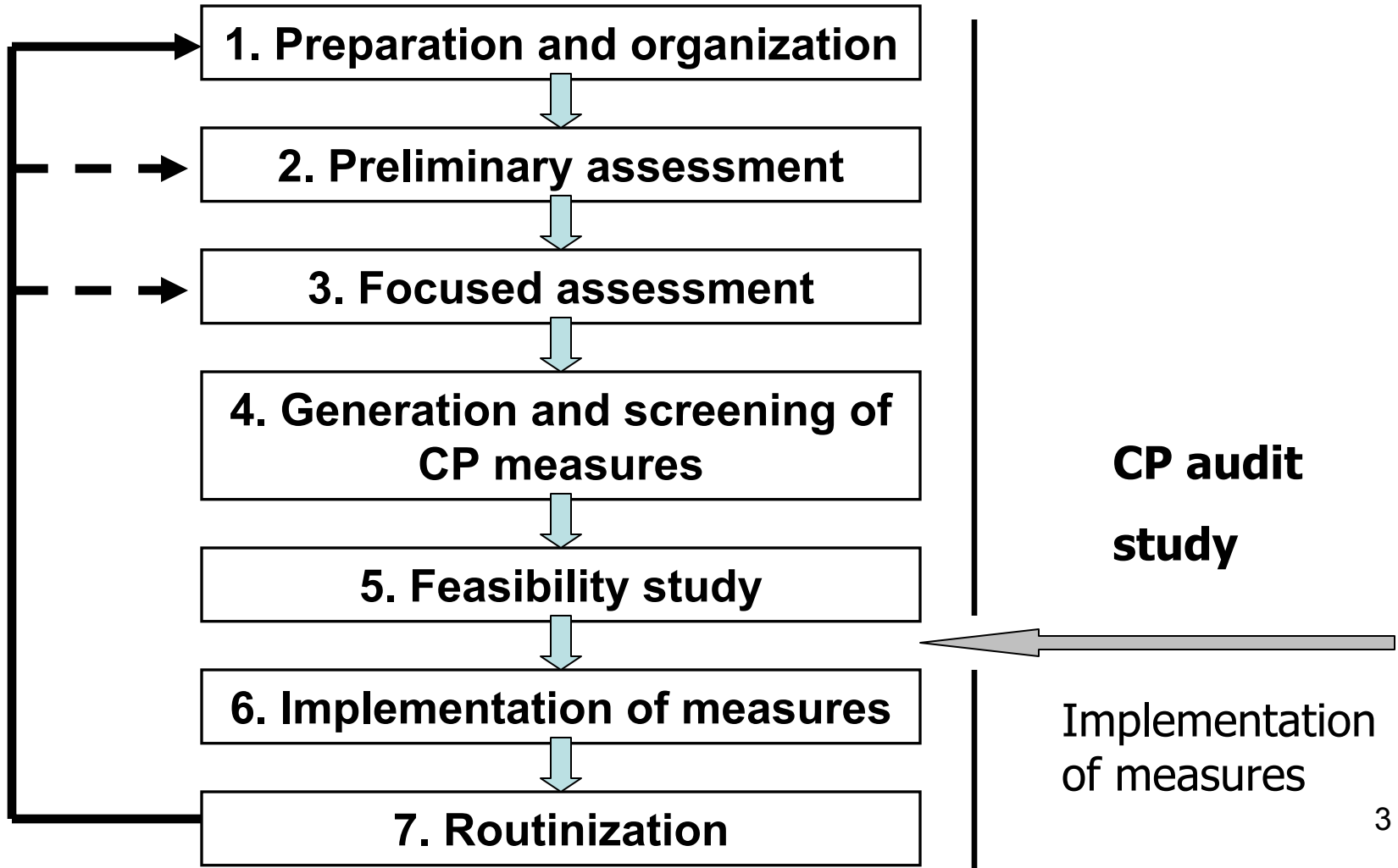
Industrial Responses to the Cleaner Production Program in Jiangsu Province, China

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Cleaner Production

- Cleaner Production (CP)
 - CP vs. End-of-pipe
 - *CP is a strategy to reduce waste generation through preventive approaches such as process modification, product redesign, raw material substitution and good housekeeping.*
 - CP tools
 - **CP audit**, life-cycle analysis, eco-design, eco-labeling, environmental management systems (ISO 14001)

CP Audit Process Steps



Research Questions

- *What effects have government-initiated CP programs had on CP activities at enterprises?*
- *What factors motivate the CP-related actions of enterprises?*

Research Location



Jiangsu



City N

City C

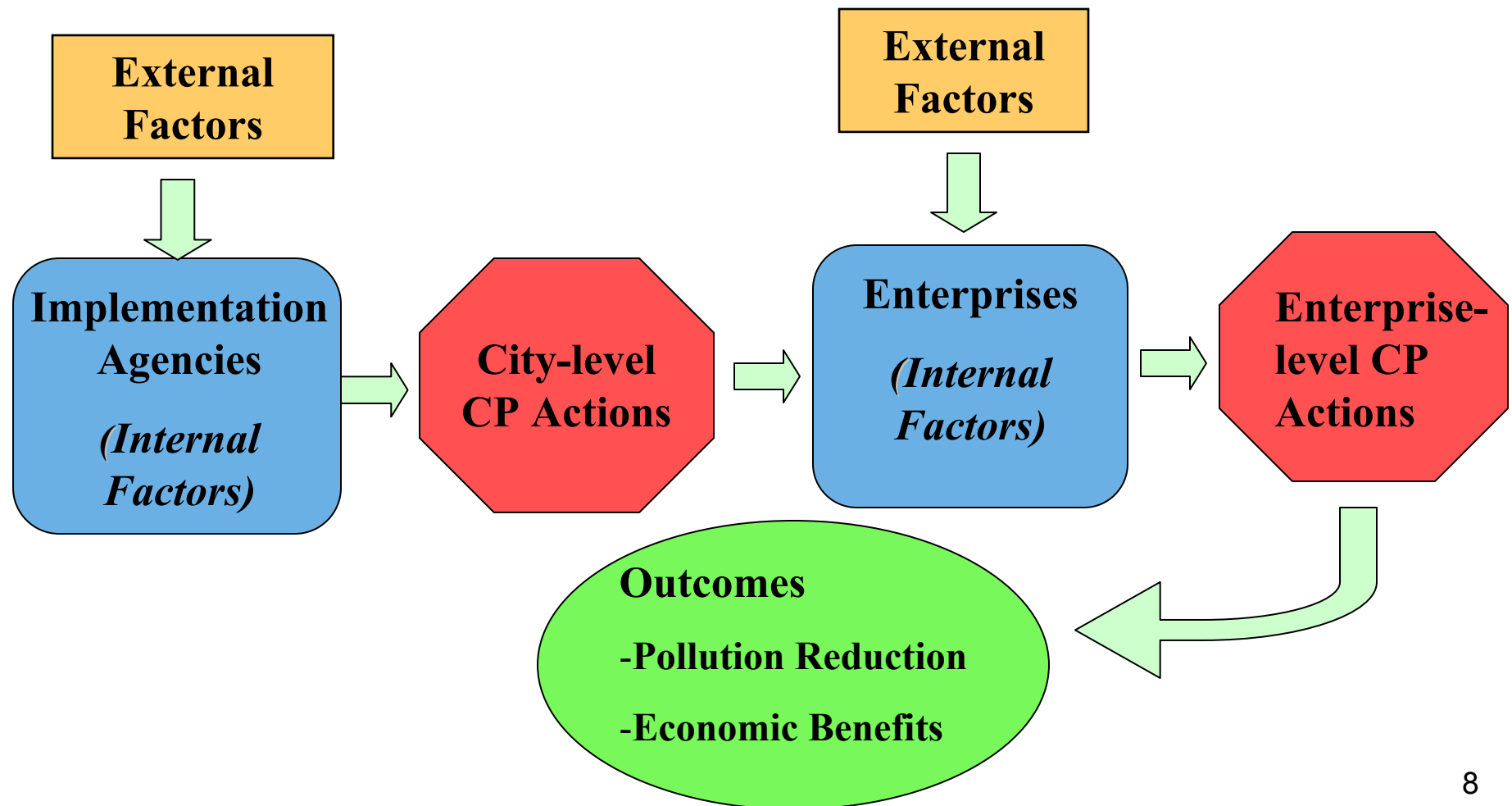
City S

Basic Statistics of City C, N and S (in 2002)

	Population (million)	Area (1,000 km ²)	GDP per capita (\$)	Number of enterprises	Total industrial output (billion \$)
City C	3.4	4.4	2,676	2,474	14.1
City N	7.8	8.0	1,368	1,933	10.6
City S	5.8	8.5	4,035	4,122	41.7

Source: Jiangsu Statistics Yearbook 2003.

Analytic Framework for a City-Level CP Program



Jiangsu CP Framework: Before 2001

- Administrative rules shaped the framework
 - 1996 Notice on Implementing CP Audits
 - **All large and medium-sized enterprises shall implement CP audits by the end of 2000**
 - 1999 Notice on Accelerating CP Implementation
 - Ten measures aim at providing incentives for industries to adopt CP
- Municipal agencies responsible for implementing the rules include
 - **Environmental Protection Bureaus (EPBs)**
 - Economic and Trade Commissions (ETCs)

Jiangsu CP Framework: Recent Additions

- Jiangsu Lake Tai Clean-up Plan (2002) requires:
 - City C – implement CP audits at **95** major polluters by 2006;
 - City S – implement CP audits at **253** major polluters.
- China Cleaner Production Promotion Law (Jan 2003)
 - Local governments have authority to mandate certain enterprises to implement CP audits.
- **ETCs** have principal responsibility for implementing above two regulations.

Typical CP Promotion Actions in a Jiangsu City

- Creating annual plan
- Selecting enterprises to conduct CP audits
- Convening conferences
- Providing training
- Offering technical assistance
- Inspecting CP actions of selected enterprises
- Collecting CP audit reports from enterprises
- Granting awards to enterprises
- Generating city-level CP reports

Large- and Medium-sized Enterprises that had Conducted Audits as of 2000

	City C	City N	City S
Total	205	183	347
No. of audits	35	58	10
No. of enterprises conducting audits	33 (16%)	46 (25%)	10 (3%)

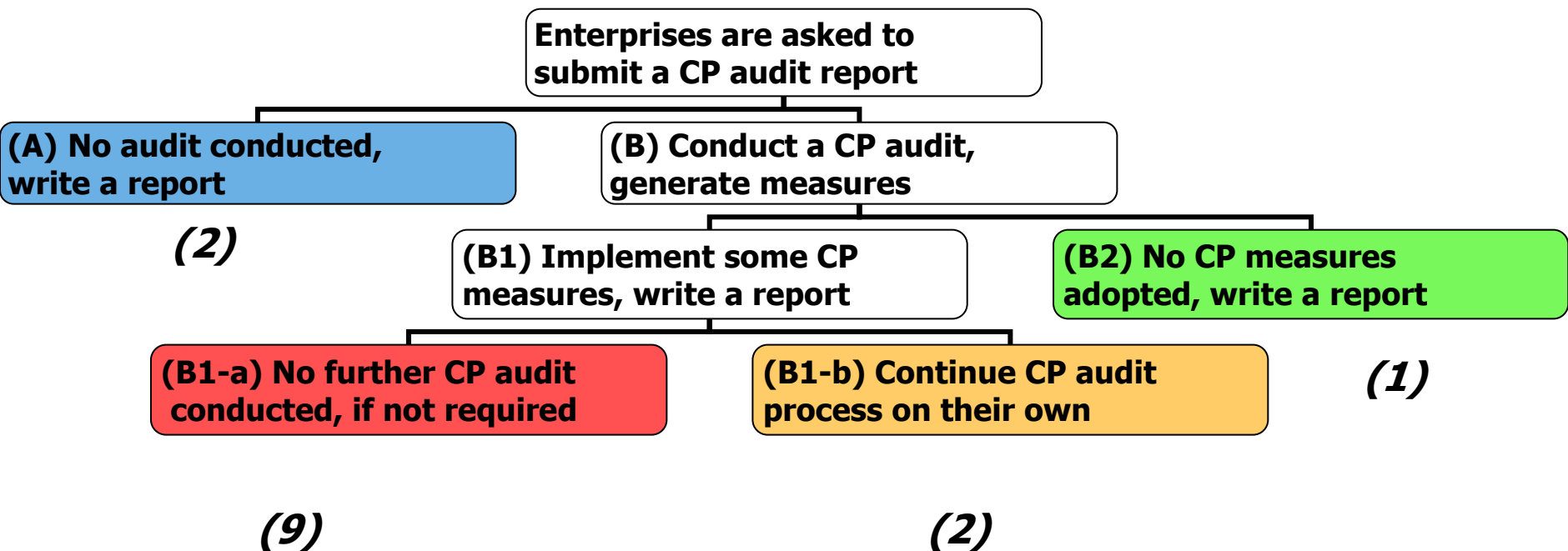
Selection Criteria for Case Study Enterprises

- Participation in city-level CP Programs
- Variation in
 - Sector
 - Size
 - Ownership type
 - Performance
- Recommendation of local ETC and EPB

Enterprise Interviews Included in this Study

- First set of interviews at 14 enterprises (2001-02)
- Second set of interviews at 16 enterprises (2004)

Industrial Responses to CP Audit Requirements

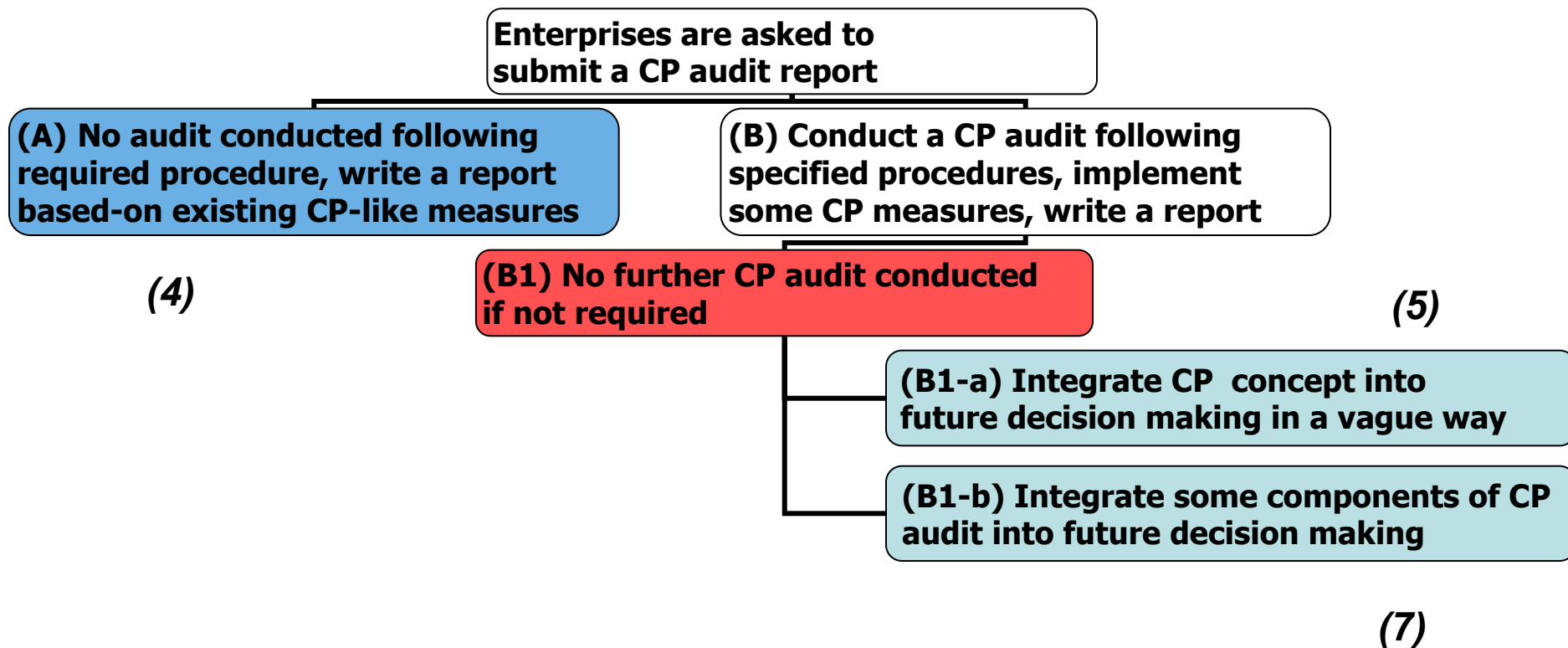


Note: data is for the 14 enterprises conducting CP audits before the end of 2001.

Enterprises Combine CP Audits with Existing Needs

- **Among 12 enterprises that conducted CP audits**
 - 7 – added CP audit to preexisting technology renovation plans
 - 4 – used audit to address known environmental violations
 - 1 – did not implement CP measures generated

Enterprises' Responses to CP Audit Requirements



Note: data for 14 enterprises conducting CP audits during 2002-03.

Strategy of the Enterprises in Meeting CP audit requirements

- 4 wrote reports based on their actions reflecting CP concept, not actions generated through required CP audits;
- 3 applied CP audits to preexisting technology renovation plans;
- 9 conducted CP audits without a technology plan as a platform;

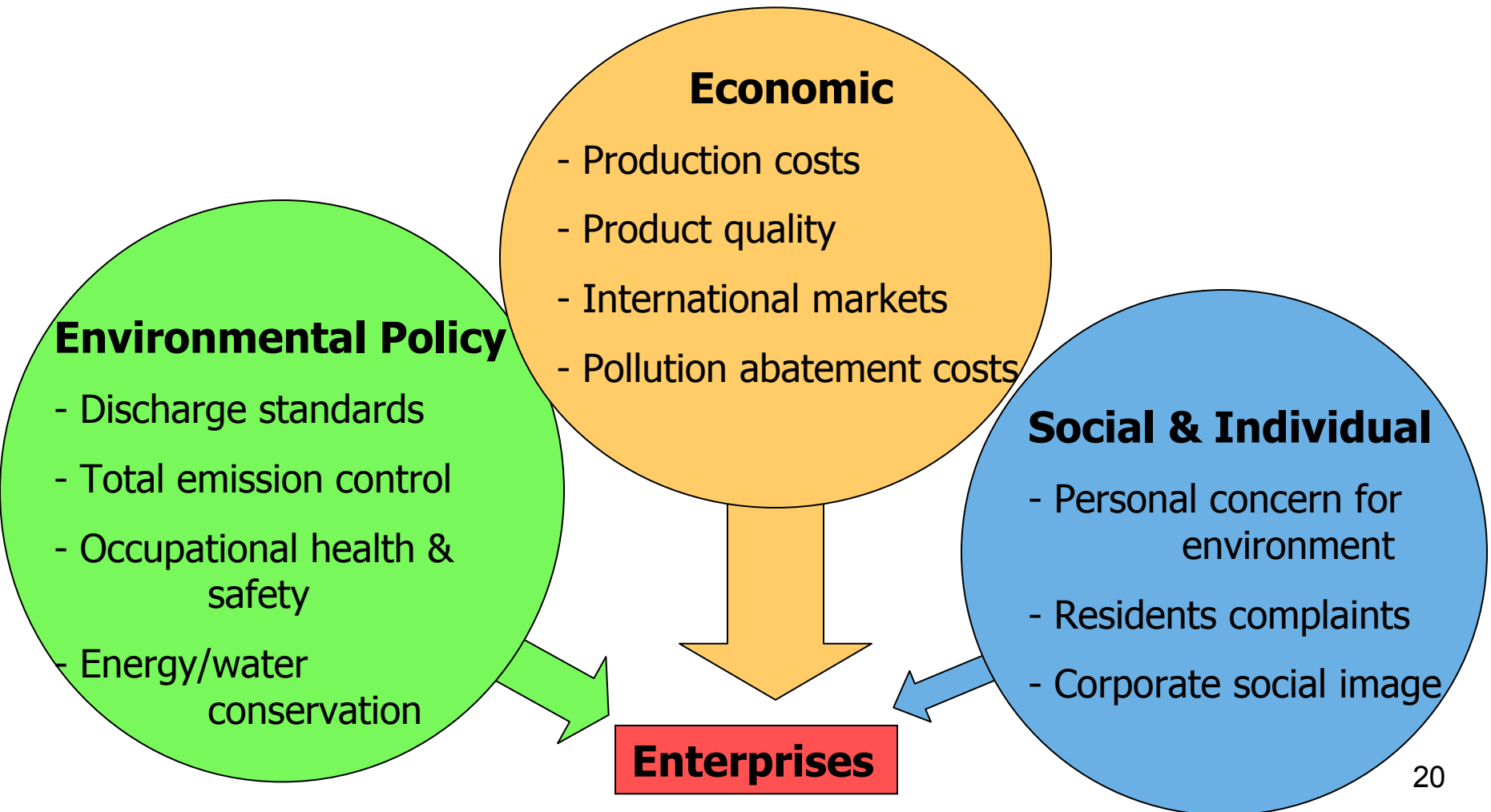
CP Practices at Enterprises

- Most enterprises in Category B had been engaged in CP practices to varying degrees long before CP audit requirement was imposed.

Examples of existing CP Practices:

- Energy conservation
 - Process and product modification
 - Water recycling, etc.
- Enterprises in Category A have also implemented some CP-like measures; and some enterprises have long been quite advanced in applying CP principles in their decision making.

Enterprises' Incentives to Adopt CP Measures



Reasons Cited by Enterprises for Implementing CP measures

Reason		Number of times cited
Economic benefits	Production cost reduction	23
	Product quality improvement	14
	International markets	17
	Abatement cost reductions	9
Environmental policy pressure	Discharge standards	19
	Total emission control	10
	Occupational health & safety	6
Social & Individual	Residents complaints	4
	Personal concern for environment	7

Conclusions (I)

- **Goal displacement** by municipal agencies: (have a certain number of audit reports submitted, instead of inducing behavior changes at enterprises); exacerbated by the insufficient resources and inadequate capacity at agencies;
- Result: **token compliance** by some enterprises
- Most enterprises conducted CP audits only to comply with government's requirement.

Conclusions (II)

- Many enterprises claimed that they would incorporate CP concept into their future decision making more consciously, but they were not willing to adopt CP audit procedures.
- A fraction of enterprises integrated some components of CP audit into their ongoing decision making processes.
- Enterprises are mainly motivated by economic factors to implement CP measures; environmental protection is considered a secondary benefit.
- End-of-pipe waste treatment approach is still the dominant approach for pollution control at most enterprises.