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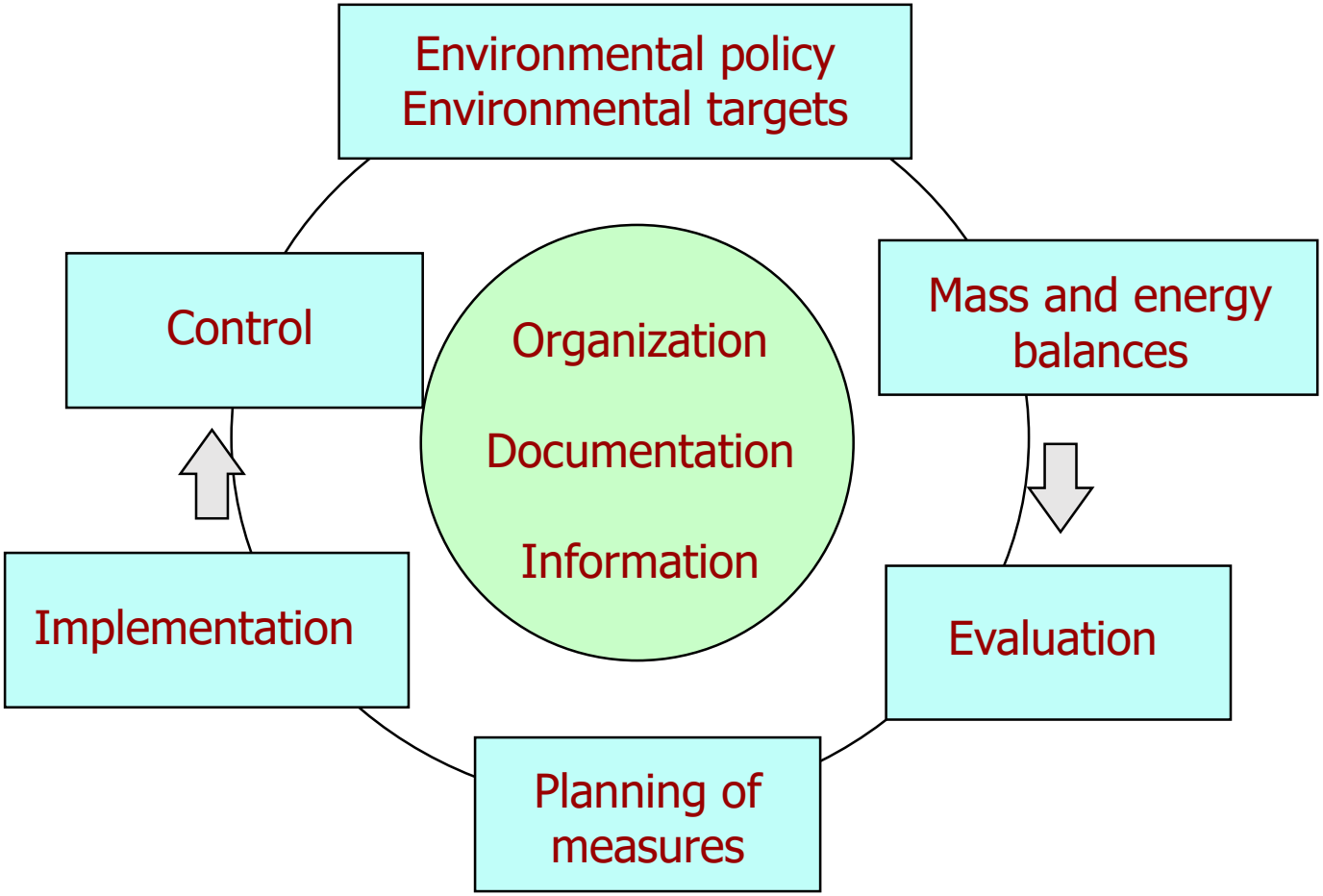
Elements of environmental controlling



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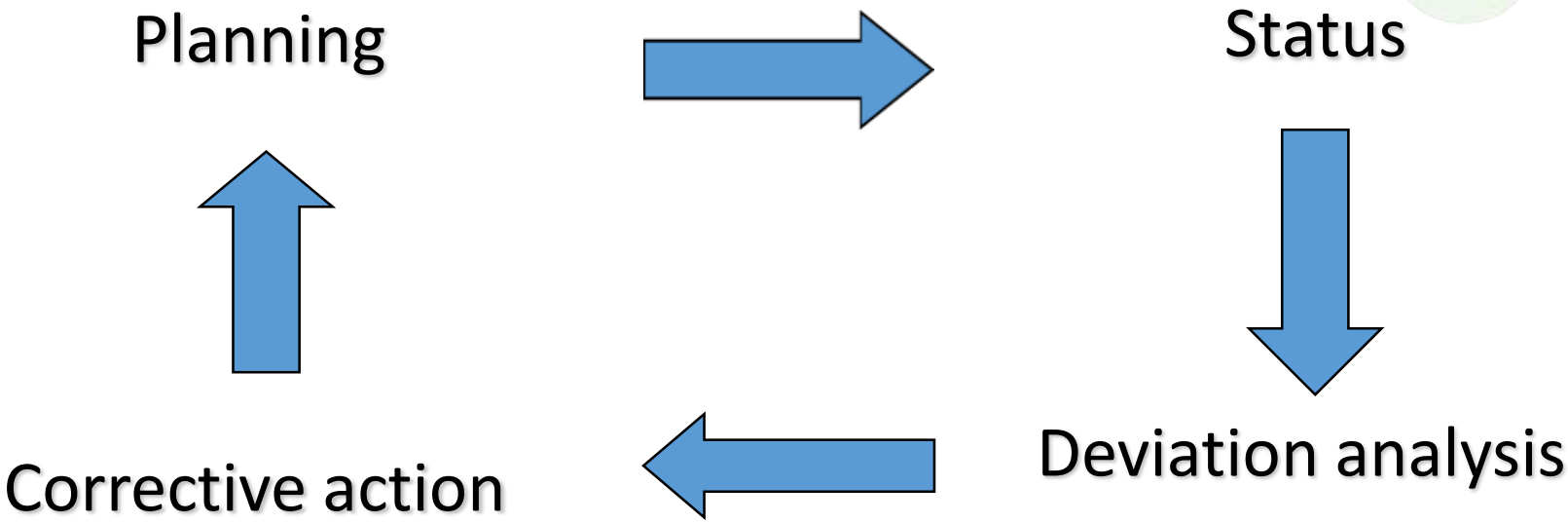
Controlling

A feedback system combines planning, reporting, status analysis, deviation analysis and corrective measures



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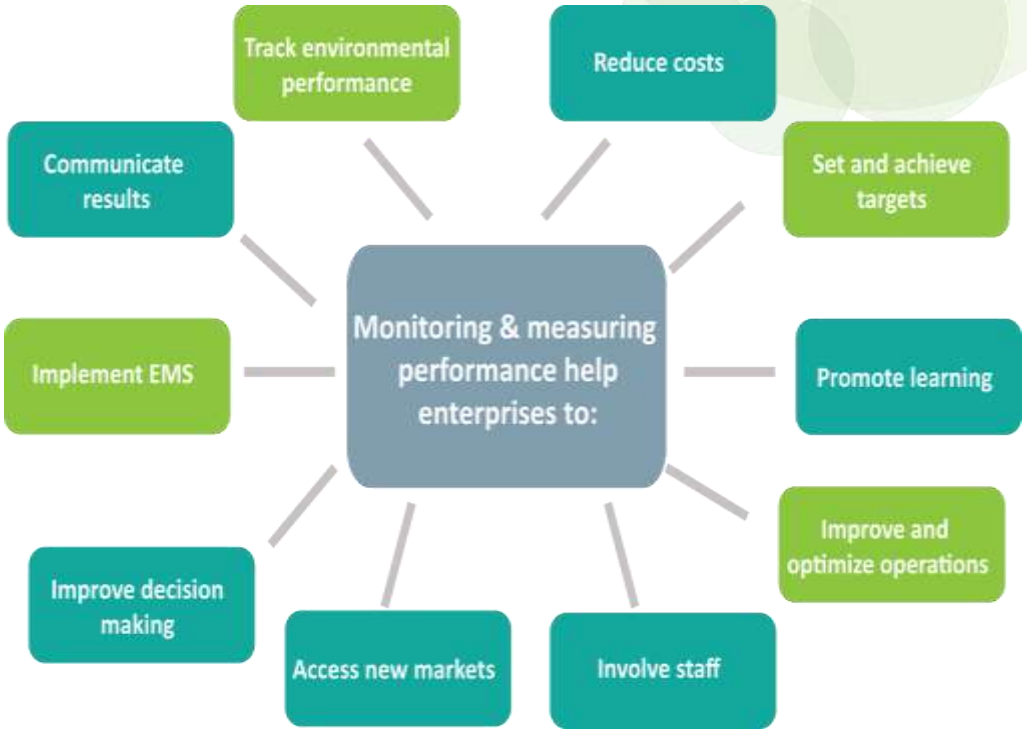
Environmental information systems
Aims of indicators

- Comparison of the actual to the planned situation
- Comparison of companies
- Comparison of variations over a period of time



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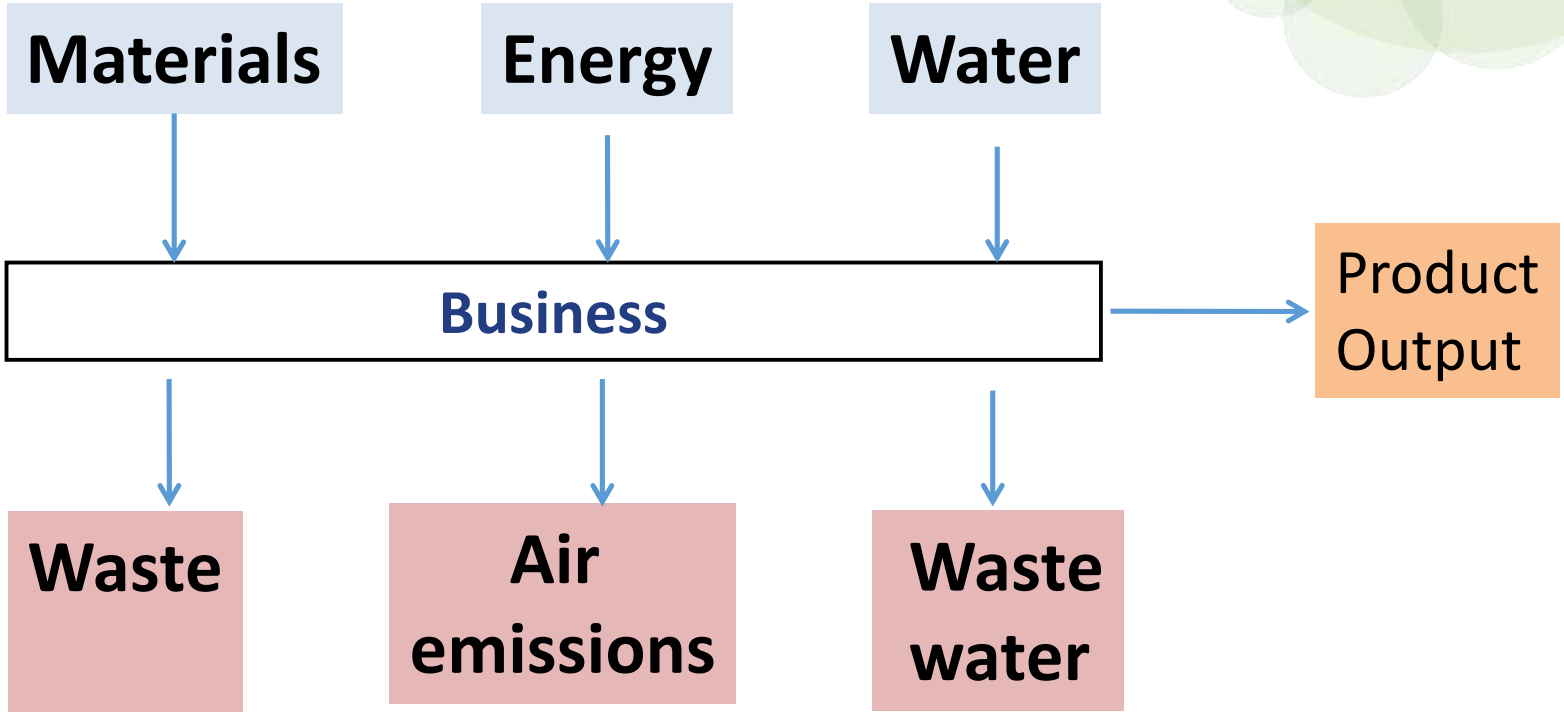
Types of indicators

- **Absolute figures:**
  - Basic data (annual consumption, turnover)
  - Totals (total consumption of halogenated solvents)
  - Differences (expenses minus earnings)
  - Average values (half hour averages)
- **Related figures:**
  - Relative figures (solvent use per product unit)
  - Normalized figures (use of halogenated solvents over total use of solvents)
  - Index figures (trends)
- **Systematically derived indicators:**
  - Complex methods for data aggregation

Relevant RECP indicators (Key performance indicators, KPI)



Relevant RECP indicators

- **Productivity ratios** quantify the amount of product output per unit of resource use, e.g., the tons of product output per ton of materials used or the volume of services delivered per cubic meter of water used. Sustainability considerations require productivity ratios to INCREASE over time, leading to more production per unit of resources used.

- **Intensity ratios** quantify the amount of resources used or the amount of emissions per unit of production, e.g., CO2 emissions per unit of production or waste generated per unit of production. Sustainability considerations require intensity ratios to DECREASE over time, leading to less pollution per unit of production.

Relative indicators can also be used to tie physical and monetary data together, for instance, cost of waste-water treatment per unit of customer service

RECP profile (KPI)

Set of six RECP indicators developed that is generally applicable for tracking enterprise level resource efficiency and pollution intensity over time in particular in SME

1. Productive output per unit of material consumption
   e.g. in ton product/ton material
2. Productive output per unit of energy consumption
   e.g. in ton product/MWh
3. Productive output per unit of water consumption
   e.g. in ton product/l
4. Waste generation per unit of productive output
   e.g. t waste/ton product
5. Air emissions per unit of productive output
   e.g. t CO_2/ton product
6. Effluent generation per unit of productive output
   e.g. l/ton product

These can be also used as resource intensity rations (e.g. kWh/ton product)

Benchmarking for option generation – identification of best practices

Typical resource consumption data

in European breweries

Country	Water *(hl/hl)*	Heat *(MJ/hl)*	Electricity *(kWh/hl)*
Spain	5.3 - 11.9	114 - 262	9.2 - 19.7
Germany	6.6 - 8.6	153 - 244	11.0 - 16.0
United Kingdom	5.9 - 11.1	155	12.5
Norway	7.4 - 10.6	209 - 232	19.2
Denmark	4.1 - 8.7	120 - 228	6.6 - 16.9

***Note** 1 litre of oil equals 39.6 MJ*

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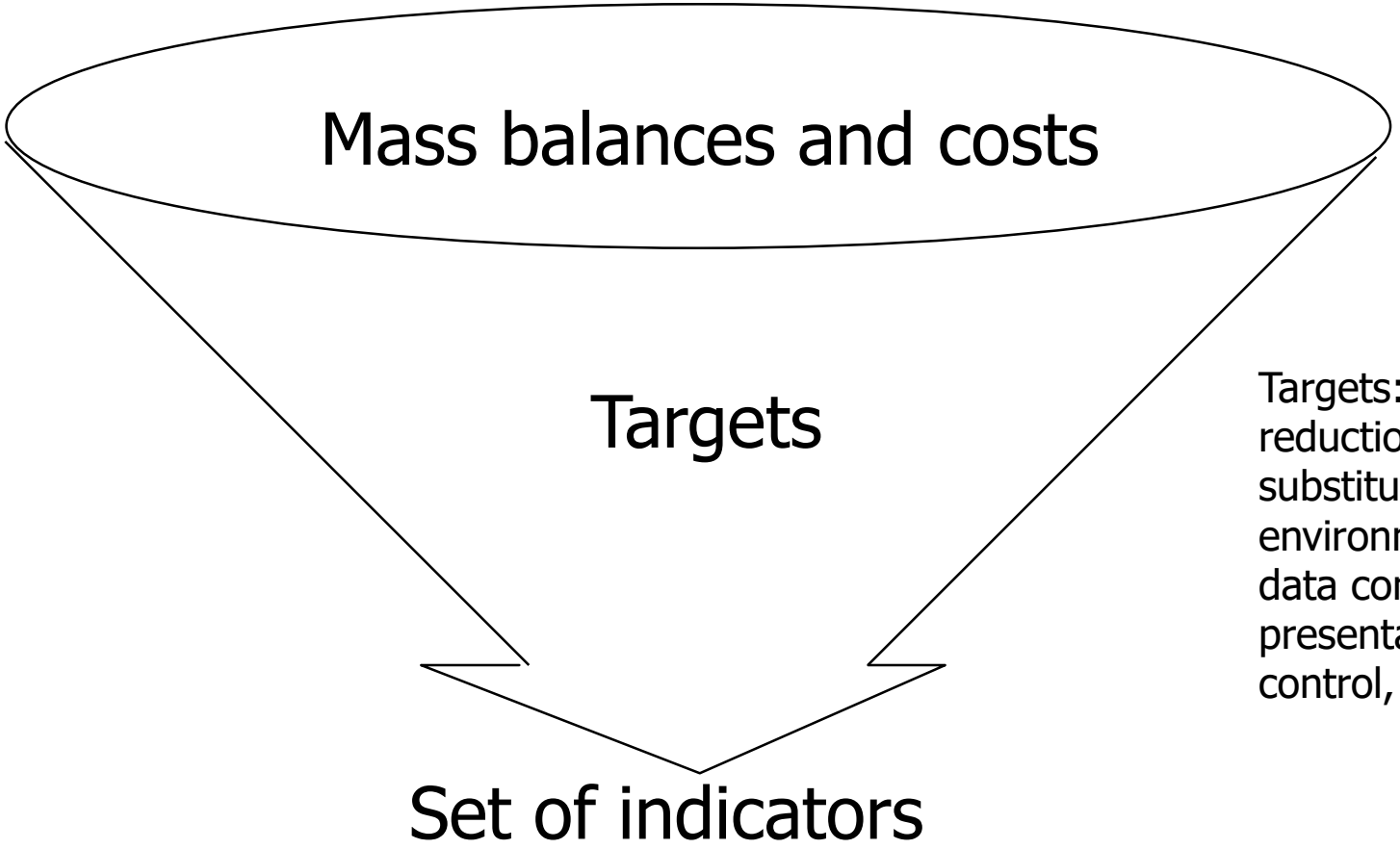
Development of a set of indicators



Targets:
reduction of material losses, substitution, cost reduction, environmental improvement, data compression, presentation, analysis, control, decision making.

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Definition of your best set of indicators

- Which figures reflect the targets (of my department) best?
- Which figures are best suited to indicate that these targets are not being met?
- How are critical deviations best measured?
- What is the best way of showing who is responsible for a critical deviation?
- For which indicators is information easily and inexpensively available?

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Reports

Frequency

- Strictly adapted to the receiver
- Use standardized structure
- Include reference values for comparisons
- Use graphics

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Development of a set of indicators Objectively Verified Indicators (OVIs)

RECP potential identified						
Resources savings			Pollution reduction			Savings, AMD
Energy, MWh/yr	Water, m^3/yr	Materials, tonnes/yr	Carbon emisions, t $CO_{2/eq}$/yr	Waste water, m^3/yr	Wastes, tonnes/yr	
25	15	5	20		8	6 108 000
29	115	25	12		40	9 535 500
25	30	40	10	4	50	9 500 600
172	245	120	52	125	18	31 774 000
26	6 300	10	10	1 200	8	5 408 000
16	24	18	6		12	8 483 000
12	14	26	5		22	4 752 000
108	40		27		8	4 800 000
25		5	10		1	2 867 000
72	150	12	19		5	13 675 000
14		9	6		4	3 040 000
2	6		1			643 000
524	**6 939**	**270**	**177**	**1 329**	**176**	**100 586 100**

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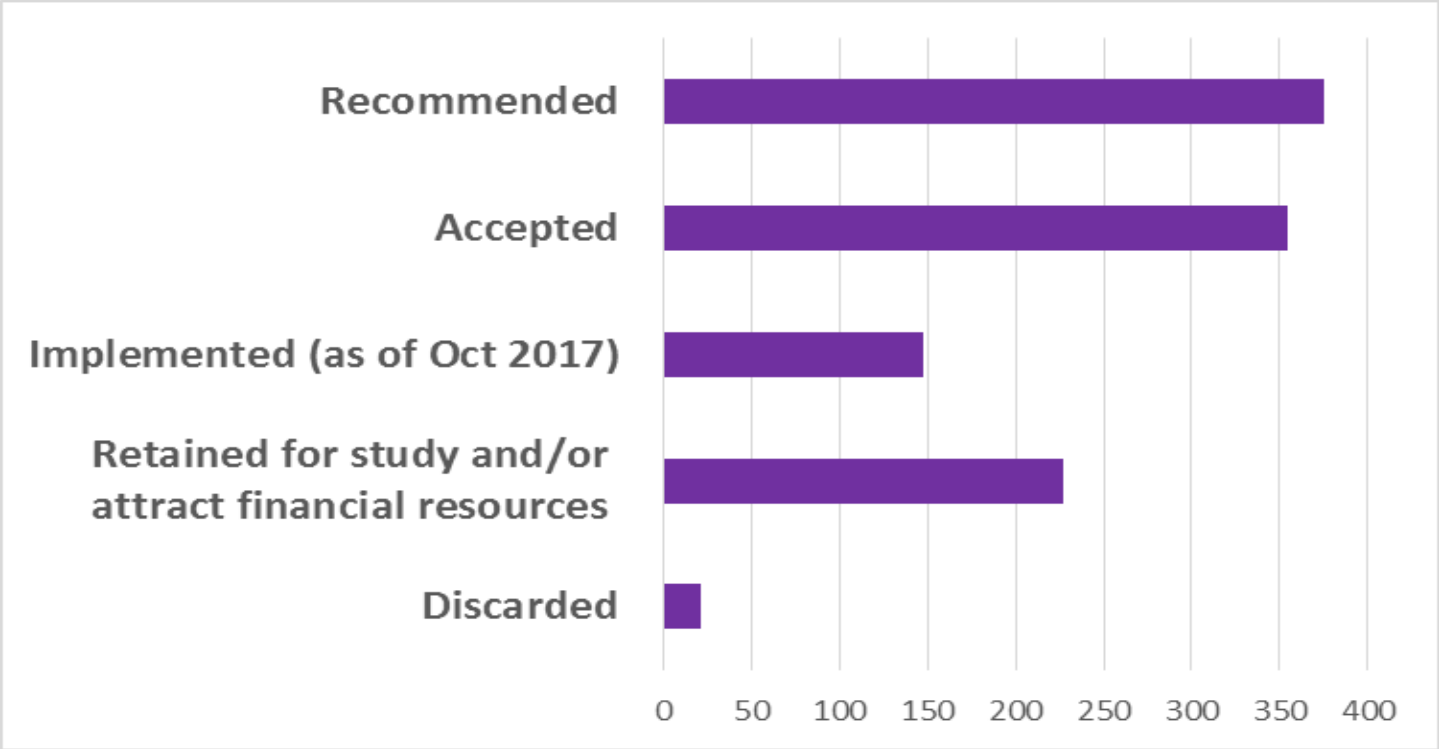
www.recp.am
http://recp.am/recp-results/



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RECP Success Story "*Kashi*" OJSC Tannery on Leather Production

- The following critical aspects have been considered to implement RECP, among others:
  - Elimination of harmful emissions and effluents
  - Reduction in the energy consumption by improving the process technique
  - Utilization of waste and wastewater effluents treatment
  - Improvement of product marketability

BUSINESS CASE

- Besides the economic and environmental benefits mentioned above, the RECP programme brought improvements in working practices and overall image of the company.

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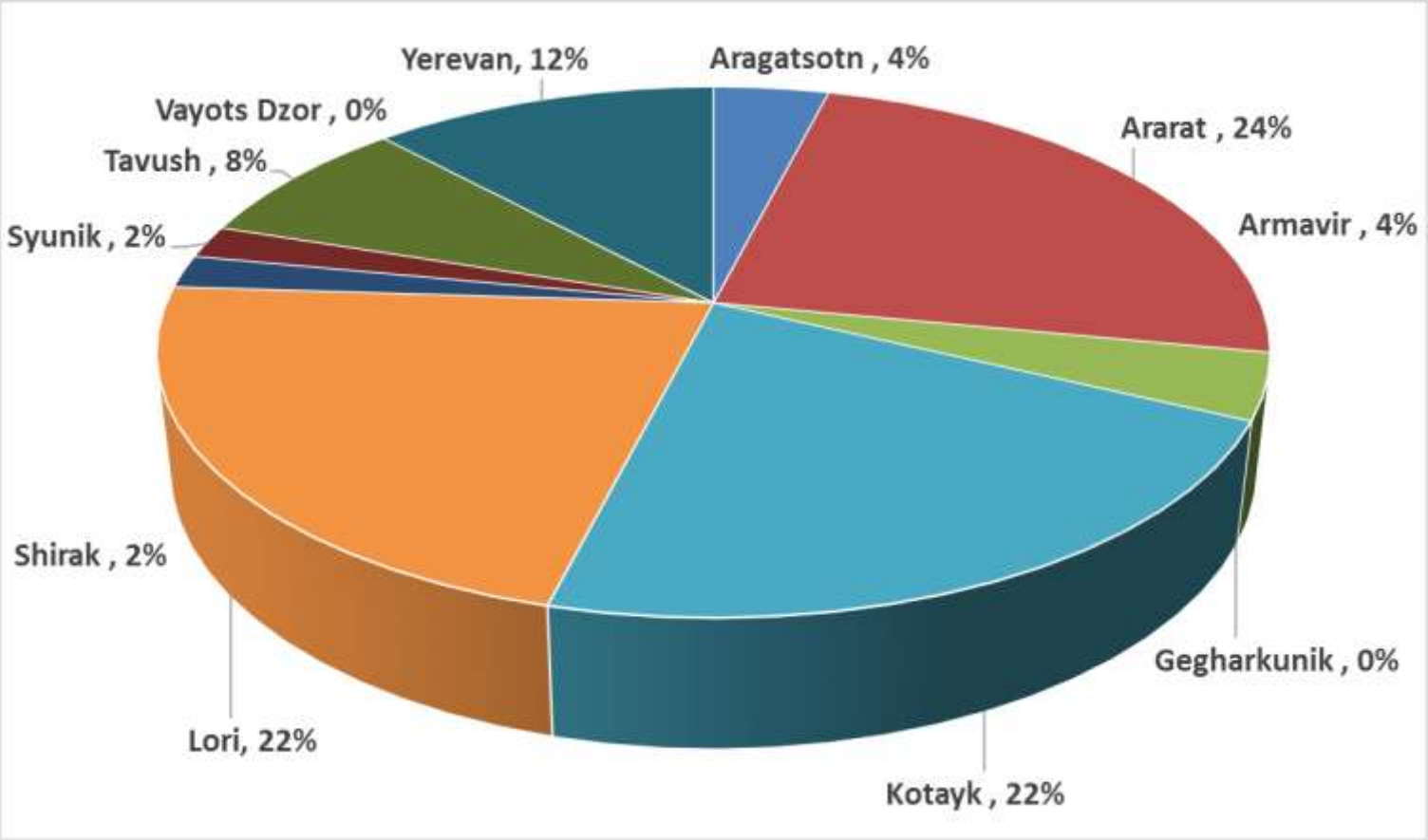
We worked in Yerevan and 8 regions of 10 in Armenia.



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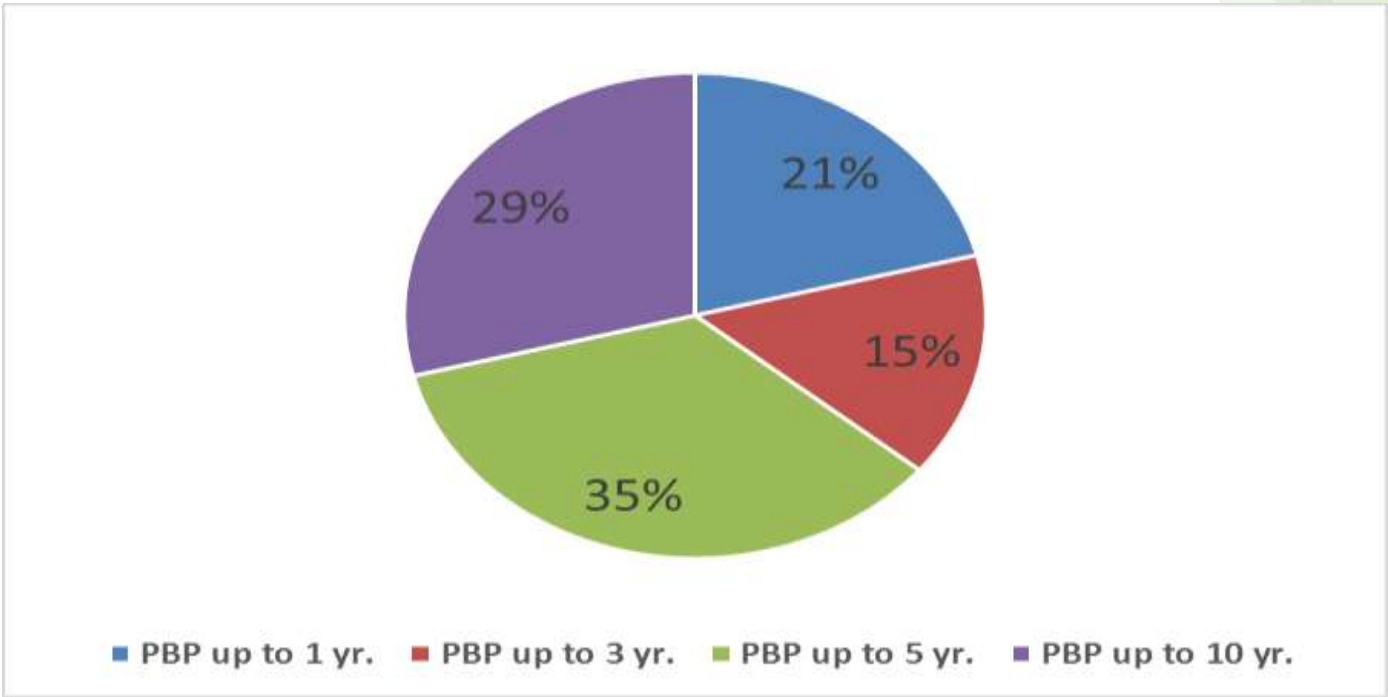
Return on investment of identified measures at the demonstration sites



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Module 9. Waste management

- Analysis of the waste management system and optimization of logistics.
- Recovery of waste with economic value (biogas, closing water cycles).

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Waste can be …

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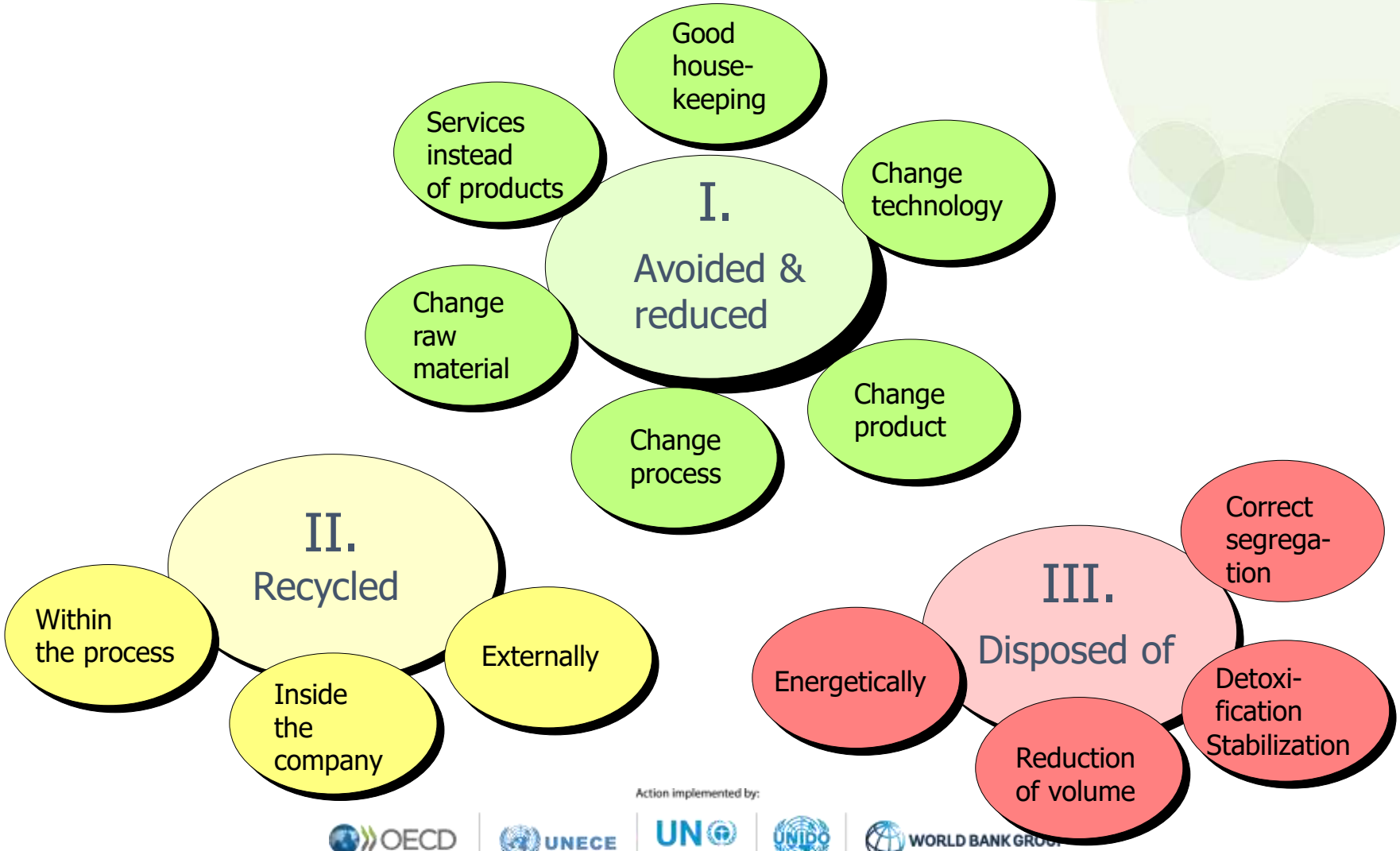

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Waste management …

is more than simply arranging containers in the company!

- Legal compliance with relevant waste regulations
- Setting up company-specific waste logistics
- Information/motivation
- Continuous controlling

Source: PREPARE Toolkit

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Why do companies optimize their waste management?

- Legal compliance
- Risk minimization
- Disposal security
- Positive image
- Motivation
- Implementation of waste minimization measures
- Cost reduction
- EMAS, ISO 14001

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Methodology – waste management

- Check legal compliance with the applicable waste regulations – corrective action
- Determine waste streams according to type of waste, waste volumes and costs
- Identify weak points of waste logistics
- Determine minimization and cost reduction potentials
- Define, implement and monitor measures

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Analysing potentials of waste reduction

❶ Central waste collection point

Container for residual waste

Container for hazardous waste

❷ Waste segregation in the company

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Waste segregation

Waste segregation can often result in considerable savings as the costs of the disposal of mixed residual waste are usually rather high. The same applies to hazardous waste on an even larger scale, which is not only expensive to dispose of, but may also affect the environment. Apart from these financial and environmental reasons, a well functioning waste management system can be seen as the calling card of a company.

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Setting up in-company waste logistics

- Involving employees at the workplace
- Information on correct waste segregation (segregation guidelines!)
- Customized container systems
- Redesign of waste collection points
- Involvement of the cleaning personnel
- Motivation of all persons involved

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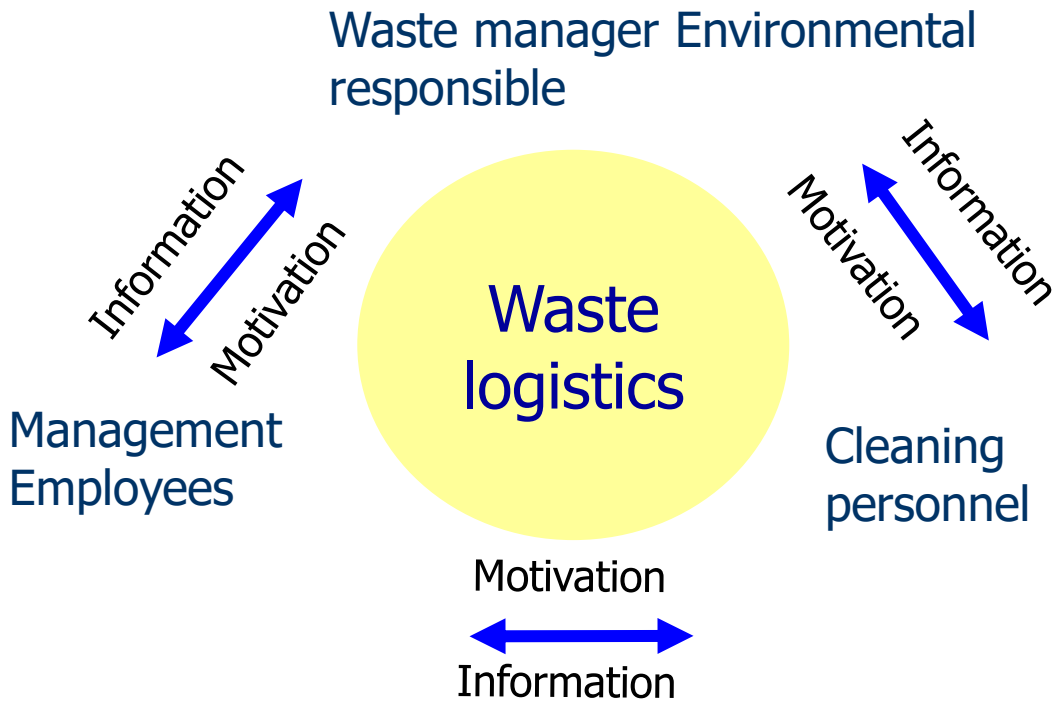
Important success factors for well functioning waste logistics



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Source: PREPARE Toolkit

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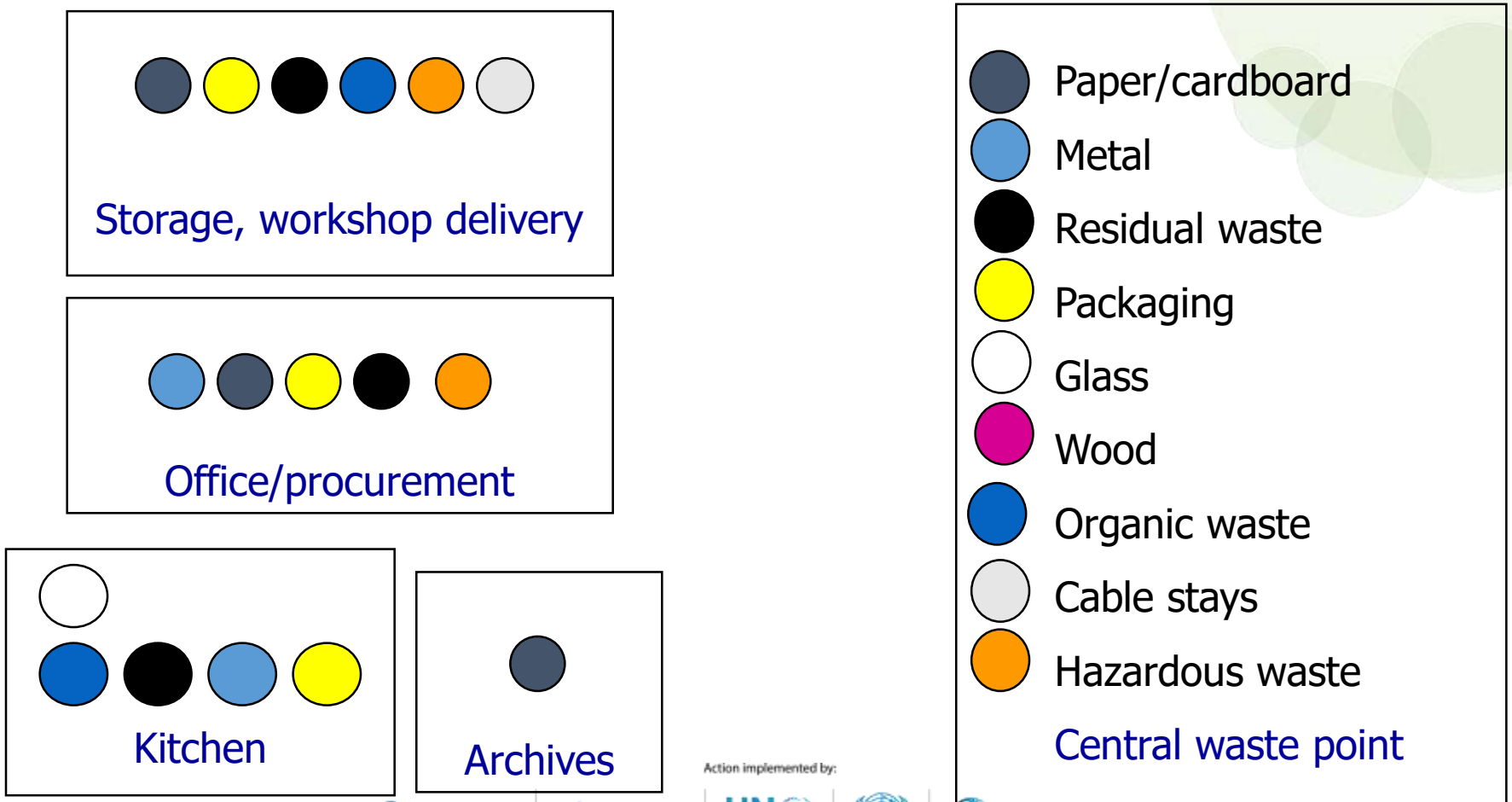
Overview of waste logistics



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Definition of measures

- **Optimize waste logistics (new containers, new waste collection points, colour system/ labelling)**
- **Improve waste segregation (e.g. metals) – reduction of disposal costs**
- **Use returnable and/or large containers**
- **Reuse certain materials**
- **Internal recycling (e.g. recycling of solvents)**
- **Use returnable cleaning rags (rental system)**
- **Use reusable packaging**
- **...**

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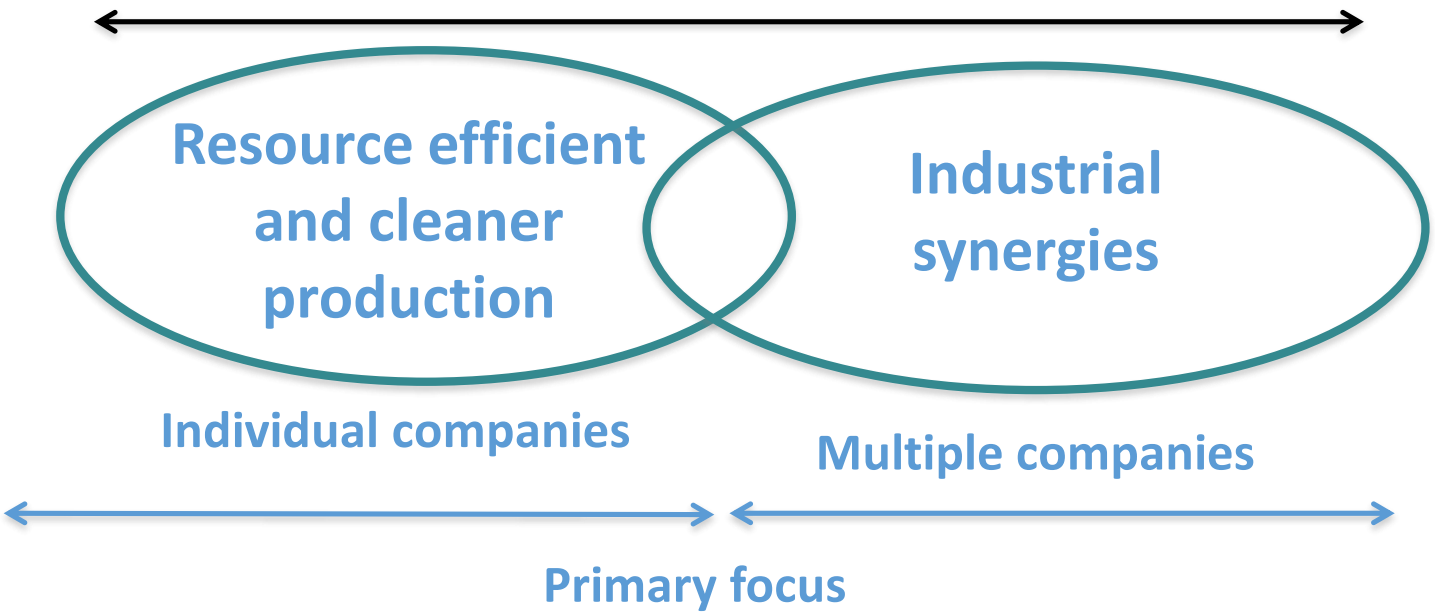
One step ahead

Cleaner production and industrial synergies

Complementary approaches

Improve economic, environmental, and social performance and increase resource efficiencies



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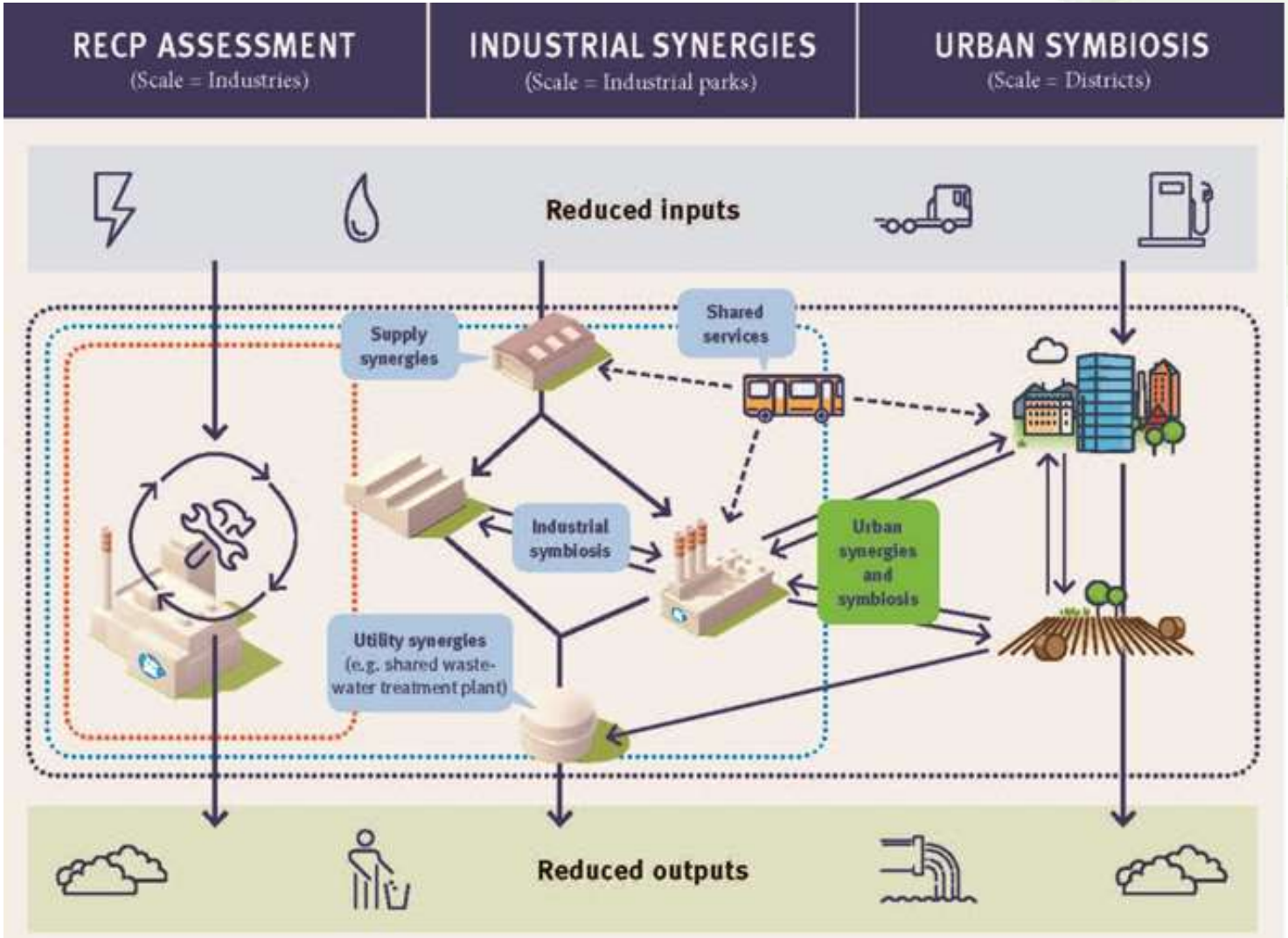
RECP ASSESSMENT
(Scale = Industries)
INDUSTRIAL SYNERGIES
(Scale = Industrial parks)
URBAN SYMBIOSIS
(Scale = Districts)
Reduced inputs
Supply synergies
Shared services
Industrial symbiosis
Urban synergies and symbiosis
Utility synergies (e.g. shared waste-water treatment plant)
Reduced outputs

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Example

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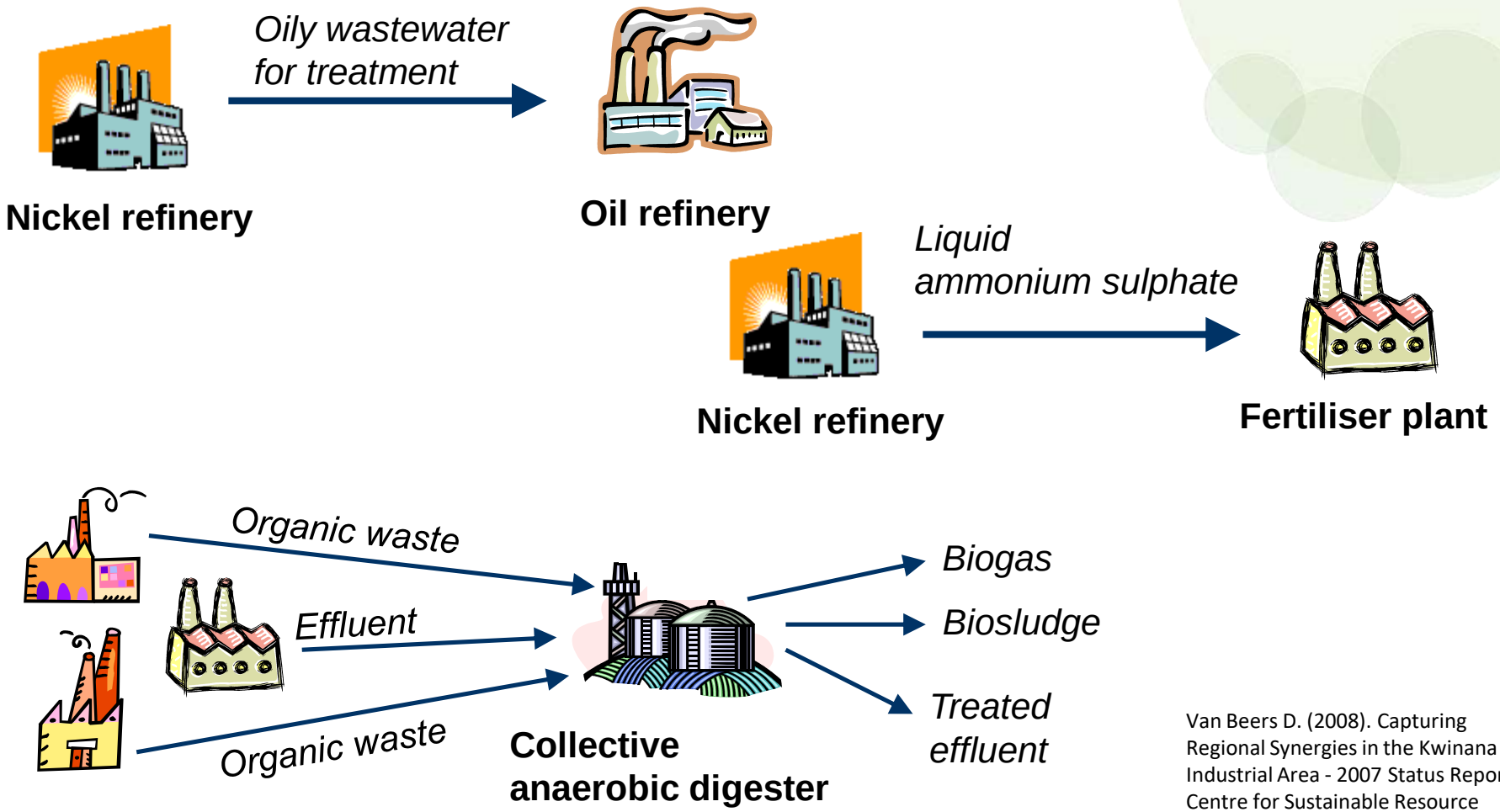
Potential synergies in Kwinana Industrial Area, Western Australia



Van Beers D. (2008). Capturing Regional Synergies in the Kwinana Industrial Area - 2007 Status Report. Centre for Sustainable Resource Processing, Perth, Australia.

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THANK YOU

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