
Exam for the lecture „Introduction to Environmental Sciences“

29 June 2012

Last name: First name:

Matr. No.: faculty: Semester:

Branches: Master Bachelor Diplom Staatsexamen
 Magister PhD Other: _____

Explication:

For the open questions is the maximum score in parenthesis after the questions.

For multiple-choice questions is *more than one answer possible*.

Duration: *90 minutes*.

The exam is considered passed if at least 50% of the maximum number of possible points has been achieved.

Evaluation:

Correct answer: + 1 point

Wrong answer: – 1 point

Abstention: 0 point

Good Luck!

Question

possible answers

correct

wrong

1. Unit: Introduction: Environmental problems and environmental drivers

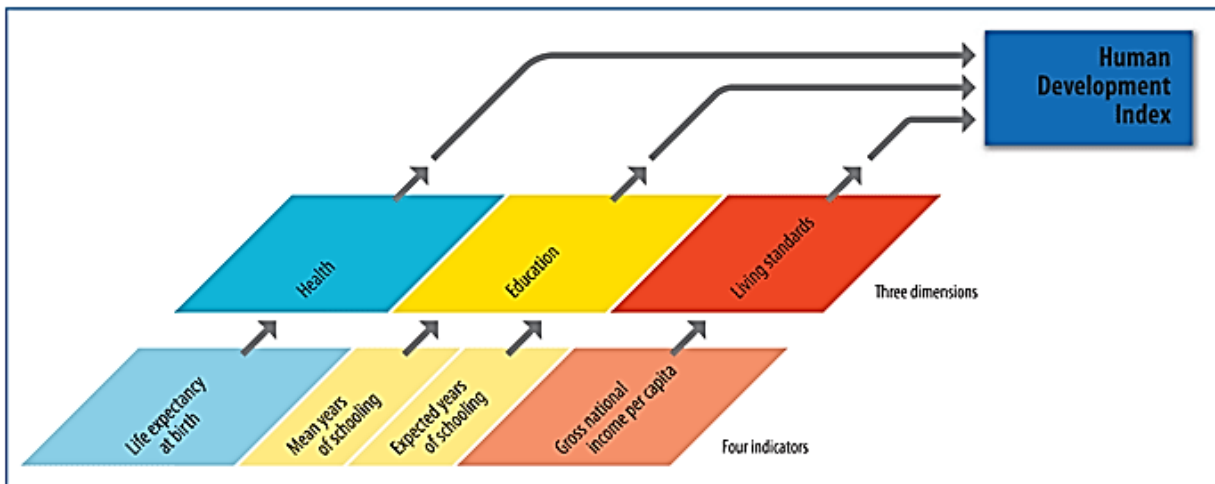
1. What characterizes the new 'quality' of environmental degradation in the 20th Century?
- a) Explosive growth of population, economic performance, energy and resource consumption
 - b) Occurrence of local forest damage
 - c) Decline in the fertility of farmlands
 - d) Explosive increase of water and air pollution and generating waste products
 - e) Local contamination of drinking water
 - f) Change from local to global impairments of the environment

2. Write the three missing terms in the boxes: (3 points)

Lösung: a) Health, b) Education c) Living Standards

Components of the Human Development Index

The HDI—three dimensions and four indicators



Note: The indicators presented in this figure follow the new methodology, as defined in box 1.2.

Source: HDRO.

3. Which of the following definitions are correct?
- a) Proven reserves: part of the resources which is identified and well analyzed
 - b) Recoverable reserves: assumed total resources
 - c) Static range: Current reserves are related to current consumption
 - d) Dynamic range: here are the future (then current) reserves related to future consumption

Question	possible answers	correct	wrong
4. „Neolithic revolution“:	a) For about 1,5 Million years (cooking purposes; hunting; maintenance of an open landscape; security)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	b) Through advanced tools and social structures (hunter and gatherer groups): 20.000 – 10.000 B.C.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	c) Beginnings of agriculture about 9.000 bis 7000 B.C. in the Middle East, 4.500 B.C in the Paris basin	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	d) Beginnings of mining, 8.000 B.C.; use of metals copper 7000 B.C. in Anatolia, bronze 3.500 B.C. in Egypt, iron 800 B.C. in central Europe	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	a) First settlements such as Jericho in Palestine or Catal Hüyük in central anatolia around 7.000 B.C. with approximately 100.000 people	<input type="checkbox"/>	<input checked="" type="checkbox"/>

2. Unit: Pressures on the Natural Environment

5. In the field of ecosystems exists the term **succession**. What does primary and secondary succession mean? (2 points)

Succession:

The temporal succession of different ecosystems and biotic communities at the same area.

- **Primary succession:** initial development of ecosystems on newly emerging areas, e.g. by volcanic eruptions or from the Ice Age to cleared areas.
- **Secondary succession:** all recovery processes after disturbances of an ecosystem.

The term succession includes also the settlement of succession sequence of organisms, e.g. the breakdown of dead plants.

6. Carbon Stocks at the atmosphere in <i>Billion Metric Tons</i> is:	a) 80000000	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	b) 40000	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	c) 4000	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	d) 1500	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	e) 825	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	f) 580.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
7. What characterizes biogeochemical cycles?	a) Flows of chemical elements through the compartments of the biosphere	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	b) They cannot be influenced by humans	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	c) They include physical, chemical and economic processes	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	d) They are only relevant for local and regional site conditions	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	e) Is forced by solar radiation and geological processes	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Question	possible answers	correct	wrong
8. What is the correct order of layers of the atmosphere from the bottom to the top?	a) Troposphere – Stratosphere – Mesosphere – Ionosphere b) Stratosphere – Troposphere – Mesosphere – Ionosphere c) Troposphere – Mesosphere – Stratosphere – Ionosphere d) Stratosphere – Ionosphere – Mesosphere – Troposphere	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
9. The ecosphere	a) Includes all organisms and their interactions within their environment b) Is an close system in relation to the energy, c) Is characterized by the diversity of species and ecosystems with different habitat conditions d) Poses with the photosynthesis the basic of the food chain e) is an open system in relation to material flows.	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>

3. Unit: Impacts: Global environmental problems

10. Task of United Nations Environment Program (UNEP):	a) Assessing global, regional and national environmental conditions and trends b) Developing international and national environmental instruments c) Facilitating the transfer of knowledge and technology for sustainable development d) Encouraging new partnerships and mind-sets within civil society and the private sector	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
11. The 4 major problems of GEO-4 are:	a) Atmosphere (increasing temperature, GHG emission) b) Land (land degradation) c) Education (environmental instruments) d) Water (drinking water situation, availability of water) e) Biodiversity (degradation of ecosystems) a) Health (Impact on the organism)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>
12. An important publication of the IPCC (Intergovernmental Panel on Climate Change) is:	a) the Kyoto protocol b) the Assessment Report c) the Millenium Report d) the Global Environment Outlook	<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>

4. Unit: Responses

13. Technic is:	a) Instrument of progress b) Cause of environmental problems c) Instrument to reused environmental problems	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
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Question	possible answers	correct	wrong
14. The Kyoto protocol	a) Was adopted in 1997	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	b) Entered into force in 2005	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	c) The industrialized states have committed themselves to reduce greenhouse gas emissions by around 20% with reference to 1990 by the years 2008-2012.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	d) The signatory states accept in doing so different emission reduction obligations	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	e) for the reductions of emissions flexible mechanisms are defined	<input checked="" type="checkbox"/>	<input type="checkbox"/>
15. Which are the possibilities of the internalisation of externalities based on the example of the chemical plant and the fisher? (Situation: The chemical plant may discharge chemicals unfiltered [without costs] into a river, as a consequence the fishes die.	a) taxation of the discharge	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	b) prohibition on discharge and appropriate disposal of the chemicals	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	c) filtering of the chemicals	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	d) compensation for fishermen	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	e) the fisher has to look for another river since the chemical plant was there first and has therefore the right to discharge	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	f) the chemical plan is official approved in plans and this resolution is unalterable, i.e. the fisher must accept the legal status	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	g) closure of the chemical plant	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Unit: Influences on industrial environmental protection

16. REACH is	a) Registration, Evaluation, Authorisation and Restriction of Chemicals	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	b) Restriction of (the use of certain) hazardous substances	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	c) energy related products	<input type="checkbox"/>	<input checked="" type="checkbox"/>
17. Management Systems – Quality Management certificate mean that the company:	a) confirm a high quality of a product	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	b) sets itself quality objectives (CIP),	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	c) controls – and improves - the quality	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	d) meets a certain (possibly self-prescribed) quality.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
18. Management Systems – Environmental Management certificate mean that the company:	a) confirm a low environmental impact or major environmental activities	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	b) applies an EMS,	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	c) sets itself environmental objectives (CIP),	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	d) collects environmental data	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	e) controls – and improves - processes with environmental impact	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	f) meets the environmental requirements.	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Question

possible answers

6. Unit: Environmental Management Systems

19. Write the missing terms in the boxes(2 points) :

a) EMAS-Regulation b) ISO 1400

	EMAS-Regulation	ISO 14001:2004
Goal	Continuing improvement of the operational environmental performance (and of the EMS)	Continuing improvement of the EMS
Applies to	EU and associated countries	Worldwide
Members	All organisations that want to improve their environmental performance	Trade, Service industry, Producing companies
Testing	Mandatory testing	Private economic testing
Testing method	Validation and registration	Certification
System verification	Entry in the register, participation logo	Certificate
Entry into the system	By means of the first test of the Environmental Statement	Establishment of the entire auditable system
System boundaries	Organisation	Organisational unit
Product inspection	Strong component of the system	Strong component of the system
Publicity	Publication obligation of environmental politics and advertising with the participation logo	Publication obligation of environmental politics

7. Unit, 8. Unit : Instruments for industrial environmental protection

20. Environmental performance indicators – Internal target groups are:
- a) Management
 - b) EM officers, environmental officers
 - c) Plant / Production Manager
 - d) Customers, suppliers
 - e) Controlling, cost accounting
 - f) Staff, works council
 - g) Banks, insurance
 - h) Authorities
 - i) Associations, NGOs, neighbours, institutions / science

Question

possible answers

21. Give some examples in the boxes for EU COMMISSION RECOMMENDATION concerning the selection and use of environmental performance Indicators (2003/532/EC): **(4 points)**

OPERATIONAL PERFORMANCE: INPUT INDICATORS

Indicator category	Examples of indicators	Examples of measurement units
Materials	Raw materials, operating and auxiliary materials, ground water, surface water, fossil fuels, wood, etc.	tonnes per year tonnes per tonnes of product per year tonnes of hazardous/harmful substances per year tonnes of hazardous/harmful substances per tonnes of product per year cubic metres per year cubic metres per tonnes of product
Energy	Electricity, gas, oil, renewables, etc.	megawatt hours per year kilowatt hours per tonnes of product
Emissions	Air emissions such as greenhouse gases, volatile organic compounds, fine and ultrafine particles, etc. Effluents such as discharge of specific hazardous substances, process water or cooling water, etc. Waste such as hazardous wastes ⁽¹⁾ , non-hazardous waste, sludge, heat, noise, etc.	tonnes per year kilograms per tonnes of product cubic metres per year cubic metres per tonnes of product kilograms of substances per cubic metre of waste water percentage of waste recyclable (per year) megajoules per year megajoules per tonnes of product decibels (at specific location)

22. The Global Reporting Initiative is a global initiative to promote sustainability
- a) It lists 10 indicators, of which 5 environmental indicators
 - b) It lists 81 indicators, of which 30 environmental indicators
 - c) It lists 81 indicators, of which 50 environmental indicators

9. Unit: Resource Efficiency

23. Resource efficiency means:
- a) producing the same amount of products with fewer natural resources
 - b) producing the same amount of products amount with less employees
 - c) producing more products with the same amount of natural resources
 - d) producing more products with the new machines

Question	possible answers	correct	wrong
24. Natural resources are:	a) Energetic raw materials like oil, coal, gas, wind	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	b) Biotic raw materials like wood, food, plants	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	c) Manpower (e.g. employees)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	d) Area (e.g. ground of company)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
25. Objectives of resource efficiency are:	a) reducing the use of the land and preventing their degradation.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	b) reducing environmental pollution.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	c) reducing cost of production	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	d) reducing the use of raw materials.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
26. Starting points for better resource efficiency are:	a) using electricity instead of gas or oil for heat production (steam, oven...).	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	b) process optimisation through cleaner production.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	c) optimisation of consumption behaviour, e.g. drive your car fuel saving.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	d) selection of raw materials with lower environmental impact	<input checked="" type="checkbox"/>	<input type="checkbox"/>

10. 11. 12. 13. Unit: Cleaner production

27. Cascade utilisation means:	a) regulate the temperature of a process or oven first to high temperature, then medium, then low temperature	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	b) cleaning parts or products by flowing liquids (cleanser, solvents) like in a shower or water-fall.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	c) first material recycling of plastic or wood, then thermal utilisation.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	d) using dirty, used cleaning liquids (cleaning bath, solvents) for pre-cleaning, and clean, new cleaning liquids for the final cleaning	<input checked="" type="checkbox"/>	<input type="checkbox"/>
28. Cleaner production means:	a) Design of resource efficient products with e.g. low energy consumption	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	b) Optimisation of production processes to minimise waste and emissions.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	c) Optimisation of production processes to maximise resource efficiency.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	d) Optimisation of production processes to minimise the efforts for end-of-pipe-technique (filters, waste and wastewater treatment)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	e) Implement filters for flue gas treatment to reduce NOx and SO2 or filters for waste water treatment.	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Question	possible answers	correct	wrong
29. Cleaner production is	a) applicable to big companies of the metal and chemical sector only and not suitable for SMEs.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	b) expensive, because the company has to buy new machines.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	c) reducing the amounts and pollutant load of wastes, waste water and emissions.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	d) causing high investments in filters like flue gas and waste water treatment plants	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	e) consisting of simple, promptly executable organisational measures up to the modifying or replacement of the existing manufacturing process	<input checked="" type="checkbox"/>	<input type="checkbox"/>
30. Typical Cleaner Production measures are:	a) specific personnel education and motivation of employees	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	b) skipping a process or service, which is not needed	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	c) reduction of rejects	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	d) change of input material, additives, etc. (e.g. less hazardous substances)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	e) separate waste collection in the company	<input checked="" type="checkbox"/>	<input type="checkbox"/>
31. Typical Cleaner Production measures for compressed air are:	a) fewer bendings in the pipes	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	b) smaller diameter of the pipes	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	c) higher pressure	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	d) no or less leakages	<input checked="" type="checkbox"/>	<input type="checkbox"/>
32. Typical processes in metal working companies are	a) Mechanical Processes (Cutting like Milling, Turning, Drilling, Sawing, Grinding)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	b) Painting of parts	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	c) Printing and dyeing of parts	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	d) Electroplating of parts	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	e) Cleaning of parts	<input checked="" type="checkbox"/>	<input type="checkbox"/>
33. In mechanical cutting processes cutting liquids are used to	a) keep the workpiece at a stable temperature	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	b) prevent rust on machine, parts and cutters	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	c) maximise the life of the cutting tip.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	d) remove paint and dirt from the metal parts.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	e) remove the metal chips.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
34. Typical Cleaner Production measures to extend the operating life of Cutting Liquids (CL) are	a) Use aqueous cleansers instead of solvents	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	b) Avoidance of tramp oil and dirt impact on the CL	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	c) Regular ventilating or circulating of CL esp. on weekends	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	d) Use of skimming, filtration and/or separation systems for cleaning the CL	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	e) Use HVLP (high volume, low pressure) spray guns	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Question	possible answers	correct	wrong
35. Typical Cleaner Production measures for Spray Painting are	a) Mix only paint quantities needed	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	b) Work dust-free and pre-inspect work pieces before painting to prevent processing of rejects	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	c) Reduce the spray pressure as much as possible	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	d) Spray at a 90-degree angle and with fixed distance	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	e) Control coating thickness and try always to get a high coating thickness.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
36. Typical Cleaner Production measures for Galvanisation are	a) Skipping the cleaning and rinsing baths between the different process baths like pickling and galvanisation	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	b) Minimise oil, rust and dirt on the work pieces	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	c) Pre-inspect work pieces to prevent processing of rejects	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	d) reduce the carry-over of one process bath to another	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	e) Keep permanent minimum concentrations of metals and chemicals in the process baths by continuous minimum dispensing of chemicals	<input checked="" type="checkbox"/>	<input type="checkbox"/>
37. Typical Cleaner Production measures in Textile Industry are	a) Selection and use of better biodegradable or bioeliminable chemicals	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	b) energy savings through e.g. heat-insulation of pipes, valves, tanks, machines	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	c) recover and re-use alkali from mercerising rinsing water (in big companies)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	d) use high-fixation, low-salt reactive dyes	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	e) Adoption of countercurrent washing (eg. reuse the least contaminated water from the final wash for the next-to-last wash)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
38. Profitability Analysis	a) Is never needed for Cleaner Production measures, because they always save money	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	b) Is given by one single complicated formula defined in VDI GL 3800 and ISO 14088	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	c) Consists of different approaches: simple calculating methods for simple CP measures and more advanced methods for CP measures with high investments	<input checked="" type="checkbox"/>	<input type="checkbox"/>