



Experience in development and application of BAT in environmental legislation

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Best Available Technology

In the European Directives, in the national legislations of the members of the EU and in the Swiss Legislation you find the term **BAT** and **BREF**.

BAT **Best Available Technology**

BREF **Best Available Technology Reference Document**

The **challenge is** often that the legislation defines a **BAT** that will be an **economically and ecologically reasonable and feasible** technology, and that is **acceptable** as investment **for the industry**.



The House of BAT

BAT

BEST

most effective in achieving a **high general level of protection** of the environment as a whole

AVAILABLE

Developed to be implemented in the relevant industrial sector, **under ecologically, economically and technically viable conditions**, advantages balanced against **costs**

Technologies

the **technology** used and the way in which the installation is **designed, built, maintained, operated and decommissioned**

economically viable

ecologically reasonable

industrially feasible



Current Swiss Experience



Based on Federal Swiss Legislation

Federal Act on the Protection of the Environment, EPA



Art 1 Aim

- 1 This act is intended to protect people, animals and plants, their biological communities and habitats against harmful effects or nuisances and to preserve the natural foundations of life sustainably, in particular biological diversity and the fertility of the soil.

Art. 2 Polluter pays principle

Any person who causes measures to be taken under this Act must bear the costs



Legislation - Ordinance - BAT

Relation between Legislation - Ordinance - BAT

European Directives, BREF

Strategic objectives, mission statement

National legislation

Strategic objectives, mission statement

No emission, closed material streams...

Ordinances

Operational objectives, statements relating to the implementation and application

Criteria, measures, limits, specifications, recycling rates...

BAT

Statements to processes

Performance indicators, consumption values, techniques and procedures...





Current Example: Revision Ordinance ORDEA*



Revision Ordinance 2014/2015 on the return, the taking back and the disposal of electrical and electronic appliances (electronic- and electric waste => E-Waste)



Why the authorities want this revision?

E-Waste

- is a fast growing waste stream
- contains a lot of hazardous waste
- contains a lot valuable materials
- to recycle as much as possible E-Waste to raw materials and to close the material loop

*ORDEA: in German VREG: <http://www.admin.ch/opc/de/classified-compilation/19980114/index.html>



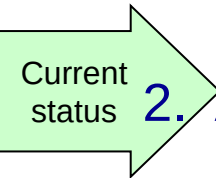
Current example: Revision Ordinance ORDEA*



Process Revision of the BAT for E-Waste Recycling



1. National authorities from the federal office for the environment define targets in a **Guidance Document**
2. An expert committee (consisting of representatives of industry, regional authorities, recyclers, scientists) is working on BAT for E-Waste in Switzerland
3. The base of creating BAT for E-Waste is related to the current state in technical development.
4. The results of these workshops leads to the BAT for E-Waste for Switzerland and will undergo 2 months of public hearing
5. Introduction and implementation of BAT
6. This whole process (from point 1 to 4) takes about 1 year



*Ordinance on the return, the taking back and the disposal of electrical and electronic appliances



Experience, or lessons learned with BAT



It is very difficult to fix all interests of all different opinions and to turn them into an ecological, economical and feasible solution.

You need people who understand **all needs of all involved** parties.

BAT is a moving target, because of fast developments in technology. No industry invests in moving targets!

You need **stability in your BAT** so the industry can invest and has a chance to depreciate their investments.



Each BAT is only as good as implemented, monitored and controlled.

Often it's not clear which authority is responsible for creation and control of BAT.

The Swiss authorities **recognized this dilemma** and decided that **ONLY** the Federal Office for the Environment is in charge of all environmental issues.

Often penalties for not working according the BATs are much lower than the investment in the BAT.

This is not legally compliant. In case the company does not follow the rules, **the company is closed.**



ORDEA* Example for E-Waste Treatment



Generated E-Waste in Switzerland 2013 200'000t**

Collected E-Waste in Switzerland 2013 120'000t or 15 kg/inh***



E-Waste is a huge source of value materials

*Ordinance on the return, the taking back and the disposal of electrical and electronic appliances

**http://step-initiative.org/index.php/Overview_Switzerland.html

***www.SFNS.ch



Example: Mobile Phones in Russia



Relation in US\$

mobile phone	1 g
gold	0.024
palladium	0.009
silver	0.25
copper	9
cobalt	3.8
Total	



*estimated

Relation in gold ore production

1t gold ore => about 5 g gold

Russia: 80 Mio mobile phones => 384'000t gold ore

The gold concentration in mobile phones is about 50 times higher than in the gold ore!





STEP 2014 Worldmap update **Preliminary** minimum domestic RUS e-waste generation, **2014**



1'200'000t in 2014



Cooling devices
contain CFC!*
211'000t



Computer
82'000t



Phones
1000t



Small household
devices
433'000t



Large household
devices
340'000t



CRT/LCD
Screens
142'000t

*About 800'000 t metals are waiting to be recycled in Russian E-Waste per year, including gold, silver, platinum, palladium, copper => **Value: Over 200Mio US\$ per year***

Source: The Global E-waste Monitor 2015, "Quantities, flows, recycling and resource management", UNU - IAS - SCYCLE, Bonn, Germany, to be released Feb. 2015. , STEP: <http://www.step-initiative.org>

CFC: *chlorofluorocarbons: CFC destroys our ozon in the atmosphere and helps to increase massive the greenhouse effect.



BAT plant for E-Waste in Switzerland



**modular E-Waste
recycling plant
according to SWISS BAT**



**each modular E-Waste
plant is built according
to national BAT**





Business Opportunity: Military Scrap



All military products are built for use at any time under any condition. That is why their quality is above industrial standard. You can find a lot of value material in military scrap and in the waste of military production industries.

1. Valuable Materials

Precious metals, especially of communications- and command systems

2. Hazardous Waste

asbestos, PCBs, fluorescent labels with **radium (radiotoxic)**.

3. Waste

Similar to solid domestic waste

The army scrap is an important source of valuable materials. In recycling it is important to separate the valuable materials from pollutants, which must be treated correctly.





!!Sensitive/secret material in Military Scrap!!



Treatment process of sensitive military data/devices

Attention: Sensitive (secret) military material

1. Sensitive data like:

1. Paper, Microfiches
2. Hard discs, tapes, CD, DVD, memory sticks...

2. Sensitive components and devices

3. 2 destruction solution

- Stationary Industrial destruction solution
- Mobile destruction solution



Priority:

Responsibility, security and 100% certified destruction



BAT Summary

1. BAT must be ecologically, economically reasonable, industrially feasible and give the industry an **opportunity** for investment.

2. E-Waste Recycling

Russia has, in addition to geological raw material, a huge potential in **urban mining**, especially in collecting and recycling **E-Waste**.

3. Business Opportunity: Military Scrap

A lot of recyclable metals are to be found in production waste of military goods and in military scrap. **A lot of precious metals are especially found in electronic components.**



Russia is a TRIPLE resource country! Do it with a reasonable BAT!





**Спасибо за внимание
Для вопросов и обращений
Я в вашем распоряжении**

**Thank you for your attention.
I am at your disposal for questions and
references.**



Optional slides



Business Opportunity: Military Scrap



Treatment process of military scrap (Switzerland)

Attention: Restricted/secret material, weapons, explosives

1. Sale of military goods => Government to Government
2. Sale of military good (no weapons) for civil use
=> Government to anybody
3. Recycling of materials out of military goods
4. Treatment and disposal of hazardous waste and normal waste



Priorities:

- 1. Responsibility, security and safety**
- 2. Sale to earn money**
- 3. Recycling of valuable material to earn money**
- 4. Correct treatment and disposal of waste**



Best Available Technology (BAT)

How and from whom is the BAT developed?

1. Environmental issue give political pressure on government
2. The government organises a Task Force with experts (public authorities, scientists, lawyers and industry) to solve this environmental issue
3. BAT will be developed by the experts
4. Implementation and controlling of the **BAT**

The **challenge is** often that the legislation defines a **BAT** that will be an **economically and ecologically reasonable and feasible** technology, and that is **acceptable** as investment **for the industry**.



Importance of CFC fridge recycling



No. 1 Ozone Killer is CFC

Climate protection will fail without the systematic reduction of CFC levels in the atmosphere





Importance of CFC fridge recycling



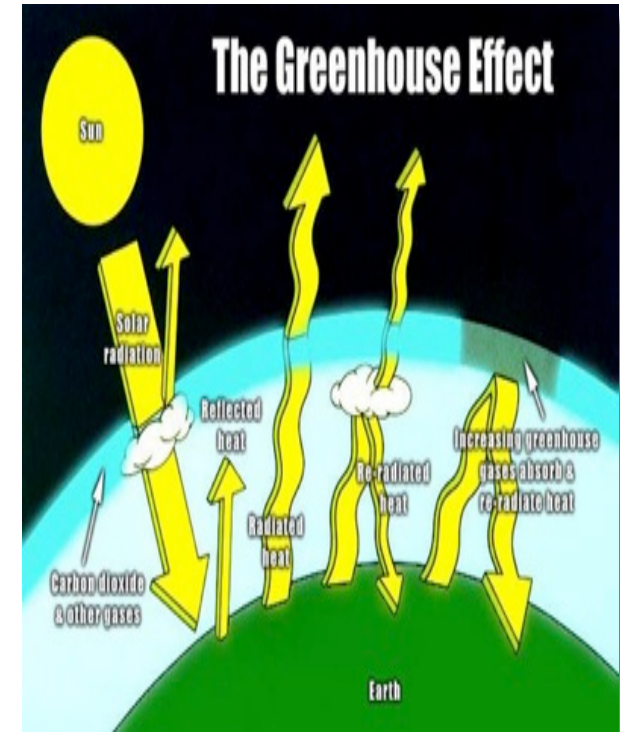
Huge influence on the greenhouse effect

CFC R12: (Compressor gas)

1kg => 10,720 kg CO₂- equivalents

CFC R11: (Insulation gas in foam)

1kg => 4,680 kg CO₂-equivalents



1 fridge => approx. 2800 kg CO₂ eq.!



Importance of CFC fridge recycling



1 fridge



2800 kg CO₂ eq.:

1 house / a



6886 kg CO₂

1 car / a



2832 kg CO₂*

*** 15000km/a und 8l/100km fuel 2.36kgCO₂/l**



Legislation - Ordinance - BAT



1. Federal Constitution of the Swiss Confederation

2. Federal legislation (Acts & Ordinances)

1 State - People - Authorities

2 Private law - Administration of civil justice - Enforcement

3 Criminal law – Administration of criminal justice – Execution of sentences

4 Education - Science - Culture

5 National defence

6 Finance

7 Public works - Energy - Transport

8 Health - Employment – Social security

9 Economy – Technical cooperation



Ordinances

1 including **BAT**

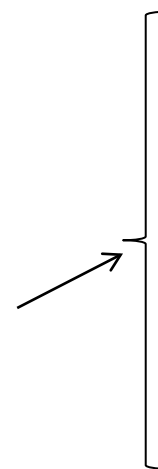
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STEP 2014 Worldmap update

Preliminary min domestic RUS e-waste generation, 2014



Category ('EU-scope')		Ktons/a	kg/ inh.
I	Cooling and Freezing	211	1.5
II	Screens (CRT and LCD)	142	1.0
III	Lamps	24	0.17
IV	Large equipment (incl. large prof. eq.)	340	2.4
V	Small equipment	433	3.1
VI	Small IT	82	0.6
Total		1,2 Mton/a	8.7 kg/inh

contained CFC!

About 800'000 t metals per year are contained in E-Waste in Russia, including gold, silver, platinum, palladium, copper

Source: Prof. Huisman, J. et al, The Global E-waste Monitor 2015, "Quantities, flows, recycling and resource management", UNU - IAS - SCYCLE, Bonn, Germany, to be released Feb. 2015.