

Waste policy at a crossroad: How to balance contradicting factors, extreme material recycling, boom in energy use and the fear of pollutants

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Content of the presentation

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- Changing goals in the treatment of biogenic waste
- Goals to take into account
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 - Phosphorus
 - pollutants
- Some conclusions for the legislator

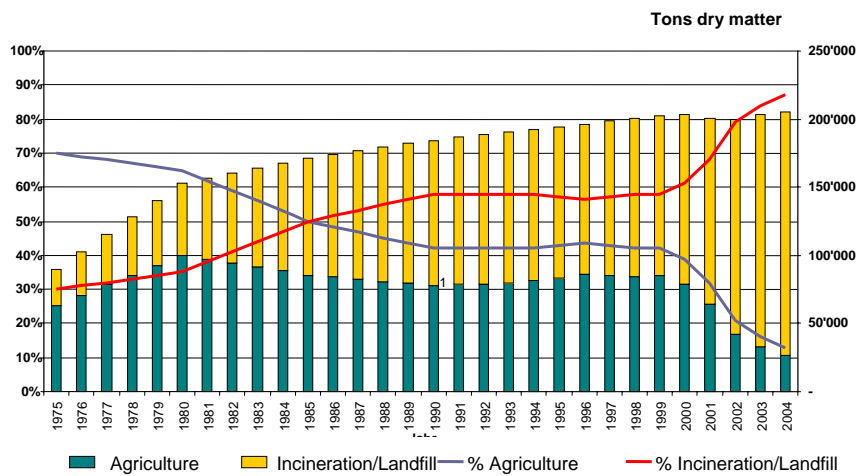


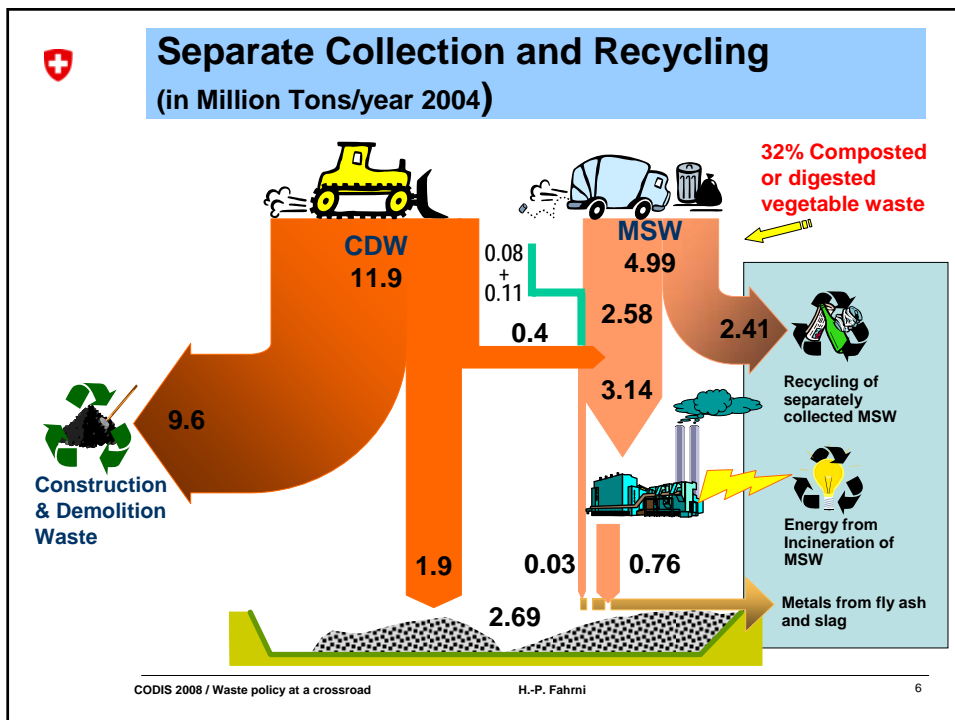
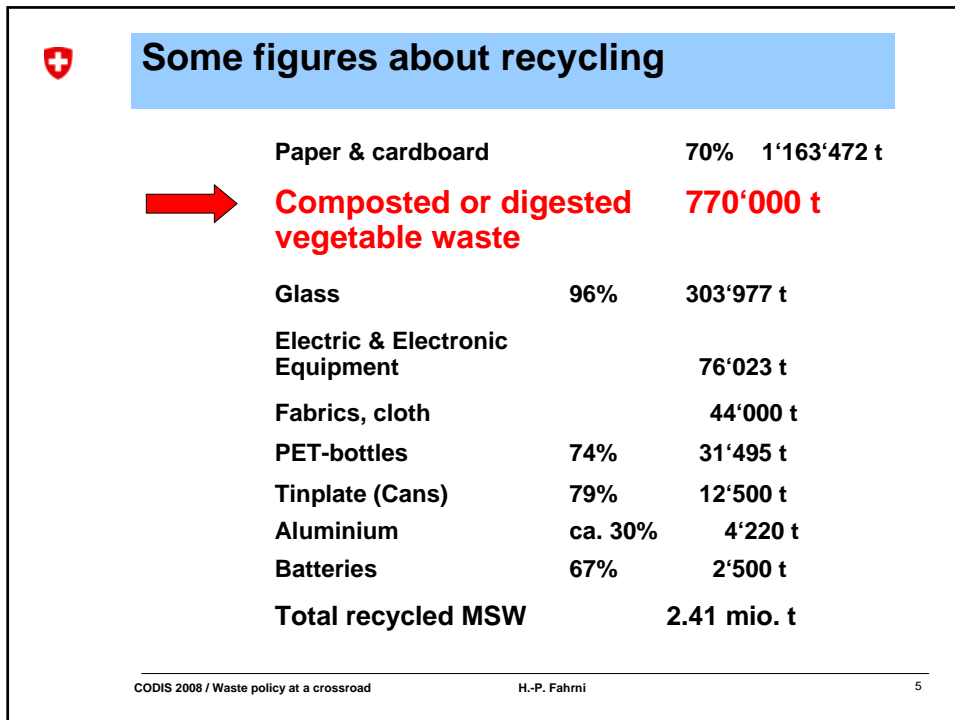
The reasons behind the two research projects and today's situation

- Since the 1980 big reductions in the load of heavy metals in sewage sludge
- Increasingly presence of medicaments such as antibiotics, tranquilizers, or medicaments; e.g. against high blood pressure or cholesterol were detected in sewage sludge
- Starting in 2002 strong concerns that “prions”, the pathogenic structures which cause the mad cow disease, could be found in sewage sludge.
- big discussion about the future use of sewage sludge in agriculture as fertilizer.
- The use of sludge in agriculture was prohibited.
- As consequence we had to find new ways to eliminate sewage sludge



Elimination of sewage sludge in Switzerland







The reason for the two research projects

- In 2002 we worried about an amount of 770'00 t of vegetable waste, which would have to be “eliminated” and could not be recycled anymore.
- We started two big research project about the concentration of pollutants in compost and about the positive effects of compost for soil and plants.
- Today, we can conclude that the quality of compost (and digestate) is rather good (exception PAH).
- There are several positive effects of the use of compost (fertilizer, suppression of plant diseases, soil structure).



Changing goals in the treatment of biogenic waste

- Before 1985 a lot of “compost” was made from mixed urban solid waste and had a low quality.
- 1985 – 1990 the fear of soil pollution by heavy metals from compost ruled the compost production.
- 1990 – 1995 the reduction of the amount of mixed urban solid waste was the main goal.
- 1995 to 2000 reduction of cost.
- 2008 the production of energy.



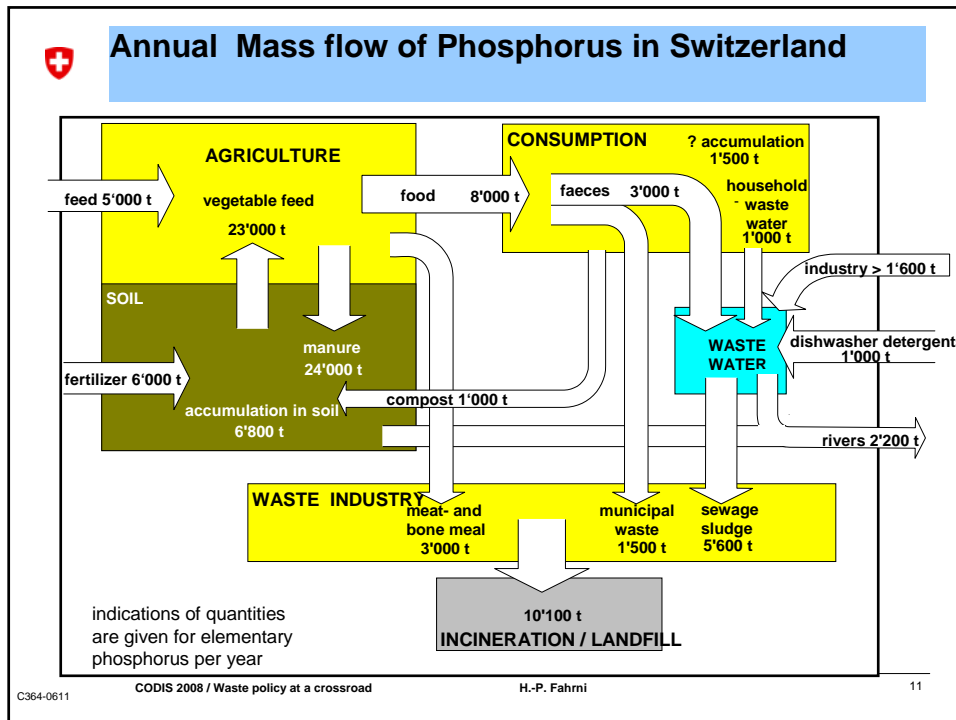
Goals to take into account

- Recirculation of nutrients as phosphorus to soil.
- Improvement of soil quality.
- Reduction of the load of inorganic and organic pollutants to soil.
- Use of energy content in biogenic waste.
- Costs for collection and treatment of biogenic waste.
- Investments in existing plants and collection systems.
- Emission of greenhouse gases.




Some remarks to the different goals: Phosphorus

- Phosphorus is an essential element, the actual level of food production is only possible because of the use of fertilizers.
- The geological reserves of phosphorus containing minerals of a good quality (high percentage of phosphorus and low concentration of pollutants as Cadmium) is very limited.
- Burning bone meal and sewage sludge together with other waste in cement kilns, coal fired power plants or municipal solid waste incinerators produces mixtures of phosphorus with products (cement, bottom ash) from which phosphorus can not be recycled easily.
- We observe a constant loss of phosphorus (phosphates) from soil to aquatic sediments in rivers, lakes and oceans.
- Phosphorus will certainly be a important issue in the future management of natural resources.



Some remarks on pollutants - or the of progress in analytical chemistry

- What means a picogramm/l ?
- 1 picogramm = 10^{-12} g
- An example
- One sugar cube 3,5 g
- in 1 m³ = 3,5 mg/l
- in 1000m³ = 3,5 microgramm/l
- in 1000'000 m³ = 3,5 nanogramm/l
- in 1'000'000'000 m³ = 3,5 picogramm/l



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One sugar cube in the Lake Zurich

3,6 g in Lake Zurich
means 3.6 g in 3'600'000'000 m³ of water
or 1 pg/l in Lake Zurich



Why is 1 pg/l of some pollutants detectable?

- 3,5 g of sugar is about 0,01 Mol of saccharose
- 1 Mol = $6.024 \cdot 10^{23}$ molecules
- 3,5 picograms of sugar are $6.024 \cdot 10^9$ molecules
- 1 picogramm of sugar are $1,72 \cdot 10^9$ molecules
- 1 cube of sugar in the lake of Zurich means **1'720'000'000 molecules** of sugar per dm³

A good chemist should be able to detect some of these molecules.

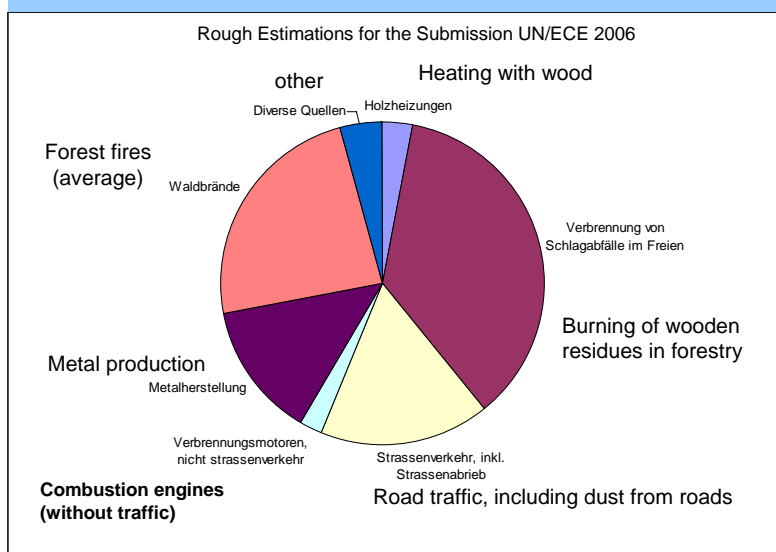


Conclusions concerning pollutants

- Almost every pollutant is detectable in many natural matrix.
- We need more knowledge about the toxicological significance of pollutants, specially about long term effects of increased background concentrations.
- The findings of this projects confirm the necessity , to continue with the actual Swiss policy of reduction of the emissions of pollutants.



Sources of the pollutant PAH in Switzerland



How come PAH in the compost/ digestate ?


The diagram illustrates the sources and transport of PAHs. On the left, three sources are shown: a forest fire, a combustion engine, and an industrial factory. Red arrows labeled 'emissions' point from these sources towards a central white truck. A large red arrow labeled 'transportation' points from the truck towards a field on the right. A red arrow labeled 'deposition' points from the field towards a tree in a field of yellow flowers. The field is under a blue sky.

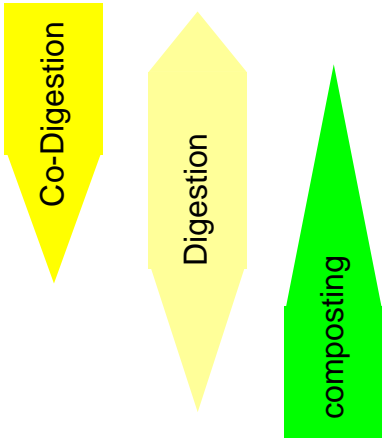
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Some general conclusions for the legislator

- First priority: Avoid damage to health or to common goods as ambient air, water and soils.
- The reduction of the emissions of pollutants remains crucial.
- Treatment plants for biogenic waste have to respect the existing emission norms.
- We probably need an emission norm for methane from digestion plants, otherwise the greenhouse effect of anaerobic digestion will be much more important than the production of energy from non-fossile combustibles.
- Continuous improvement of all types of waste management plants remains an important issue.
- Continuous improvement of the quality of digestion products and composts.


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 **Which waste to which process I**




- Grease from grease separators
- Kitchen waste from restaurants
- Waste/excess animal feed
- Vegetables from malls and commerce
- Waste from food processing industry
- Kitchen waste from households
- Grass from Lawn mowing
- Foliage, leaves
- Branches, bushes

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 **Which waste to which process II**

- Grease from grease separators
- Kitchen waste from restaurants
- Waste/excess animal feed
- Vegetable waste from malls and commerce
- Waste from food processing industry
- Kitchen waste from households
- Grass from Lawn mowing
- Foliage, leaves
- Branches, bushes



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Decisions must respect local situations

Taking in to consideration local conditions

- as collection systems,
- existing plants,
- efficiency of energy use in the different existing and planned plants,
- public health hygiene issues,
- convenience for households,

will help to find “custom made” solution