Waste planning: institutions, circulations and conflicts

Rohstoffwende

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How to balance the demands on a resource-efficient circular economy with the demands of a non-toxic environment?

Wie sollen die Anforderungen auf eine ressourceneffiziente Kreislaufwirtschaft mit den Anforderungen auf eines nicht-toxischen Umwelt kombiniert werden?

Resources and hazards

Sewage Sludge

Ashes

Background

	Ashes	Slag	Sludge
Sweden	<5 %	<5 %	25%
Central Europe	75% (Belgium)	43% (Germany)	70% (Denmark)

Plan/Research questions

Identify challenges for circularity in Sweden.

Examine how these challenges have been addressed in Central Europe.

With the lessons in mind, how can the Swedish challenges be addressed?

- Why does circulation differ between countries? (material, technology, power, policy, economy)
- Who are benefitted and disadvantaged? Who takes the resources/risk?
- Why are secondary materials used instead of primary materials? (the perspective of the receiver)
- How is the conflict between resources and hazardous balanced?

Some insights…

Ashes

mg/kg	Arsenic (As)	Cadmium (Cd)	Chrome (Cr)	Copper (Cu)	Mercury (Hg)	Lead (Pb)	Nickel (Ni)	Zinc (Zn)
Sweden								
Unrestricted	10	0,2	40	40	0,1	2	35	120
Landfill cover	10	1,5	80	80	1,8	200	70	250
Flanders								
unrestricted	250	10	1250	375	5	1250	250	1250
Germany								
unrestricted	20	0,6	50	40	0,3	100	35	140
Restricted open	50	3	200	200	3	300	200	500
bounded	150	10	600	600	10	1000	600	1500

l/mg	Arsenic (As)	Cadmium (Cd)	Chrome (Cr)	Copper (Cu)	Mercury (Hg)	Lead (Pb)	Nickel (Ni)	Zinc (Zn)
Sweden								
Unrestricted	0,05	0,004	0,06	0,2	0,001	0,1	0,2	0,8
Landfill cover	0,05	0,004	0,06	0,2	0,001	0,1	0,2	0,8
Denmark								
Unrestricted	0,008	0,002	0,01	0,05	0,0001	0,01	0,01	0,1
Bounded	0,05	0,04	0,5	2	0,001	0,1	0,07	0,6
Vallonien								
Unrestricted	0,1	0,1	0,1	2	0,02	0,2	0,2	0,9
Germany								
unrestricted	0,01	0,002	0,015	0,05	0,0002	0,02	0,04	0,1
Restricted open	0,04	0,005	0,075	0,15	0,001	0,1	0.15	0,3
Bounded	0,06	0,01	0,15	0,3	0,002	0,2	0,2	0,6
Draft			0,15-0,6	0,11-2				

Important factors for ash utilization

Alternative costs

The public sector uses secondary materials to demonstrate its potential

Public procurement

Agreements between state and industry

Sewage sludge

	Cadmium(Cd)	Copper(Cu)	Mercury(Hg)	Nickel (Ni)	Lead(Pb)	Zinc (Zn)
Sweden	2	600	2,5	50	100	800
Germany	1,5	900	1,0	80	150	4000*
Denmark	0,8	1000	0,8	30	120	4000
Spain	40	1750	25	400	1200	4000
Netherlands	1,25	75	0,75	30	100	300
Flanders	6	375	5	50	300	900
Austria	10	500	10	100	400	2000
Range	**0,8-40**	**75-1,750**	**0,75-25**	**30-400**	**100-1200**	**300-4000**

The policy for sewage sludge is changing over time.

Landfill ban on organics / landfill tax pushing for circulation

Prohibition of sludge spreading in the Netherlands since 1991, Flanders 1999, also Sweden (repealed). Individual food producers do not buy food from farms using sludge

Objectives to extract phosphorus

- long-term goals in Germany, Switzerland and Austria
- But is technology available? The economy? CO2-emissions?
- New problems? What happens to the residues?

	Cadmiun (Cd)	Copper (Cu)	Mercury (Hg)	Lead (Pb)	Nickel (Ni)	Zinc (Zn)
Sweden						
Ashes	0,2	40	0,1	20	35	120
Sewage sludge	2	600	2,5	100	50	800
Germany						
Ashes	0,6-10	40-600	0,3-10	100-1000	35-600	140-1500
Sewage sludge	1,5	900	1,0	150	80	4000
Spain						
Sewage sludge	40	1750	25	1200	400	4000
High risk	>4	>1000	>10	>800	>350	>3500

Environmental benefits and costs at different scales, related to different environmental problems.

How should the benefits and costs be weighted by the authorities?

What different strategies can we see for a circular economy?

- what are the pros and cons of different stragies?
- end of pipe? Reactive solutions?

Where is the limits for the primary material?

Other issues to discuss? Any literature recommendations?