

Danish national taxes on phosphorous discharges and on sludge ash landfill

European workshop: Waste Water phosphorus removal tomorrow: ambition and reality Liege, 24 November 2019 Jóannes J. Gaard

Waste Water Plants i Denmark

2.000- 9.999 PE	175
10.000 - 49.999 PE	114
50.000 - 99.999 PE	34
100.000 PE >	31
Total	354
Approved capacity PE	12.781.438
Actual capacity PE	8.560.597

Normal Treatment	Anaerobic digestion	Sludge Mineralization
28%	66%	6%

Distribution of sewage sludge in Denmark

	2014	2015	2016
On farmland	66%	65%	64%
Composting	8%	6%	9%
Incineration	25%	28%	26%
Landfill	0%	1%	1%
Total (Dry matter, tons)	132	131	132
Phosphorus (tons)	5	5	5

Struvit production – 150 kg/pa



The hierarchy in the EU waste directive's article 4

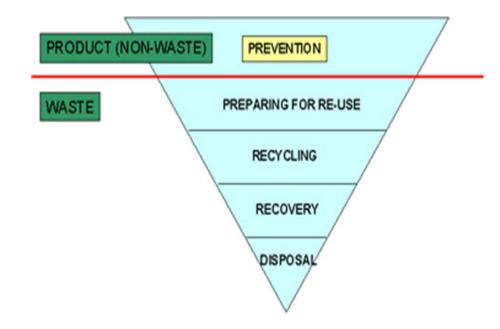
Prevention (Forebyggelse)

Preparing for re-use (Forberedelse til genbrug)

Recycling (Genanvendelse)

Other recovery, e.g energi recovery or other material recovery (Anden nyttiggørelse, fx energi- eller anden materialenyttiggørelse)

Disposal, e.g. landfilling (Bortskaffelse, fx deponi)



Member States shall encourage options delivering best overall environmental outcome Specific waste streams may depart from the hierarchy where justified by life-cycle thinking on the overall impacts generation and management

In the proposal for revised waste directive from EU-Commission:

Backfilling definition: any recovery operation ... used for reclamation, engineering, construction

Member States shall make use of adequate economic instruments to provide incentives for application of the waste hierarchy



Strategy for utilization of phosphorus

Danish Resource Strategy, 2013

"Denmark without waste"

2018:

80% of phosphorus from sewage sludge is to be recycled through:

- Recovery by utilization of sewage sludge on agricultural soil
- Recovery of phosphorus from the sewage sludge incineration ash as fertilizer





HeavyMetals in sludge compared to Phosphorate rock

	AS	Pb	Cd	Cr	Ni	Hg
	mg/kg P					
Phosphate rock	51	184	44	1138	241	2
Struvit	<17	<25	<0,4	11	<8	<0,1
Danish sludge (Fe)	97	263	3	267	233	7,3
Danish sludge (AL)	<74	241	11	407	219	5,6
Trible Super Phospate	11	16	43	453	146	0,2
Limits in Danish legislation		10000	100		2500	200



Economic regulation

Resource utilization has become a part of the utilities main business activities in the Water Sector Act in

Waste water tax

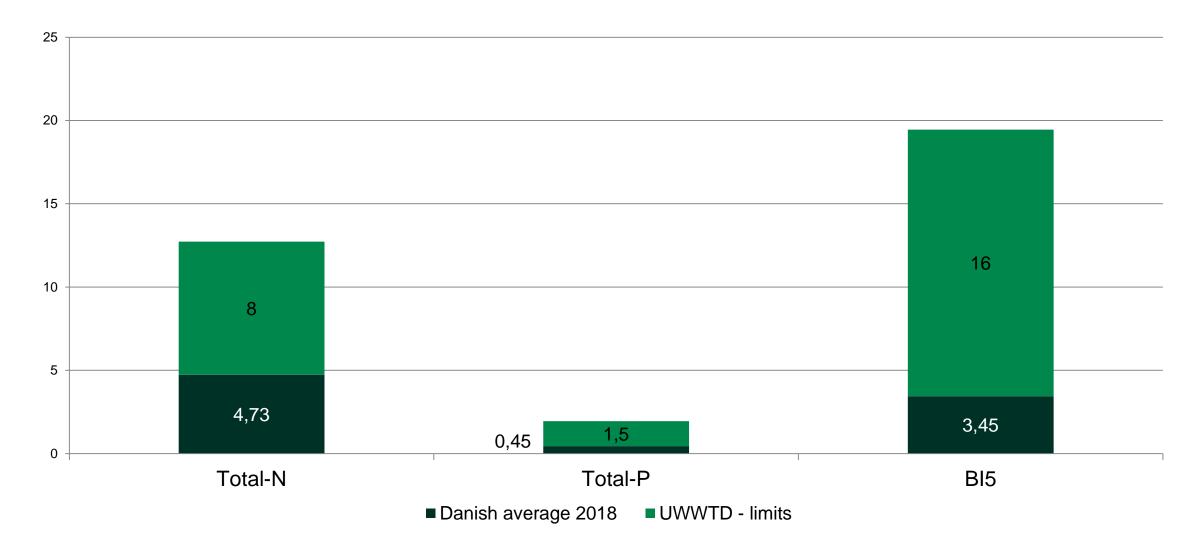
- Utilities pays
 - 22 Euro per Kg Phosphorous in the outlet
 - 4 Euro per Kg Nitrogen in the outlet
 - 2 Euro per kg Organic Material

Tax on landfill

Utilities pay 63 Euro pr. ton landfill

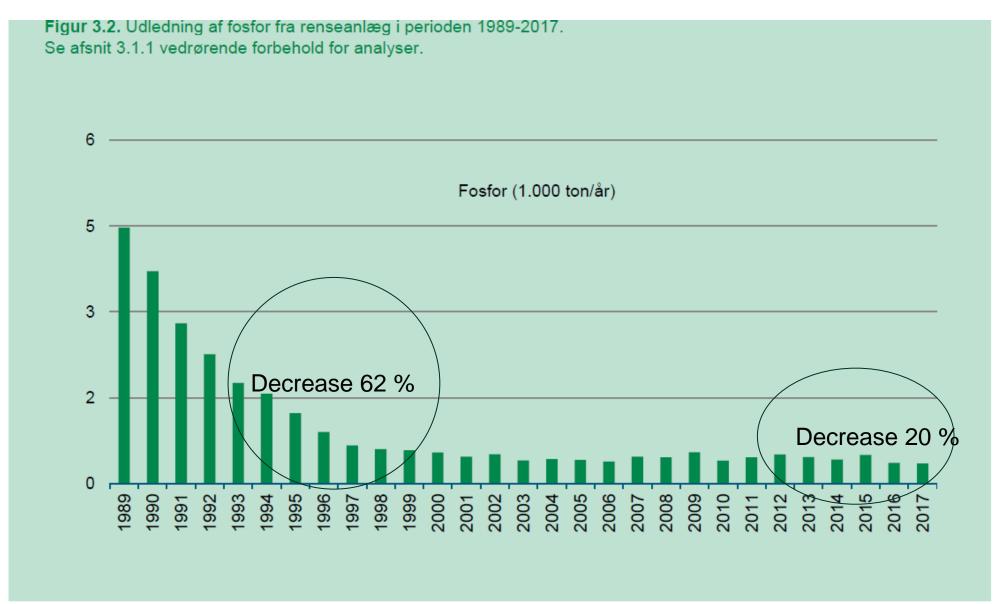


Average dicharge levels in Denmark





Development in WWTPs outlet of Phosphorus



Urban Waste Water Treatment Directive

Article 14 1. Sludge from sewage treatment plants must be reused when this is appropriate......

Revision of the Urban Waste Water Treatment Directive.

Danish priorities:

- 1. Benchmarking of utilization of the resources in Waste Water
 - Percent Phosphorus reused
 - Energy performance
 - CO2 performance





Thank you for your attention!