

Biogas and waste management in Norway

IEA Bioenergy workshop

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Henrik Lystad

Assistant director Avfall Norge

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henrik.lystad@avfallnorge.no



[Contact Henrik on LinkedIn](#)

Experience

Board member at European Compost Network ECN e.V:
February 2011 - Present (1 year 1 month)

Assistant Director at Avfall Norge
April 2003 - Present (8 years 11 months)

Producer responsibility

WEEE

Biological waste treatment/MBT

Biogas

Composting

Acting director at Avfall Norge
November 2011 - December 2011 (2 months)

Board member at Norsk Energigassforening
November 2008 - May 2010 (1 year 7 months)

Co-founder and deputy chairman.

Researcher and research manager at Jordforsk
July 1997 - April 2003 (5 years 10 months)

Education

Technische Universität Berlin
Diplomingenieur/MSc, Environmental engineering, 1990 - 1997

Content

- Who is...
- A view on waste treatment and biogas
- Biogas in Norway
 - Production
 - Use of biogas
 - Future perspective – some plans for biogas

Waste Management Norway (Avfall Norge)

- Interest organisation for the Waste sector in Norway, with main focus on the municipalities
- Founded in 1986 - 10 employees in administration + project engagements
- Covers 96% of the population through public members
- Organization:
 - Board, R&D board and 7 working groups

Members

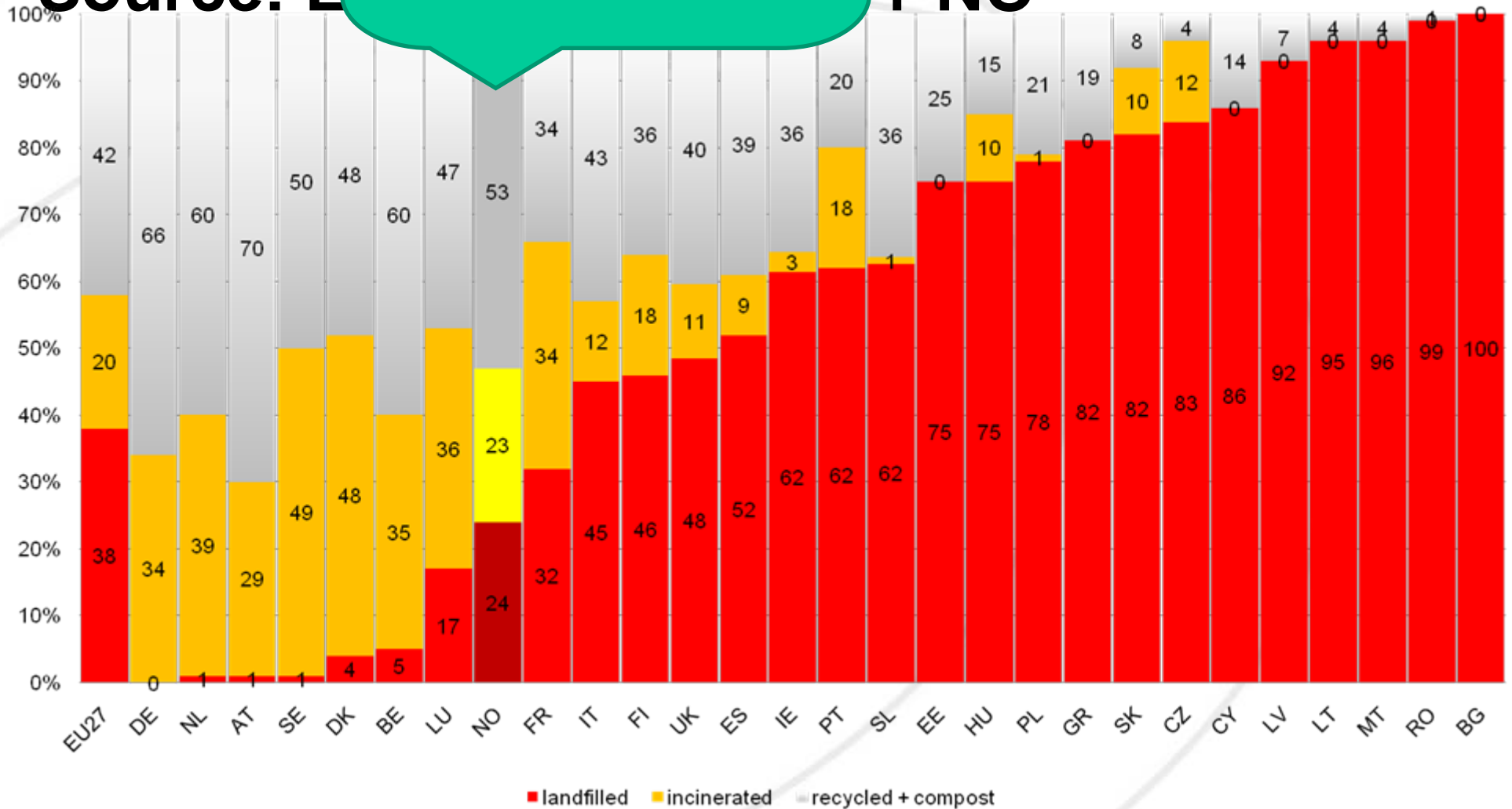
- Approx. 100 municipalities and inter-municipal companies.
- Private companies within waste management, including research and development, consultancies
- Most treatment plants within waste-to-energy, composting, biogas treatment and landfilling are represented.



Municipal Waste Treatment in 2009

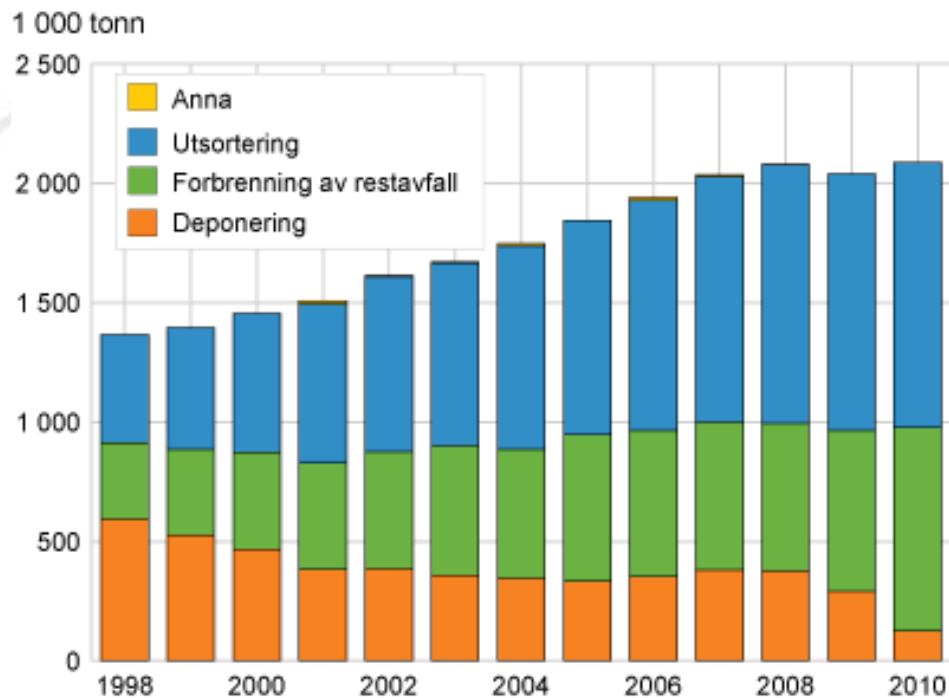
Source: Eurostat + NO

Norway 2008:
 Material recovery 45 %
 Incineration 30 %
 Landfilling: 25 %



Household waste

Handtering av husholdsavfall. 1998-2010. 1 000 tonn



- Waste per capita: 424 kg/a
- Source separation >50%
- Reduced landfilling since ban in 2009

Municipality structure and waste regulation

- Household waste is responsibility of municipality
 - System
 - Collection (tender)
 - Treatment (both)
- 433 Municipalities
 - Average size: 10 900
 - => Intermunicipal cooperation through regional waste companies is the solution in many regions
- Commercial waste is responsibility of waste owner

Number of inhabitants	Number of municipalities
Fewer than 2 499	129
2 500-4 999	106
5 000-9 999	91
10 000-24 999	69
25 000 and more	35

Biowaste treatment in Norway

- System predominating until 2009:
 - Either
 - Source separation and composting OR
 - No biowaste sorting and incineration
- After landfill ban (7/2009)
 - Some rural districts: Stopping source separation to reach size for waste-to-energy plant
 - Climate focus: urban areas with incineration introduce source separation and AD – biogas utilisation as vehicle fuel

Type	K tonnes (2009)
Composting	392
Biogas	62
Food waste	201
Sludge	149
Garden waste	85

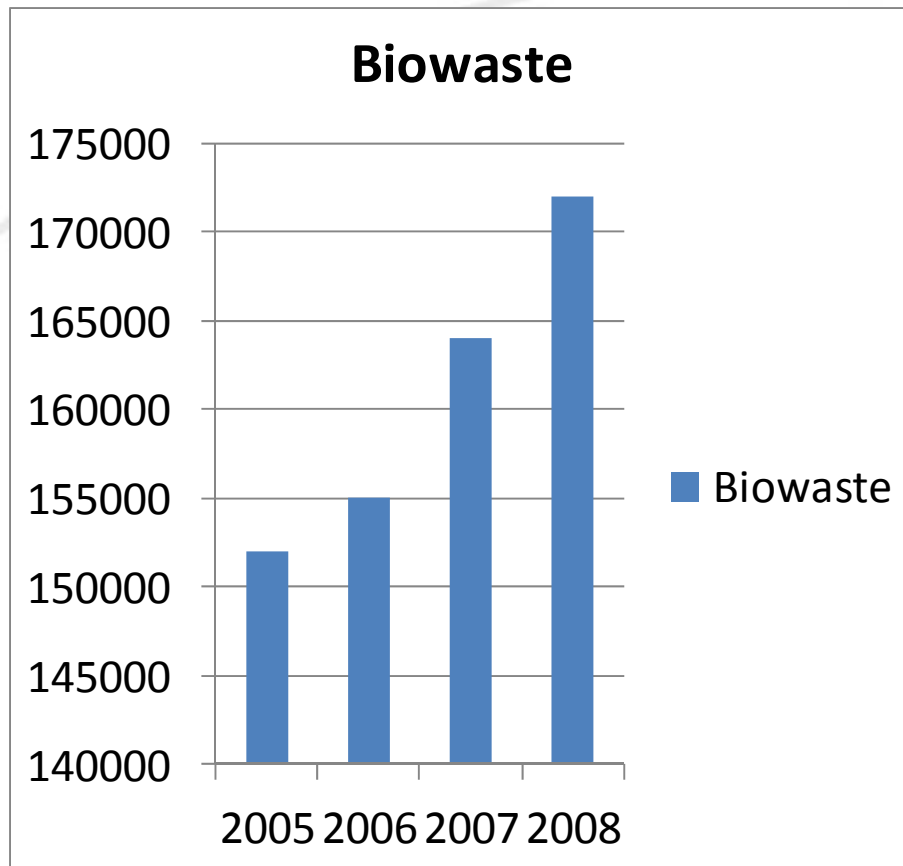


Collected amounts

- **Norway statistics**
(www.ssb.no/waste)
 - 172 000 t biowaste
 - 65 kg/inhab*y
(that have source separation)
- **Survey**
 - Average 67 kg/inhab*year
 - More in regions where napkins and/or garden waste is included

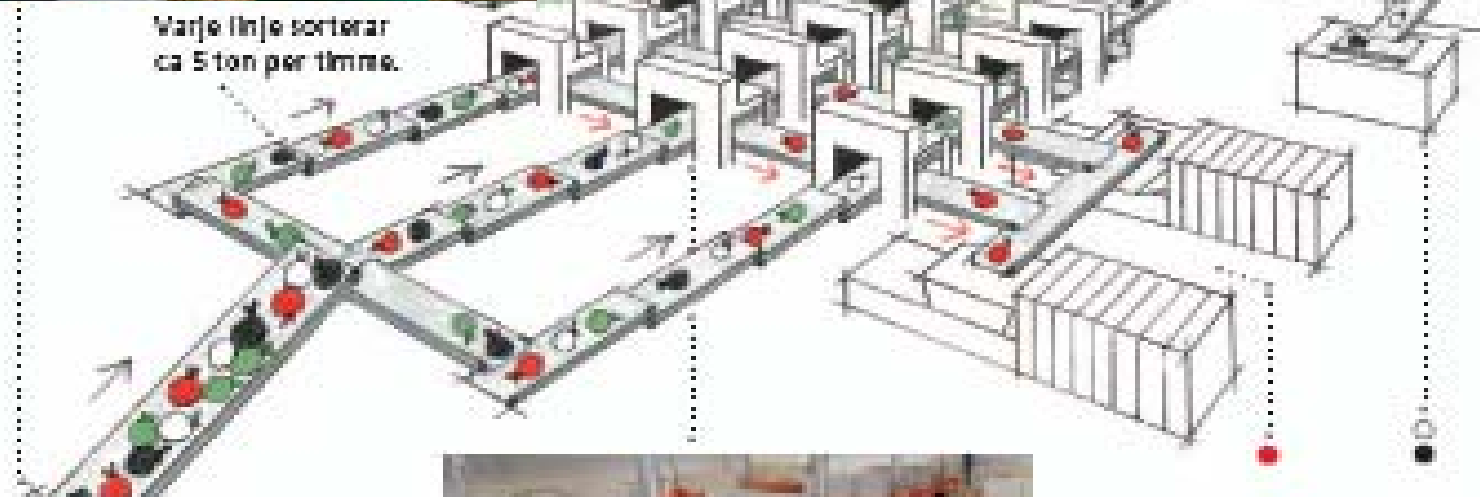
System	Average collected biowaste kg/inhab*y
All	67
With napkins	96
With garden waste	85
Only kitchen waste	50

Collection trends



- Expected to rise substantially since Oslo has started source separation and surrounding municipalities are planning the same

Oslo-case: Coloured bags and optical sorting (food waste, plastics and paper/cardboard)



Other models for sorting:



Material recovery



New alternative: Food waste in separate bag, optical takeout in sorting plant



Material recovery



Waste quality



Biogas treatment today

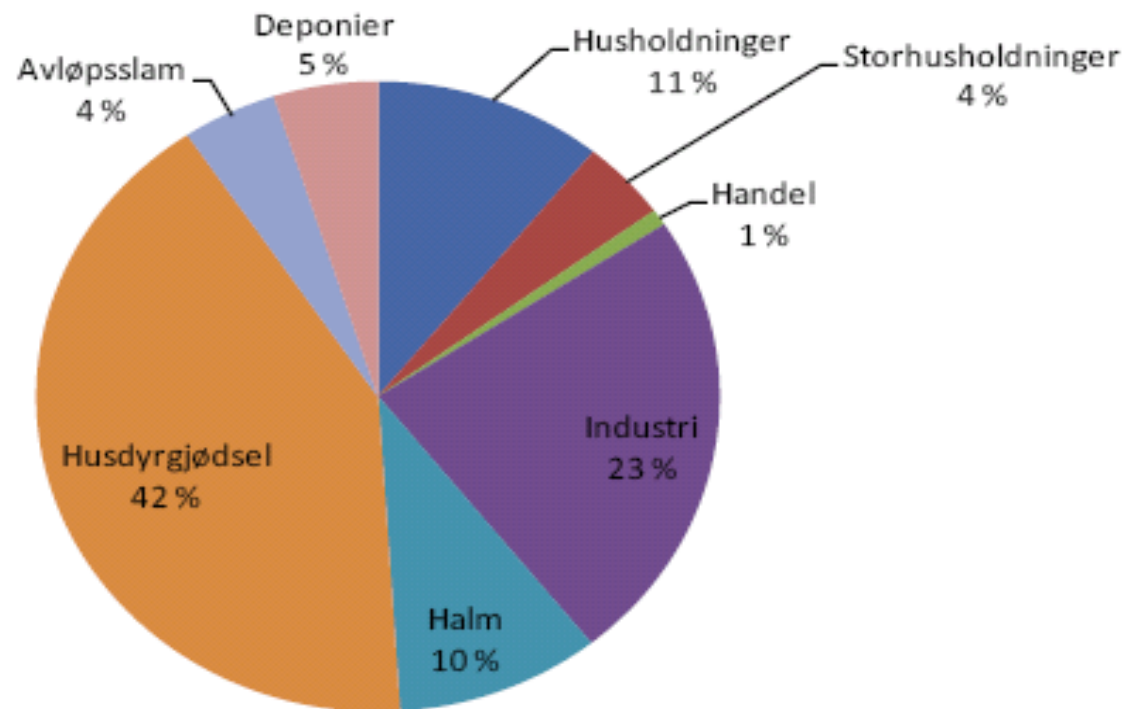
- In total: about 35 plants
- 23 Waste water treatment plants
- 6 Waste treatment
- 5 Manure plants

- Production ca 200 GWh



Total potential for biogas: 6 TWh

Fordeling av teoretisk energipotensial mellom ulike biogassressurser i Norge



Status biogas today

- Conditions less favourable than in neighbouring countries (DK/S)
- Upgrading is best economic option, but:
 - Large scale necessary
 - Co-digestion of waste, manure and sludge etc.
 - Need for fleet vehicles (buses, waste trucks etc.)
- Many plans for new capacity:
 - Oslo, Bergen, Trondheim, Drammen, Jevnaker, Tønsberg, Vestby, Rakkestad, Fredrikstad

Existing upgrading facilities

- Fredrikstad, FREVAR (sludge, 2002)
- Oslo, Bekkelaget (sludge, chemical sorption)
- Stavanger, IVAR (sludge, chemical sorption)
- ----
- Lillehammer, Glør (waste-membrane technology)



New plans – Oslo / Romerike

- capacity of 50,000 tons of food waste from the city of Oslo
 - Cambi technology with thermal hydrolysis
- 4.5 mills. Nm³. The gas volume will drive 135 buses
 - Liquid biogas (LBG) on the market in 2013 (new technology)
- bio fertilizer will have the capacity to fertilize approx. 100 medium size Norwegian farms

Trondheim - Biokraft

Sted	Fiborgtangen
Prosjekt owner	Biokraft (Trønderenergi m.fl)
Input	Fish waste (kat 2), pulp & paper waste, manuer
Mengder	
Sikret	
Produksjon	75 GWh
Oppstart	2013...
Biogass	Oppgradering (flytende) drivstoff
Biorest	
Kontakt	Håvard Wollan

- Situated at a paper mill.

Lindum – biogas from sludge and waste

Sted	Drammen
Prosjekt owner	Lindum AS
Råvarer	Avløpsslam
Mengder	25.000 t
Sikret	Langsiktige kontrakter
Produksjon	16 GWh
Teknologi	Cambi/Läckeby
Biogass	Flere muligheter
Biorest	Jordbruksformål/grønta nlegg
Kontakt	Jan Hammer

- Under construction, in operation mai 2012
- Biogass kan som nå leveres til lokal CHP med varmeleveranse til boligfelt
- Oppgradering til drivstoff vurderes
- Biorest avsettes gjennom eksisterende kanaler

White papers in the pipeline – and demands

- Broad paper on **climate**, expected before june 2012
- **Waste treatment** expected autumn 2012
- "Biogassalliansen" demands a national biogas strategy (as in S)
- Avfall Norge suggests a national target to be set at 50 % collection of all food waste for biological treatment within 2020



Thank you

Henrik.lystad@avfallnorge.no

Tlf: +47 / 90 91 93 60

www.avfallnorge.no

Come visit the norwegian waste industry at the annual waste conference:

www.avfallskonferansen.no