PROJECTIONS OF GHG EMISSIONS IN WASTE SECTOR

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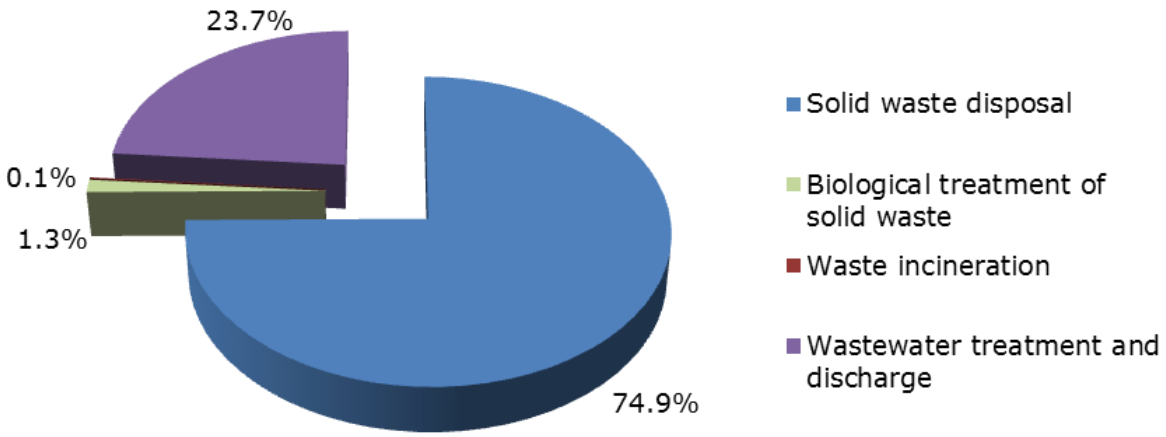
Overview of the sector

The share of GHG emissions by subsectors



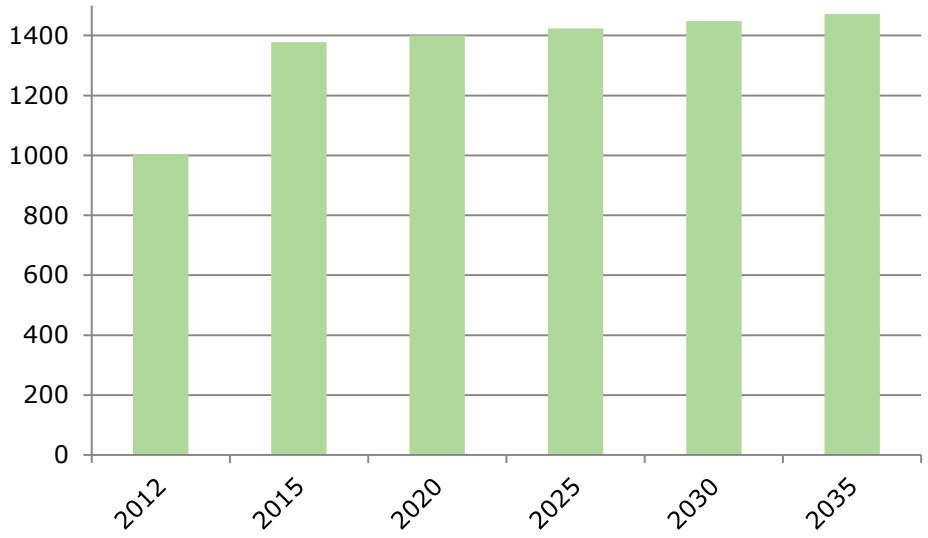
Data providers

Projections of GHG emissions are based on:

- ✓ The National Plan of Waste Management for period 2014-2020
- ✓ Data provided by the Ministry of Environment
- ✓ Data provided by Environmental Protection Agency
- ✓ Data provided by the Association of the Regional Waste Management Centers

Assumptions used for projecting GHG emissions from solid waste disposal on land (1)

- ✓ Projected amount of generated municipal solid waste for period 2015-2020 is provided in the National Waste Management Plan. Municipal solid waste generation during the period 2021-2035 was calculated following the increase during the period 2015-2020



Assumptions used for projecting GHG emissions from solid waste disposal on land (2)

- ✓ Municipal solid waste generation in 2012 was 336 kg/capita/year, by 2020 it will reach 524 kg/capita/year and 716 kg/capita by 2035
- ✓ It is assumed that less than 35% of generated MSW will be disposed of in landfills till 2030
- ✓ In the Lithuanian National GHG inventory Report emissions of sludge disposal are reported together with MSW disposal on land category. In the Plan disposal of sludge in landfills is foreseen to be stopped not later than 1st of January 2015
- ✓ Projected amount of CH_4 recovery from landfills for period 2015-2030 is provided by Association of the Regional Waste Management Centers . CH_4 recovery from landfills during the period 2031-2035 was calculated following the decrease during the period 2025-2030
- ✓ Emissions from MSW and sewage sludge were calculated using First Order Decay model provided in the 2006 IPCC Guidelines

Assumptions used for projecting GHG emissions from solid waste disposal on land (3)

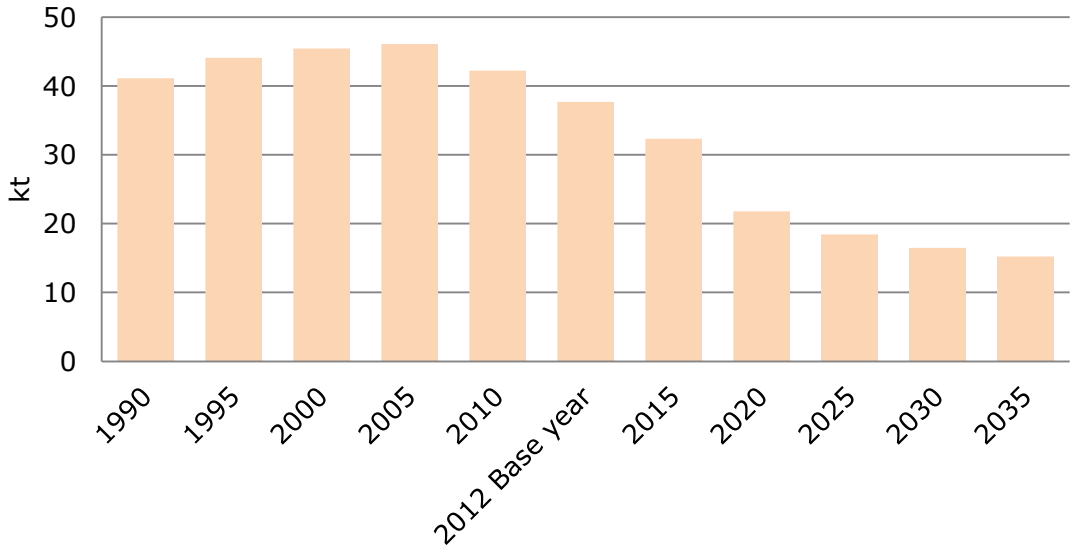
- ✓ EUROSTAT population projections for the period 2015-2035 were used

Summary of activity data for MSW GHG emissions projections

Activity	***Units***	***Historic values***	***Scenario "with existing measures"***				
		2012	***2015***	***2020***	***2025***	***2030***	***2035***
MSW generation	kt	1004	1377	1401	1424	1448	1472
MSW generation per capita	kg/capita/year	336	475	524	587	658	716
MSW disposed of in landfills	kt	792	758	490	475	459	442
MSW disposed of in landfills	%	79	55	35	33	32	30
Sewage sludge disposed of in landfills	kt	49	0	0	0	0	0
Amount of methane recovered from SWDS	kt	5.1	6.7	11.7	10.0	8.9	8.0

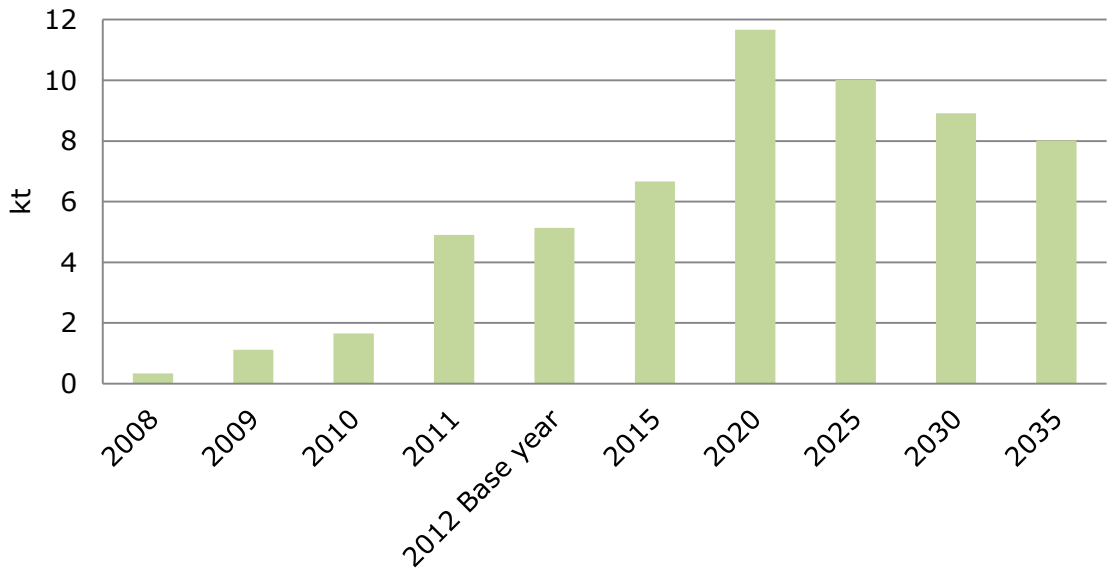
Projections of GHG emissions in solid waste disposal on land (1)

National targets to reduce CH_4 emissions from solid waste disposal on land are set in the National Plan of Waste Management . The projections were estimated assuming that targets such as reduction of the quantity of landfilled waste, increase of biodegradable waste composting, increase of the recovered gas use for energy will be achieved. Implementation of these targets will lead to gradual reduction of CH_4 emissions and will reach 15.3 kt (incl. CH_4 recovery) by 2035



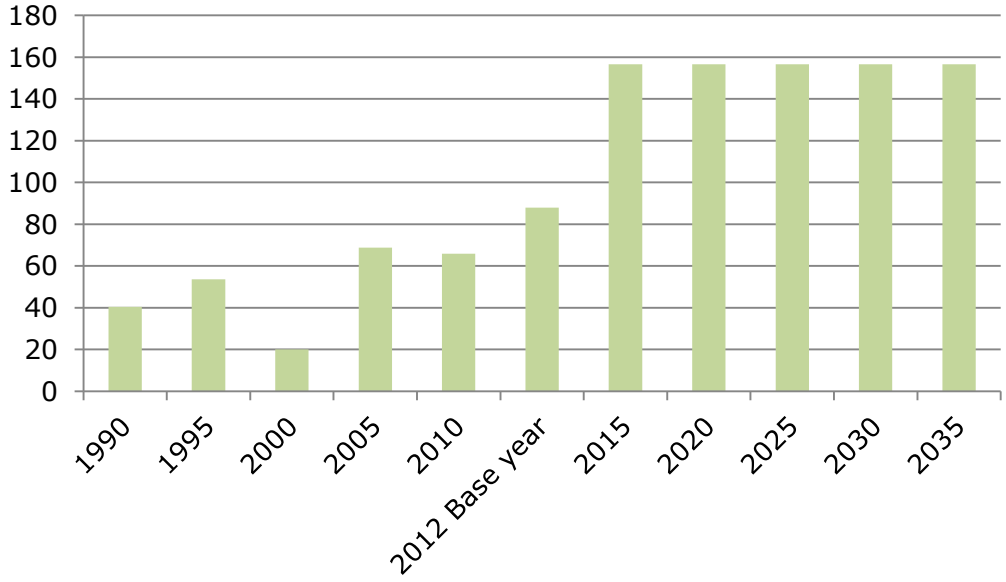
Projections of GHG emissions in solid waste disposal on land (2)

The amount of CH_4 recovery from landfills will increase by 127% from 5.14 kt in 2012 to 11.67 kt in 2020 and will start to decrease by 24% from 2020 to 2030 (8.91 kt). CH_4 recovery from landfills during the period 2031-2035 was calculated following the decrease in the period 2025-2030



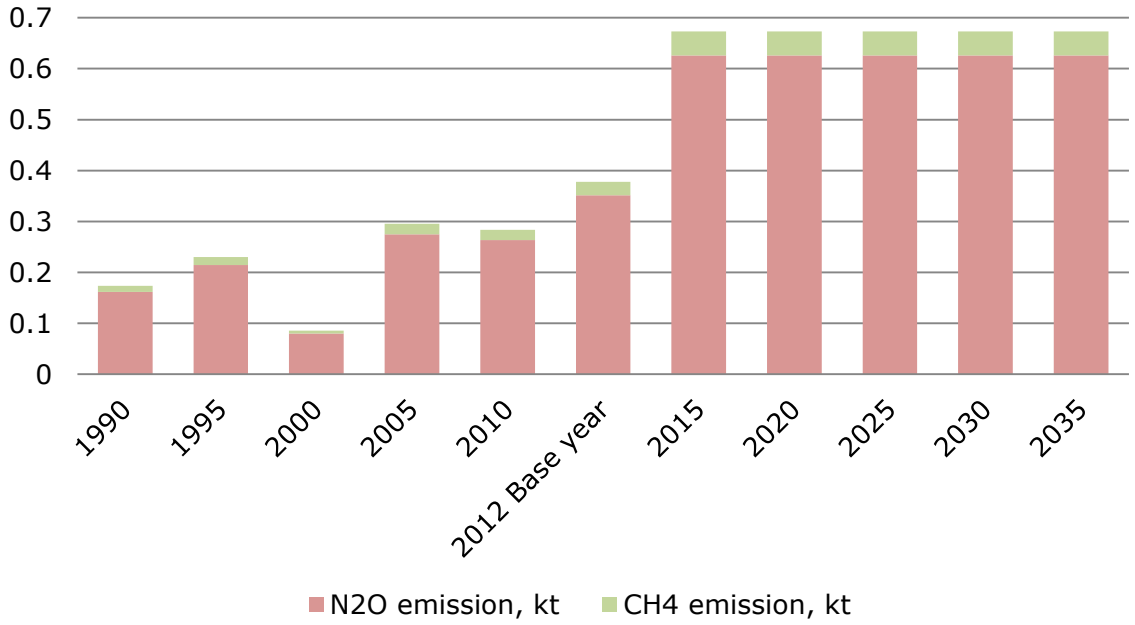
Projections of GHG emissions in biological treatment of waste (1)

Biological treatment of waste is a source of CH_4 and N_2O. According to the National Waste Management Plan Lithuania had 9 sewage sludge and 49 green waste composting facilities by 2012 and 4 more green waste composting sites are planned to be installed by 2014. After the installation of all planned green waste composting facilities, up to 150 kt of green waste is planned to be treated there. Emissions from composting were calculated using method provided in the 2006 IPCC Guidelines



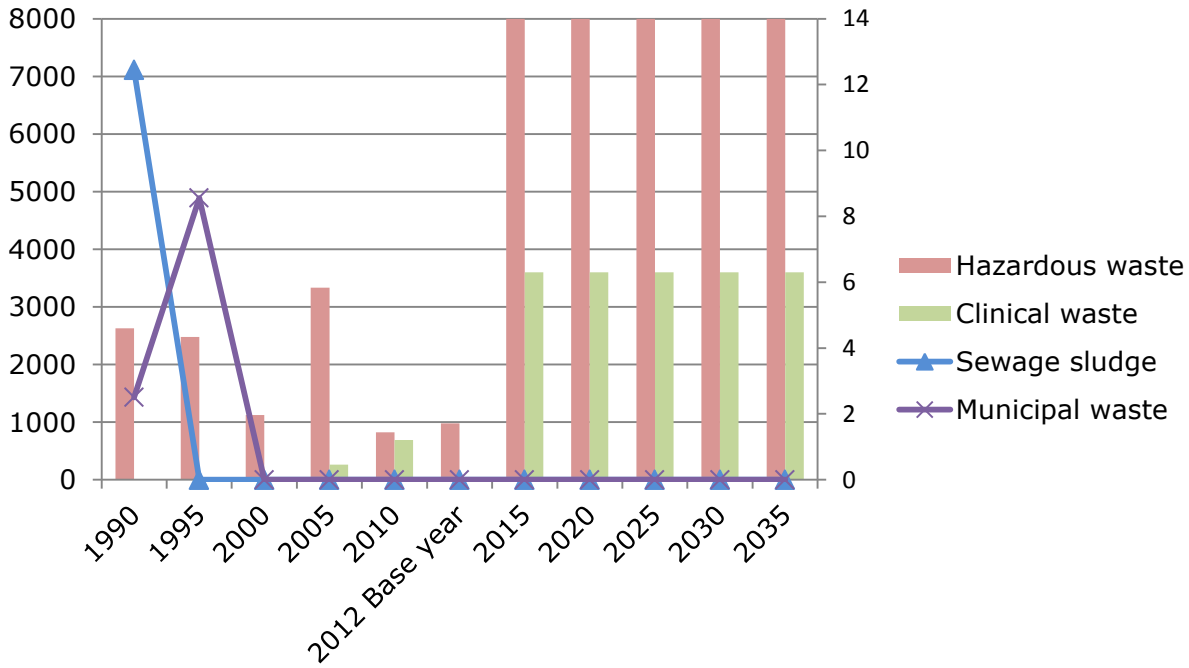
Projections of GHG emissions in biological treatment of waste (2)

The amount of biodegradable waste disposed in landfills has to be reduced and do not exceed 270 kt in 2020. To achieve these targets separate collection of biodegradable waste accumulated in the municipal waste flow and installation of new composting sites are foreseen. As a result of biodegradable waste composting increase, CH_4 and N_2O emissions will increase by 78%.



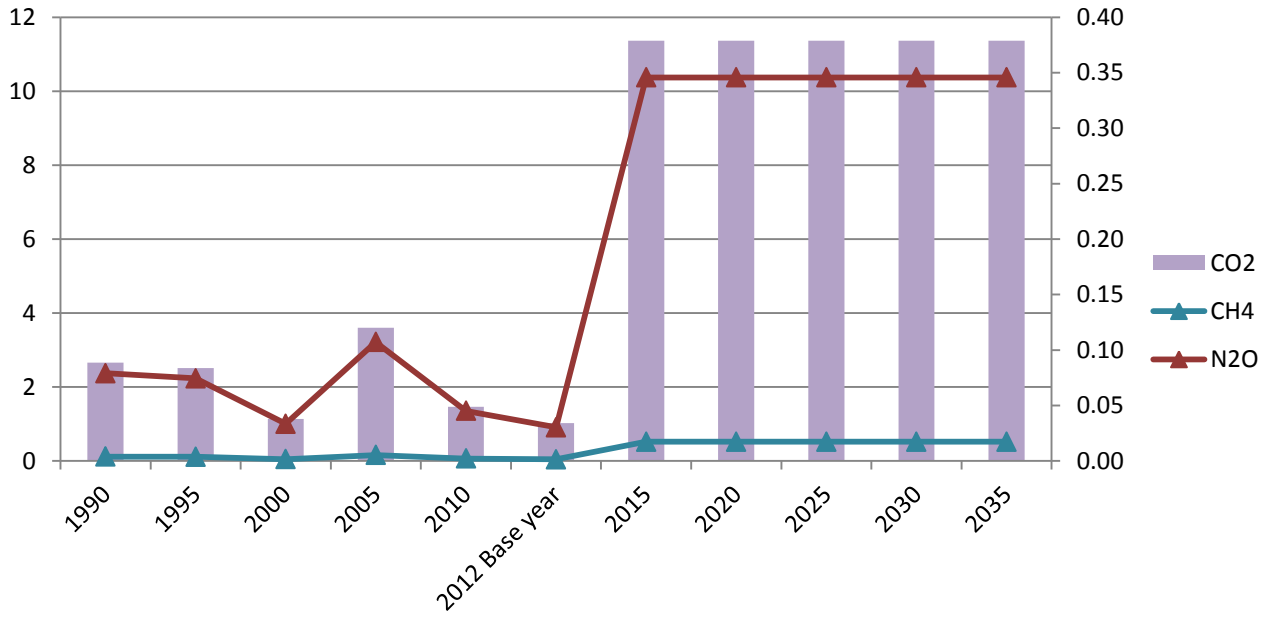
Projections of GHG emissions in incineration of waste (1)

Clinical waste incineration facility with nominal capacity 2 kt per year and hazardous waste incineration facility with nominal capacity 8 kt of hazardous waste and 1.6 kt of clinical waste per year are foreseen to be launched in 2014. Emissions from incineration of waste were calculated using method provided in the 2006 IPCC Guidelines



Projections of GHG emissions in incineration of waste (2)

Considerable increase of emissions from incineration of waste are projected as two incineration facilities are foreseen to be launched in 2014, however, it will contribute only 2.5 % to the total GHG emission from waste sector in 2035



Assumptions used for projecting GHG emissions from wastewater treatment and discharge (1)

This section covers CH_4 emissions from wastewater transportation and treatment as well as from septic tanks used by population not connected to centralized sewer networks and N_2O emissions from human sewage

Main assumptions used for projecting GHG emissions:

- ✓ It is projected that discharge of degradable organic matter will increase slightly (about 2%) by 2020 and same growth trend will continue until 2035

Year	***2012***	***2015***	***2020***	***2025***	***2030***	***2035***
kt BOD	75.8	76.4	77.3	77.9	78.4	78.8

- ✓ The percentage of Lithuanian population connected to centralized sewer networks will increase to 100% by 2035

Year	***2012***	***2015***	***2020***	***2025***	***2030***	***2035***
%	64	74	81	88	95	100

Assumptions used for projecting GHG emissions from wastewater treatment and discharge (2)

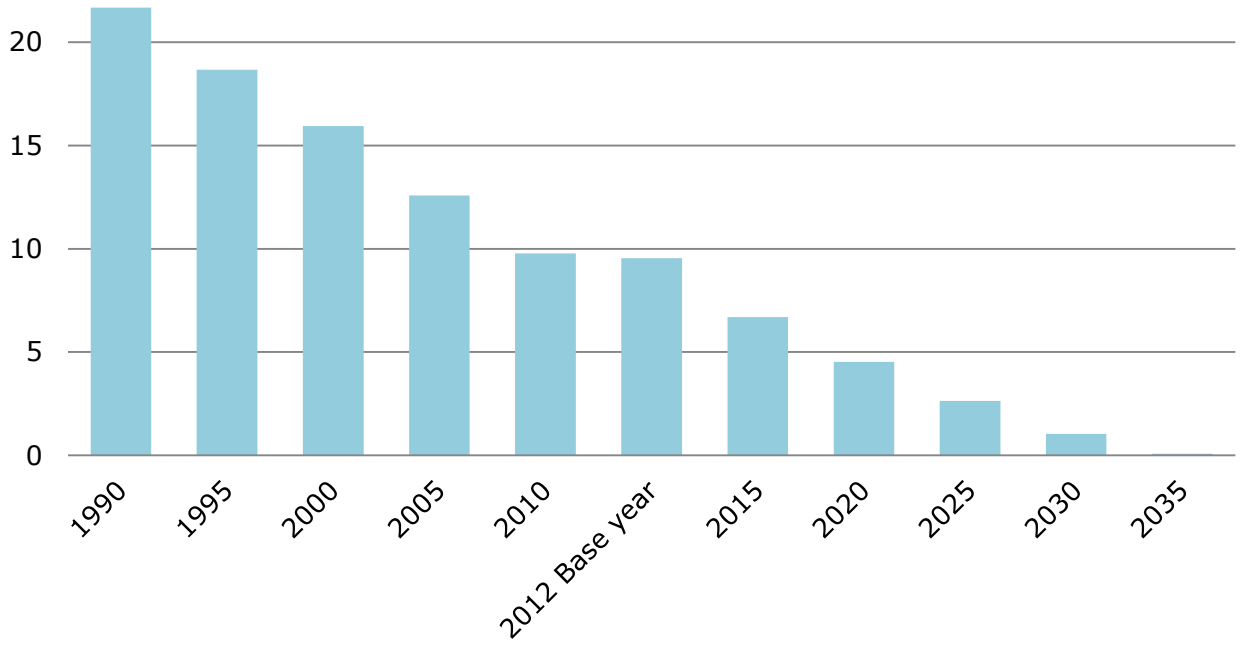
- ✓ EUOSTAT population projections for the period 2015-2035 were used
- ✓ Protein consumption per capita was evaluated by the Center for Health Education and Disease Prevention (77,4 g/capita/day in 1998, 78,1 g/capita/day in 2002, and 81,91 g/capita/day in 2007). Approximation of these data by least square method was used for evaluation of consumption during 2015 to 2035

Year	***2012***	***2015***	***2020***	***2025***	***2030***	***2035***
g/capita/day	84.09	85.62	88.18	90.74	93.30	95.86

- ✓ Emissions from wastewater treatment and discharge were calculated using method provided in the 2006 IPCC Guidelines

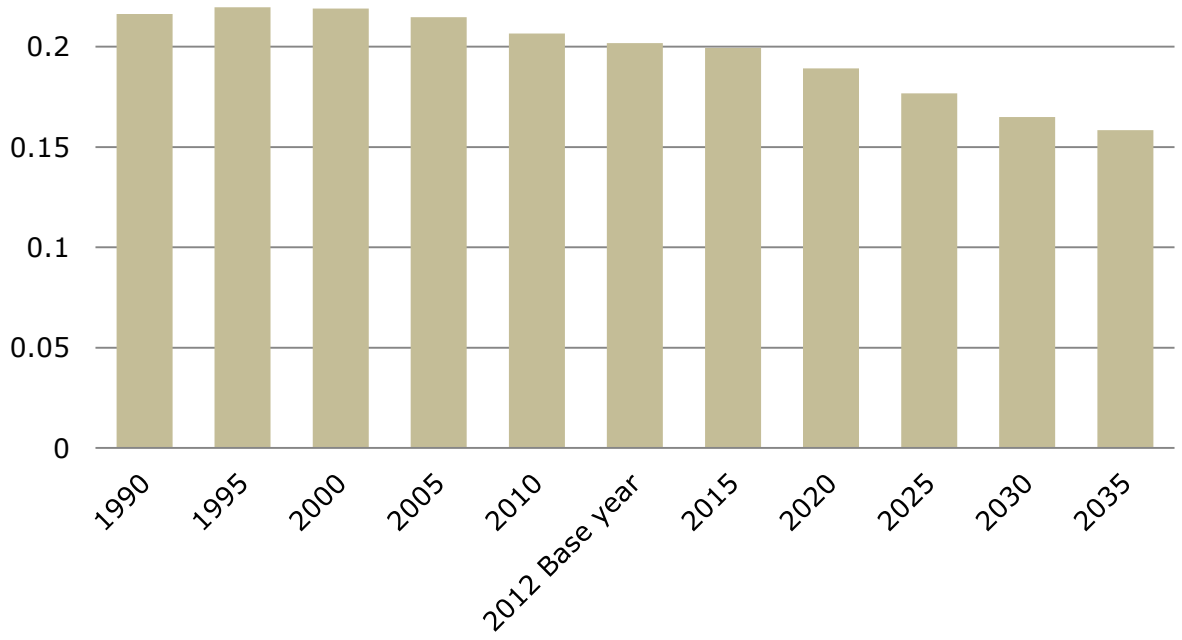
Projections of GHG emissions in wastewater treatment and discharge (1)

There are close to 1800 wastewater discharge points in Lithuania. 99% of wastewater is treated in centralized aerobic wastewater treatment plants. The main source of CH_4 emissions are septic tanks. Emissions will decrease due to increase of population connected to centralized sewer networks and it is projected to be 0.1 kt of CH_4 by 2035



Projections of GHG emissions in wastewater treatment and discharge (2)

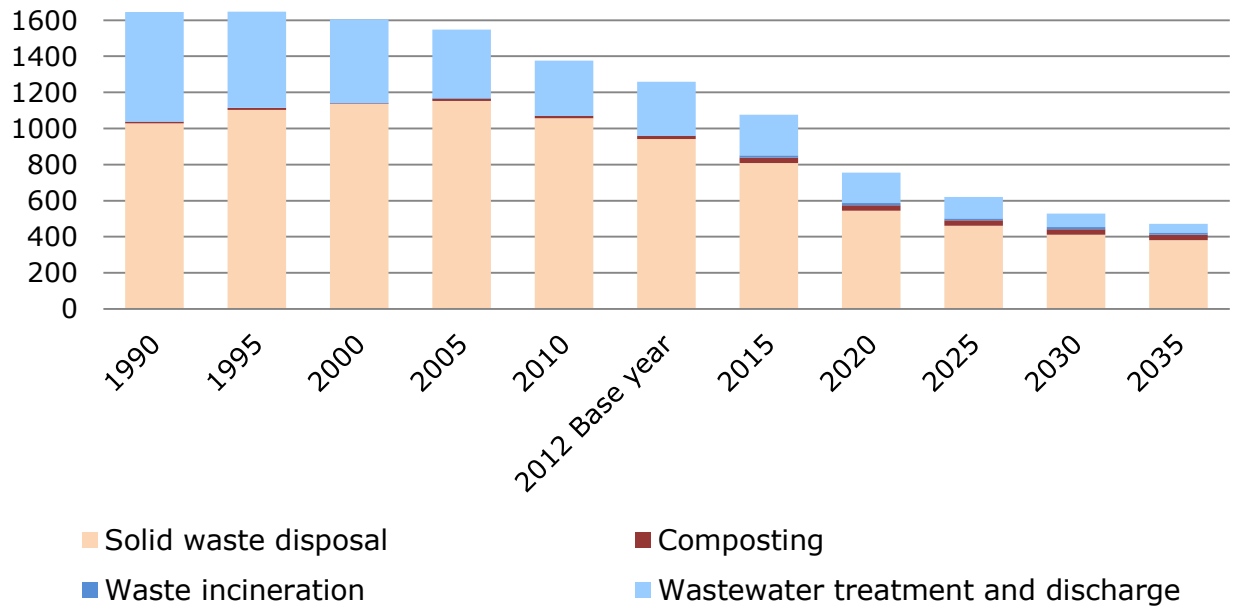
No projections on protein consumption were made, therefore, N_2O emissions from human sewage were calculated using population projections and interpolated protein consumption. Emissions will drop due to decrease of the population and it is projected to be 0.16 kt of N_2O by 2035



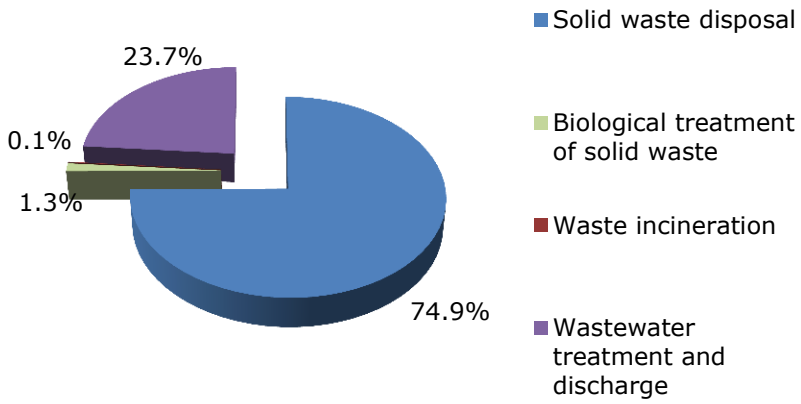
Historical and projected GHG emissions

	2012 Base year	2015	2020	2025	2030	2035
*Solid waste disposal**	942.1	808.8	544.8	460.5	411.7	381.3
Composting	16.7	29.7	29.7	29.7	29.7	29.7
Waste incineration	1.1	11.7	11.7	11.7	11.7	11.7
Wastewater treatment and discharge	298.6	226.6	169.5	118.4	75.3	49.3
Total	***1258.5***	***1076.8***	***755.7***	***620.3***	***528.4***	***472***

*Including emissions from sewage sludge and CH_4 recovery

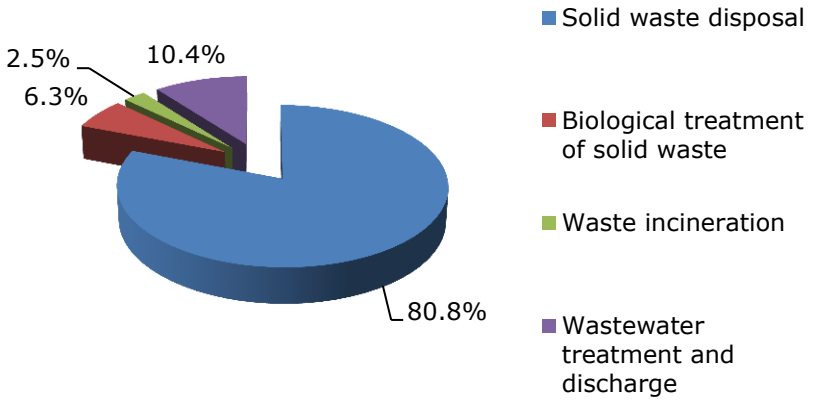


The share of GHG emissions in 2012 and 2035



2012

2035




Thank you for your attention!