Monitoring of PAMs for NC and BR.

Workshop with Latvia, November 9, 2015

Hans H. Kolshus, Norwegian Environment Agency

Themes (intertwined)

- Norwegian Environment Agency's work with PAMs
- Reflection of PAMs in GHG inventory and projections
- Quantitative estimates of the effects on emissions and removals
- (QA/QC procedures for PAMs)

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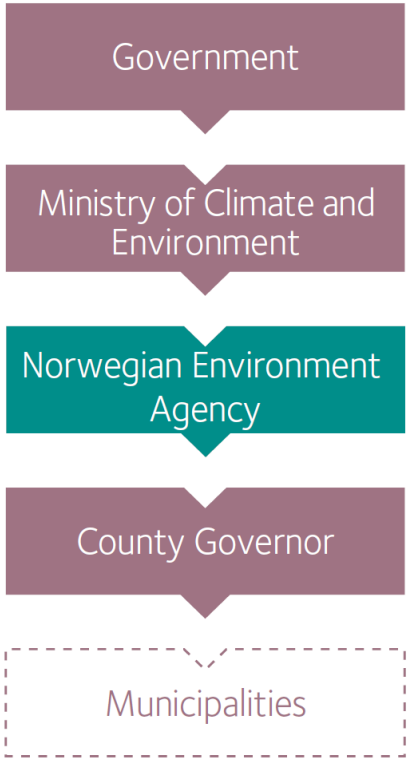
Norwegian Environment Agency

- Agency under the Ministry of Climate and Environment
- Established 2013
- About 700 employees – mainly in Trondheim and Oslo



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NEA, GHG inventory, projections and PAMs

- Responsible for reporting the GHG inventory to UNFCCC
- Involved in preparing GHG projections
- Mitigation potential analysis
- Assess PAMs in NC and BR, responsible for certain sectors (mainly industry, waste, parts of transport and LULUCF)
- Assess GHG impact for other sectors since we know the inventory
- Also assess the GHG impact for other reports

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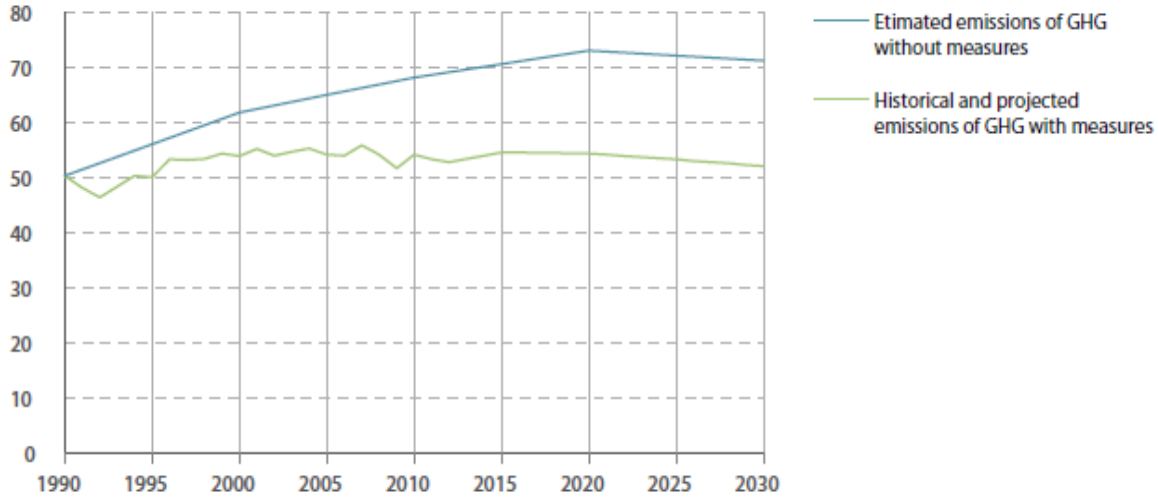
Total effect of PAMs in NC6



2020: Emissions would be 17.1-20.1 million tonnes higher

2030: Emissions would be 17.8-20.5 million tonnes higher

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Industry

- Long history of using point source data in the inventory
- Many time series stored in Excel files
- Includes to a degree emissions, AD, EF and production
- Very useful to track emission, IEF trends and impacts of PAMs

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Effects of PaMs for industry in NC6

- The NC6 reported a total of 10 PaMs
- Effects reported for 7 PaMs (2 IE and 1 NE)
- A total of 4.5-6.8 million tonnes CO2-eq in 2011
- A total of 4.7-7.2 million tonnes CO2-eq in 2020

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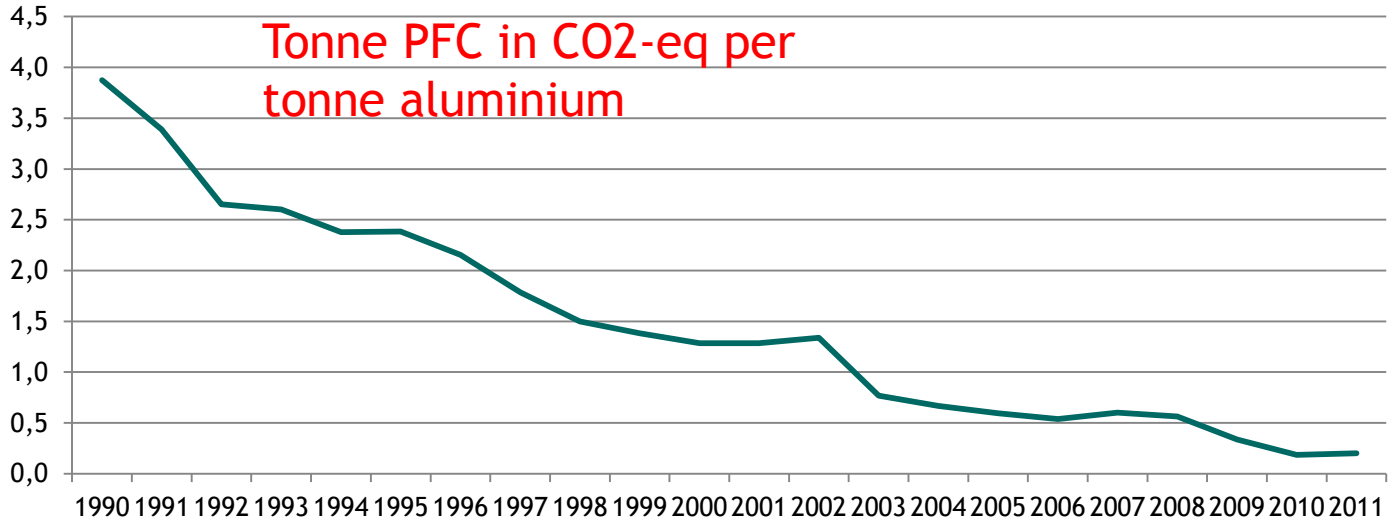
Agreement with aluminium industry (I)

PFC emissions were reduced from 3.3 mill CO2-eq in 1990 to 0.23 mill CO2-eq. in 2011.



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Agreement with aluminium industry (II)

- Time series in the GHG inventory
- IEF reduced by 95% from 1990 to 2011
- Reduced anode frequency and time
- Shift from Soederberg to prebaked technology
- Effect estimated by multiplying production levels by the reduction in IEF
- Range of effect reported since it is difficult to separate the effect of the agreement from other effects

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Agreement with aluminium industry (III)

Estimated effect in 2010:

Production (2010) = 1.1 million tonnes
IEF (2010) = 0.19
IEF (1990) = 3.88
IEF (1997) = 1.79

Projections:

Assume production levels in 2020 and 2030

Use latest IEF

Effect = from 1.1 million x (1.79-0.19) to 1.1 million x (3.88-0.19)
= from 1.8 to 4.1 million tonnes CO2-eq

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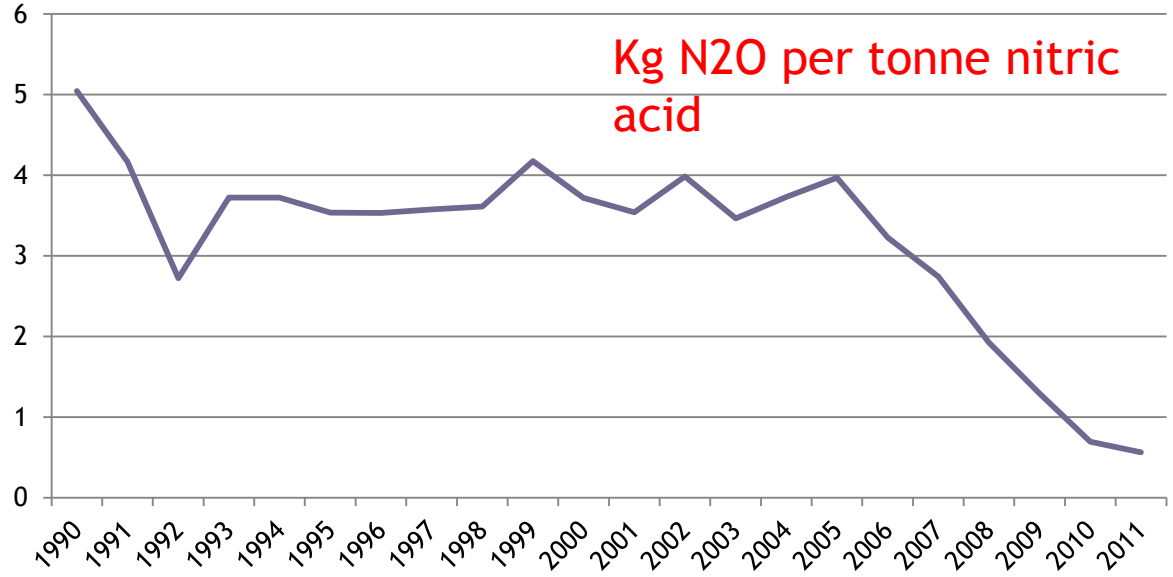
N2O from nitric acid production (I)

N2O emissions were reduced from 2 mill tonnes CO2-eq to 0.29 mill tonnes CO2-eq from 1990 to 2010.



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N2O from nitric acid production (II)

- Time series in the GHG inventory
- IEF reduced by 86% from 1990 to 2011
- Restructure of a production line in 1991
- Installation of new technology in all lines
- Effect estimated by multiplying production levels by the reduction in IEF

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N2O from nitric acid production (III)

Estimated effect in 2010:

Production (2010) = 1.65 million tonnes
IEF (2010) = 0.7
IEF (1990) = 5.04

Effect = 1.65 million x (5.04-0.7)
= 2.2 million tonnes CO2-eq

Projections:

Assume production levels in 2020 and 2030

Use latest IEF

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F-gases (HFCs)

- F-gas regulation
- Tax and reimbursement scheme of HFCs

GHG impact: Actual emissions in the GHG inventory compared with pre-tax scenarios (example: -0.7 mill tonnes CO2-eq in 2020)

Projections are based on expert judgement

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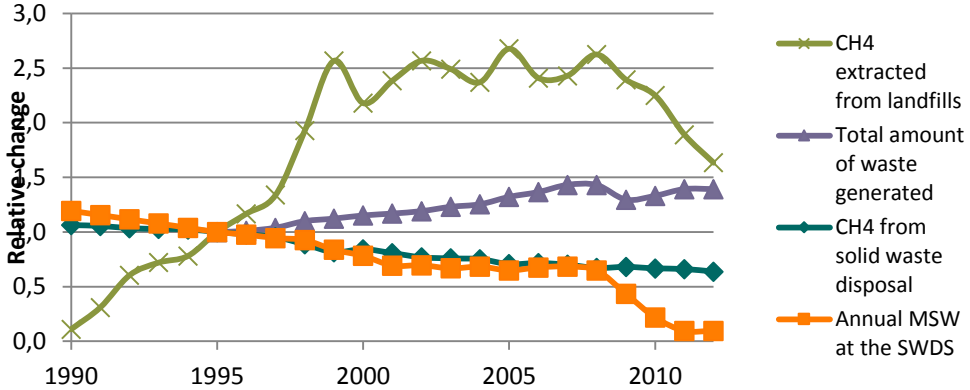
Waste sector (I)



Effects of PaMs (MT CO2e)	2000	2011	2020	2030
Ban on landfilling of biodegradable waste		0.1	0.3	0.5
Requirement to collect landfill gas	0.4	0.4	0.3	0.2
Tax on final disposal of waste		NE	NE	NE
Producer responsibility (take back systems)		NE	NE	NE
Waste recycling targets (vehicles, electronic waste, batteries)		NE	NE	NE

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Waste sector (II)

- Emissions based on a model for CH4 from waste
- The model is also used for projections (amount of waste deposited)
- Effect of PAM is the difference between emissions from baselines with and without the PAM

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Transport (I)

- Assess the effect for 3 PAMs
- CO2-dependent registration tax
- Tax exemptions for electric and hybrid cars + EU standards
- Requirement of 3.5% bio fuels of fuel consumption in road transport

- Another 5 are described, but without GHG impact

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Transport (II)

- The projections assumed that national and EU requirements will reduce emissions from new cars to 110 gram CO2 per km by 2020
- Without measures, emissions would have been 1.1 million tonnes higher
- 0.5 million tonnes from the registration tax (emissions from new passenger cars would have been 22 grams CO2 per km higher in 2011 if the tax had not changed from 2007 onwards)
- 0.4-0.6 million tonnes from incentives and EU standards (large increase in number of electric vehicles)

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Transport (III)

Mandatory biofuels turnover (2.5% in 2009, 3.5% in 2010)

- Bio ethanol and bio-diesel are not subject to CO2-tax
- 2010: 0.6% of petrol was from biofuels
- 2010: 5.6% of diesel was from biofuels
- Effect in 2020/2030 based on the contents of biofuels as of 2010
- PAM reflected both in the GHG inventory and the projections

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LULUCF

- Seven PAMS included in NC6 for LULUCF
- No effect reported
- Trees grow slowly in Norway and sequestration in 2020 and 2030 is limited

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PAMs in the BR

BR reporting GL:

information on mitigation actions, including the policies and measures that have been implemented or are planned to be implemented since the last national communication or biennial report

BR1: New or changed PAMs since NC6 in 2010

BR2: New or changed PAMs since BR1 in 2014

BR2: Short time-period to consider PAMs, not necessarily reflected in the inventory yet

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Explanations for NE

For BR: short time period

Generally:

- Difficult to isolate the mitigation effect of a change or adjustment
- Difficult to isolate the effect of a PAM from the effects of other PAMs or other factors

Nevertheless, useful to display the range of PaMs that have been adopted or are to be implemented even if the impact of the action has not been quantified

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