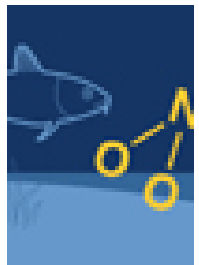
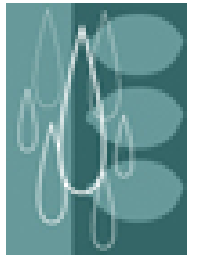


The Swedish charge on emissions of nitrogen oxides (the NO_x charge)

Petra Hagström

Swedish Environmental Protection Agency

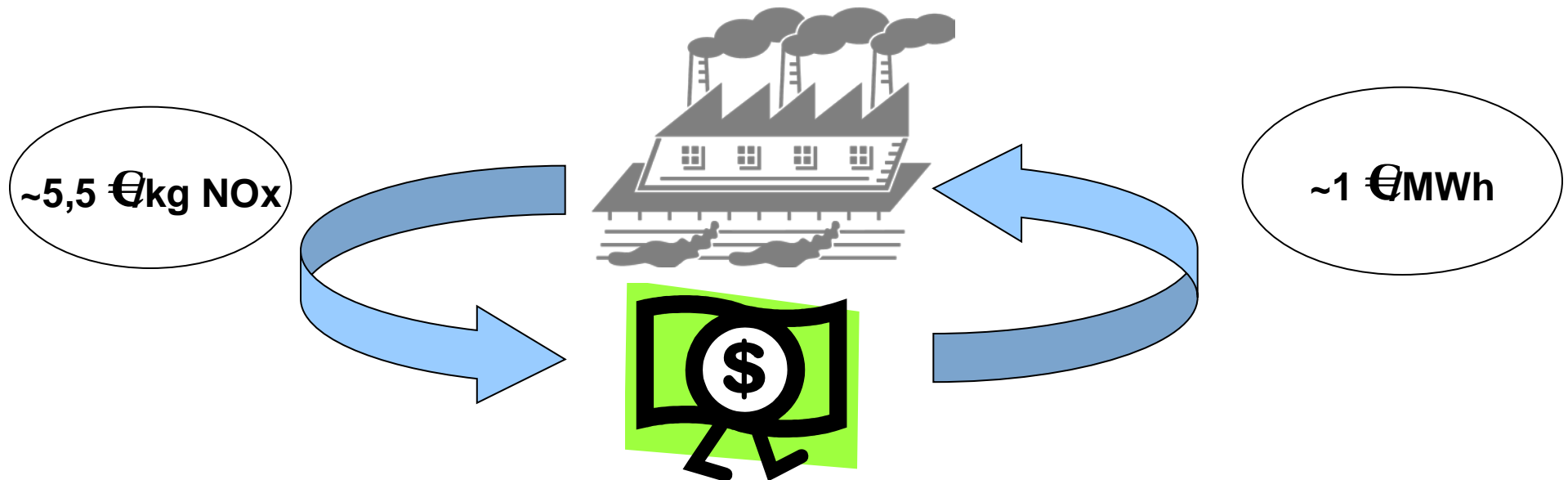
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The NOx charge

- A charge with refund
- Applies to boilers, stationary combustion engines and gas turbines with a useful energy production of at least 25 GWh/year
- The cost is 50 SEK per kg emitted NOx
- Participating plants are refunded in proportion to their production of useful energy
- → Boilers with high emissions relative to their energy output are net payers to the system, and plants with low emissions relative to energy output are net recipients.

NO_x emissions and energy production 2015 within the NO_x charge system



NO_x emissions: 11 400 tonnes ~60 million €
Energy production: 66 560 GWh

Administration – Swedish EPA

- Every plant submits a tax return once a year stating
 - NO_x emitted
 - Energy produced
 - Control and supervision information
 - Report on measuring equipment check by independent accredited inspector
 - Fuel composition data
 - Use of presumptive emission levels
- Inspection (site visits)
 - On average all plants are visited over a period of 7-10 years.

Administration over the year

Jan 1st

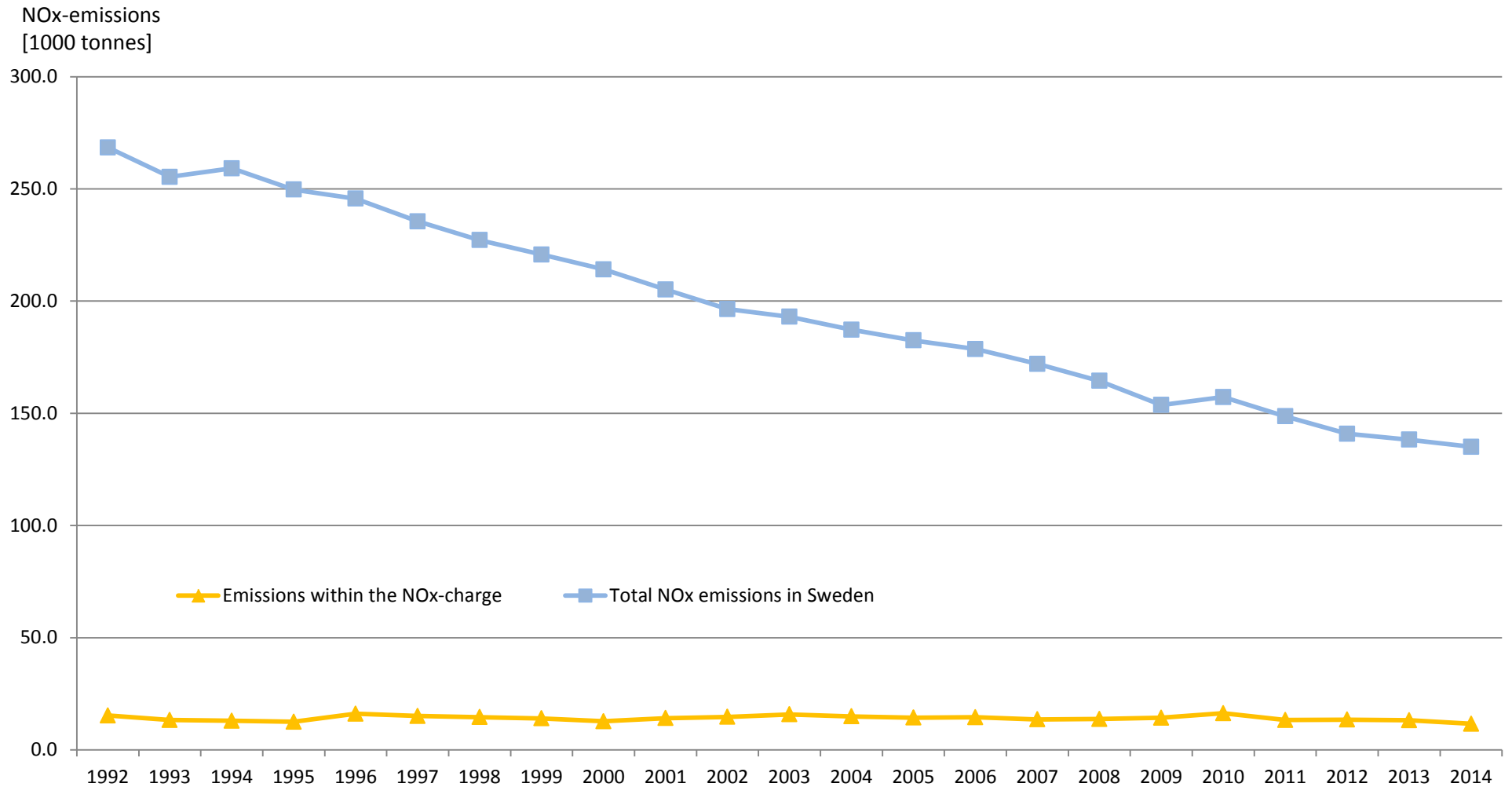
25 Jan
Tax return
submitted

November
Refunding of "net
charge"

September
Invoicing of net
charge

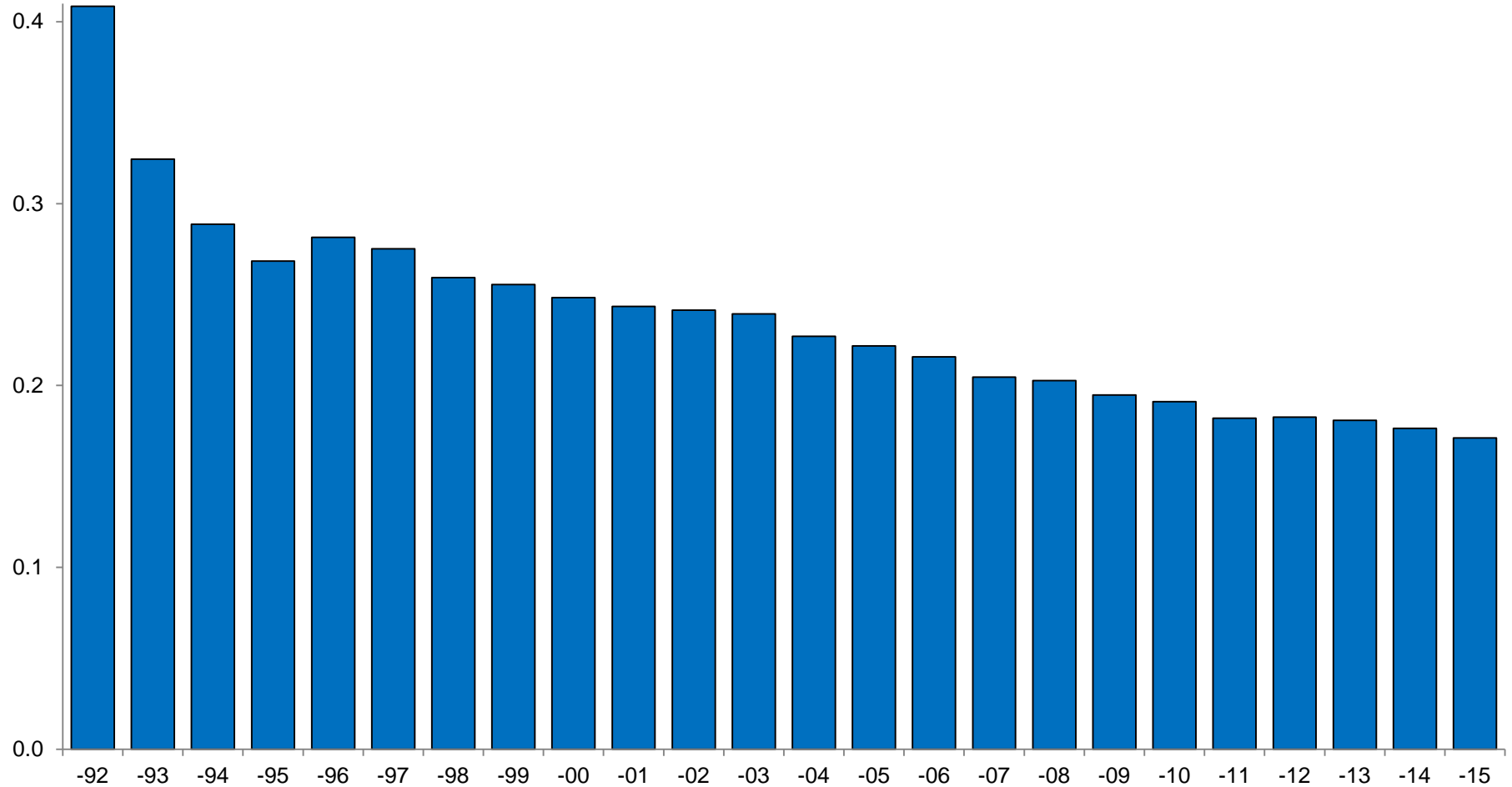
August
Decisions of net
payment/refund

Total NOx emissions in Sweden and within the NOx charge system



Specific emissions of NOx [kg/MWh]

[kg/MWh]



Pros and cons of the NOx charge

Pros

- Cost-effective emission reduction
- Low administrative cost (<1%)
- Simple to budget investments in NOx reduction – every kg counts
- Technology development (SCR, SNCR, CFB, Low-NOx burners)

Cons

- Some criticism due to money flow between industry sectors
- The net charge is lower than the actual NOx charge and can pass unnoticed
- NOx reduction can lead to increase of CO, N₂O, NH₄

Possible changes to increase the effect of the NO_x charge

- Expand the system to cover more plants
- Including N₂O
- Raise the charge (currently 50 SEK per kg NO_x)

Thank you!

More information:

<http://www.naturvardsverket.se/Documents/publikationer/620-8245-0.pdf?pid=3960>

(from 2006, some numbers are outdated but description of how it works is correct)



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INFORMATION FACTS
THE SWEDISH CHARGE ON NITROGEN OXIDES
MARCH 2006

The Swedish charge on nitrogen oxides – Cost-effective emission reduction

Emissions of nitrogen oxides (NO_x) contribute to several environmental problems. Together with sulphur dioxide (SO₂), emissions of nitrogen oxides are the main causes of acidification, which results in widespread damage to vegetation in forests and lakes. In addition, nitrogen oxides contribute to the formation of ground-level ozone, which has adverse effects on vegetation and human health, and they are a main cause of eutrophication in forest soils and on sea beds.

Emissions of nitrogen oxides are connected to several of the 15 national environmental quality objectives, such as Natural acidification only and Zero eutrophication. The acidification objective has an interim target, stating that emissions of nitrogen oxides are to be reduced to 148 000 tonnes per year by 2010. This is in line with the EC Air Quality Directive¹ and would mean a 56 per cent reduction compared to 1990 levels. Emissions are also regulated in the UNECE-CLRTAP Protocol² to abate acidification, eutrophication and ground-level ozone.

In the 1980s acidification was a major problem in Sweden. In 1985, the Swedish Parliament decided that airborne emissions of nitrogen oxides should be reduced by 30 per cent by 1995, compared to 1980 levels. In line with proposals put forward by the Swedish Environmental Charges Commission in the late 1980s, a charge on emissions of nitrogen oxides from energy generation at combustion plants was introduced on 1 January 1992. The intention was to achieve a more rapid reduction in emissions of nitrogen oxides than was considered possible by relying on the administrative guidelines in place at that time. There was also a will to provide an incentive for cost-effective emission reductions in excess of these administrative guidelines.

In 1980, total emissions of NO_x in Sweden amounted to about 450 000 tonnes³. Total emissions of NO_x in Sweden from 1990 to 2003 are shown in Figure 1.

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SWEDISH EPA
PRESENTS FACTS
ABOUT DIFFERENT
ISSUES

¹ Also referred to as the NEC (National Emissions Ceiling) directive.
² United Nations Economic Commission For Europe – Convention on Long-Range Transboundary Air Pollution. The protocol is also referred to as the Gothenburg Protocol.
³ Methods for calculating emissions of NO_x have changed. This figure is an indication of the size of the emissions in 1980.