

Effectiveness and efficiency of environmental inspections

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Challenge

- In modern society, any government organisation is expected to reach its goals in an **effective** and **efficient** manner and to strive for **permanent improvement**.
- This is expected/wanted by:
 - minister / parliament / European Union
 - citizens / NGO's
 - inspected companies
 - environmental inspectorate

==> WHAT is Effectiveness & Efficiency (E&E)?

==> HOW do we MEASURE E&E? (indicators!)

==> HOW to IMPROVE E&E?



Content

- **Definitions**
- **Goals and types of indicators**
- **Output indicators**
- **Outcome indicators**
 - compliance indicators
 - environmental indicators
- **Influence of external factors / actors**
- **Criteria for indicators**
- **Efficiency**
- **How can we improve E&E?**
- **Case: waste incineration**
- **Conclusions**



Definitions

- **EFFECTIVENESS** = degree to which the goals have been reached

= **OUTCOME / GOALS**

- **outcome:** effects, results of the enforcement process
- (**output:** activities, services or products delivered)

- **EFFICIENCY** = degree to which the goals have been reached, in relation to the means that have been applied

= **OUTCOME / GOALS / INPUT**

- **input:** financial, personnel and logistic means



Goals and types of indicators

- **GOALS of the Environment Inspection Section:**
 - to obtain compliance with the environmental legislation
 - to prevent nuisance, damage and serious accidents
 - to maintain / improve environmental quality
- **Which indicators are needed to measure E&E?**
 - **OUTPUT indicators** -> number of activities, services, products
 - **OUTCOME indicators** -> effects, results
 - **compliance indicators**
 - > to measure degree of compliance, nuisance,
 - **environmental indicators**
 - > to measure improvement of environmental quality



Examples of OUTPUT INDICATORS

Figures from the EIS in 2002

- **12.060** inspections (always with inspection report)
- **5.280** inspected companies
- **741** official reports + **1.299** exhortations
- **92** administrative measures + **8** advices to suspend/ withdraw the licence + **4** advices to change the licence conditions
- **1.839** samples of waste water - **469** samples of waste
- **108** samples of groundwater - **31** samples of soil
- **141** plants where flue gas emissions were measured
- **58** noise measurements
- **1.847** complaints dealt with
- ...



Output indicators: pros

- very informative
 - detailed “on line” follow-up of the number of activities
 - internal, external reporting
 - annual assessment of global work of Inspectorate
 - input for individual evaluations of inspectors
 - year-to-year trends/tendencies
- useful for EU-reporting
- easy to generate from the file management system
- useful for planning of activities
- rough indication of degree of compliance, nuisance,



Output indicators: cons

Output indicators DON'T measure:

- precise degree and duration of non-compliance
- seriousness of nuisance, damage and accidents
- impact on human health
- effects on environmental quality
- emission reduction
- improvements in organisation / behaviour of companies

==> output indicators are insufficient to determine E&E

Conclusion:

OUTCOME indicators are necessary !

⊠ compliance

⊠ environmental



Compliance indicators (1)

Needed to assess degree of compliance, nuisance, damage, ...

- output indicators are useful as first approximation
 - e.g. number of official reports vs number of inspections
- however, to assess the **degree of (non-)compliance**, more detailed/qualitative information will be needed, preferably in a **quantifiable** form, e.g. compliance scores:
 - licences: no licence at all - partly - complete licence
 - licence conditions: full compliance - small infringement - large infringement - “zero” compliance
 - emissions: concentration/ELV
 - nuisance: seriousness * frequency
 - time needed to obtain full (or X%) clean-up
 - total amount of fines



Compliance indicators (2)

PRO

- Directly linked with inspections and enforcement
- Give the most valuable information on the outcome of inspections / enforcement

CON

- Take a lot of effort/time/cost to measure, follow-up, ...
- Influence of external actors
- Hard to quantify qualitative aspects



Environmental indicators (1)

Needed to assess effects on environmental quality, human health,

- output indicators are of little use
- examples of environmental indicators:
 - total emission of a pollutant (e.g. benzene, COD, CO₂)
 - river water concentrations (BOD, ...)
 - Pb content of children's blood (around Pb-plant)
 - dioxin content of cow's milk (e.g. around incinerators)
 - ...



Environmental indicators (2)

PRO

- Measurements are often already available or easily feasible
 - e.g. environmental quality data, emission data, ...
- Very useful if there is a direct link with inspections
 - e.g. campaign aimed at emission reduction of a specific pollutant

CON

- Often factors beyond the Inspectorate are interfering
 - e.g. traffic, households, ... (not controlled by EIS)



Influence of external factors / actors

- legislation:
 - quality: unambiguous, achievable, enforceable
 - content: environmental quality standards, ELVs, ...
- quality of the environmental licensing
- co-operation with other actors
- (non-)decisions of licensing authorities based on Inspectorate proposals
- criminal follow-up (Public Prosecutor, judge)
- public support
- other instruments:
 - covenants, awareness raising campaigns, ...
 - financial/tax measures



Criteria for good indicators

- Relevant: having a direct link with inspections / enforcement
- Well defined
- Measurable (in a cost effective way): max. based on easily available data
- Transparent and accessible
- Informative for the different users
- Comparable between different inspecting authorities
- Compatible with other (existing) reporting requirements
- Credible, based on accurate data
- Selective (few and meaningful)



Efficiency

- Besides **outcome** indicators, also **INPUT indicators** needed:
 - financial, personnel, logistic means
- Reaching 100% effectiveness will **not** be feasible due to **limited means** => choices have to be made, based on **priorities**, in order to use the means efficiently.
- Keep in mind the Pareto principle (80/20 rule)
- How to compare efficiency (internal/external)?
 - internal: determine the **benefits** of compliance / preventing or reducing nuisance-emissions-damage /
 - external:
 - benchmark between enforcement authorities
 - compare with other instruments (covenants, taxes)



How can we improve E&E?

- **INTERNAL FACTORS**

- define clear targets
- measure E&E indicators
- inspect thoroughly, impose measures, follow-up of clean-up
- work in a planned, co-ordinated, targeted manner (EIP)
- apply tools (checklists, codes of good practice, ...)
- data management (e.g. for selection of companies)
- sufficient, well trained and motivated personnel
- internal quality management/assurance system
- switch between integrated and specialised inspections
- preventive action (e.g. announcement of campaigns)

- **EXTERNAL FACTORS:**

- legislation, public prosecutor, licensing authorities, ...



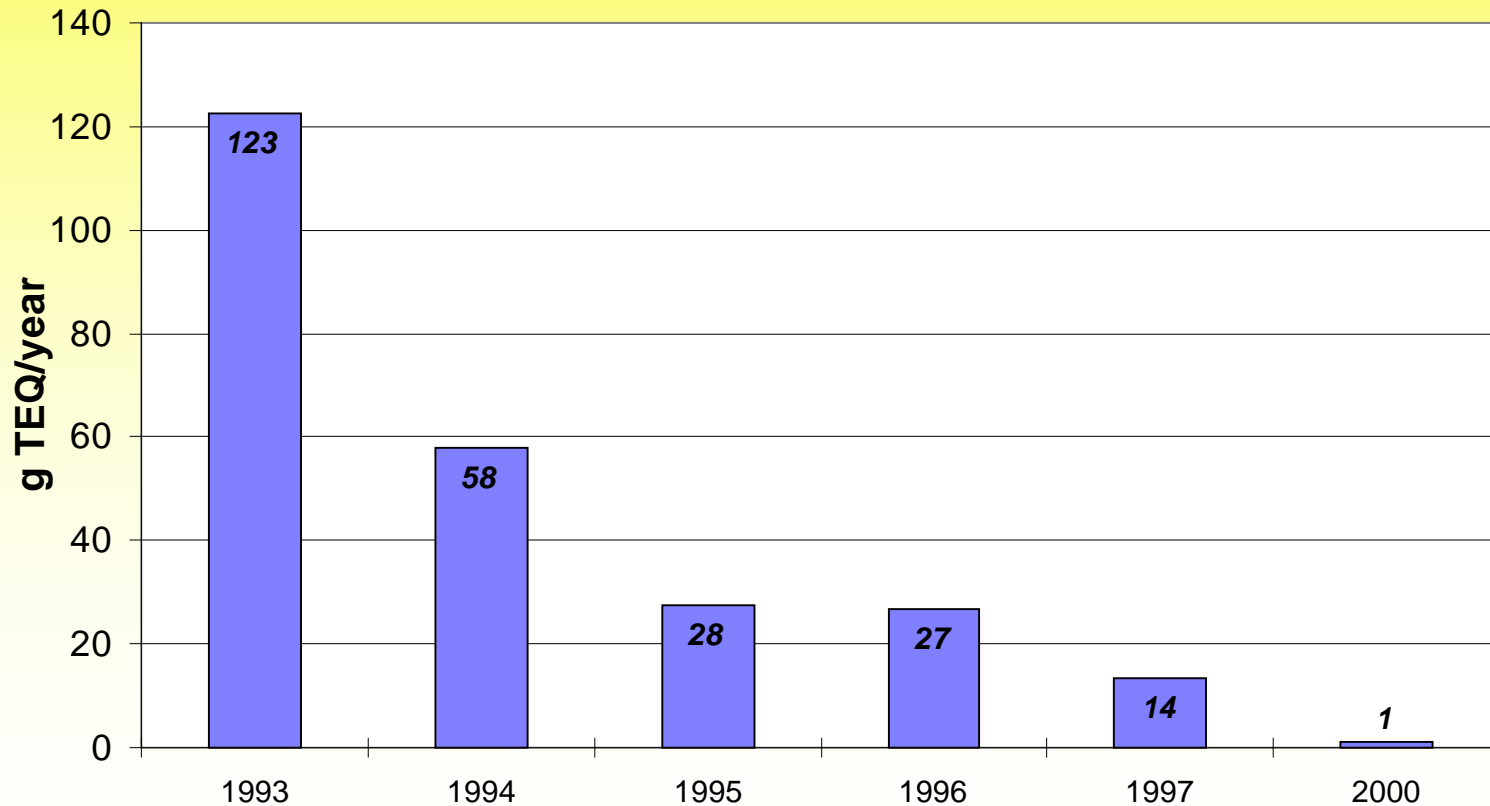
Case: Enforcement campaign at municipal waste incinerators

- 1993: emissions measured at all 21 plants = zero situation
 - total dioxin emission: **121 g TEQ/y**
 - dioxin deposition: 20 - 200 pg TEQ/m².day
 - cow's milk at surrounding farms: 5 - 10 pg TEQ/g fat
- 1993-1998: numerous inspections, measurements, reports, exhortations, follow up inspections, coercive measures,
- since 1995: legal dioxin ELV as suggested by the EIS
- 1999: 9 MWI have been shut-down - 12 MWI still working (upgraded) with about same total capacity
 - all emissions \ll 0.1 ng TEQ/Nm³
 - total dioxin emission < **1 g TEQ/y**
 - dioxin deposition: < 10 pg TEQ/m².day
 - cow's milk at surrounding farms: < 2 pg TEQ/g fat



Case: Enforcement campaign at municipal waste incinerators (2)

total PCDD/F emission from MWI



Case: Enforcement campaign at municipal waste incinerators (3)

- **EFFECTIVE?** yes: goals have been obtained!
 - emissions/environmental quality/food have improved
 - legal emission limit values (ELV) have been set
 - compliance with ELV has been reached
- favourable internal/external factors:
 - clear goals were stated
 - direct relation with public health
 - political priority
 - public awareness and support
- **EFFICIENT??**
 - took many years of work, lots of inspections, own emission measurements, many exhortations/coercive measures



Conclusions (1)

- To respond to the expectations of the outside world, the effectiveness and efficiency (E&E) of the inspections have to be permanently improved.
- In order to measure E&E, indicators are needed.
- Two types of indicators can be distinguished:
 - output indicators
 - outcome indicators
 - compliance indicators
 - environmental indicators
- Output indicators are generally available, but offer insufficient information on the outcome / E&E
- Therefore, specific outcome indicators are needed.



Conclusions (2)

- **Environmental** indicators measure the effect on environmental quality, human health, etc...
They are fairly easy to measure, but their relationship with inspections/enforcement is often disturbed by other factors.
- **Compliance** indicators measure the degree of (non-) compliance, nuisance, etc...
Due to their direct link with inspections, they should be preferred, but are often more difficult to measure/assess.
- Outcome indicators will need to meet a number of criteria.
- Improvement of E&E is determined by internal + external factors and can be followed-up through outcome indicators.
- In the development of better outcome indicators, there may be a role for IMPEL!?

