Can TERM determine the environmental impact of transport?  
Reflections on a core set of transport indicators

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Indicators for the environmental impact of transport

- The Transport & Environment Reporting Mechanism (TERM) in EU since 1999 to “measure the integration of environmental concerns in transport policy.”
- a.o.: “Is the environmental performance of transport improving?”

- precursor: OECD environmental indicators (last 2001)
- off-springs: SUMMA, ETIS, … – “ideal” set, data problematic
- competitors: ASSESS was used for Mid-term review of EU transport policy
- No indicators for transport and environment in use in Germany
- Countless indicator sets at local level treat transport.

- Only set of transport’s environmental indicators with real data in EU.
- Designed for policy monitoring and as role model for other sectors.
This talk: Analysis of internal concept, indicators and data

Science can help in

- definition of sound concept
- definition of appropriate indicators
- provision of reliable data

Review: Have indicators delivered,
- are they useful – what are institutional provisions?
- and used – what procedures in place?

I. TERM-concept: All relevant environmental impacts covered?

Cross-check for

- completeness with Life Cycle Assessment and Strategic Environmental Assessment.
  - classification of TERM indicators according to impact categories

- relevance according to German Federal Environment Agency for LCA (UBA 1999):
  - of impact category: „Ecological importance“ and „distance-to-target“;
    evaluations for Germany – no EU assessment available,
  - of transport: Specific contribution to overall pressure.
    My cut-off level: >5%.

- Identify core indicators – by aggregation or selection (pre-cautionary principle).
  - representative for impact AND specific for transport AND data available
  - Provide focus (DPSIR scheme in background).
I.1: Impact: Climate change

TERM indicators for transport operation:
- fossil fuel consumption and
- emissions of direct greenhouse gases: CO₂, N₂O, CH₄

Ecological relevance (UBA 1999): ++++
Distance-to-target (UBA 1999): ++++
- 32% of final energy consumption,
- 21% of CO₂-eq.

Suggestion: Choose emissions of greenhouse gases, as directly related to impact.

I.2: Impact: Stratospheric ozone depletion

No TERM indicator

Ecological relevance (UBA 1999): ++++
Distance-to-target (UBA 1999): ++
<<5% of ozone depleting substances: HFCs, SF6, N₂O

Suggestion: No core indicator.
I.3: Impact: Air pollution - Human health

- TERM gives
  - Emissions - annual national totals transport: CO, NH3, NOx, NMVOC, prPM, SOx
  - Concentrations (selected urban points): NO2, PM10, SO2, O3
- Group by impact categories:
  - Toxic pollutants: Elemental carbon, benzene, aldehydes missing!
  - Photosmog: Aggregate into ozone forming potential.
  - Particles: Aggregate into particle forming potential (de Leeuw 2002)
- Ecological relevance: ++++ Particles >> Toxics >> Photosmog,
- Distance-to-target ++++ (Lambrecht et al. 1999; UBA 1999; WHO 2004, 2005; Borken 2005)
- Specific contribution of transport (2001, EEA 2003): 50% of TOFP, 35-40% of PFP.
- Suggestion: Use particle forming potential (pre-cautionary principle), if only one indicator.

Reasoning only for EU/national area. Different pollutants might be more important in individual places.

II. Proposal for core TERM indicators, that are representative, specific, non-redundant AND data available

- Resource consumption
- Climate change
- Ecosystem toxicity
- Human toxicity
- Protection of soil, landscape, nature
- Acidification
- Photosmog
- Noise

Additional information:
- Energy consumption
- Energy intensity for passenger transport
- Energy intensity for freight transport
- % of renewable energy
- Consumption: Primary energy
- Exceedances air quality standards:
  - Benzene
  - Lead
  - CO
- Emissions of:
  - PM10
  - SOx
  - ozone precursors
- Proximity of infrastructure to designated areas
- % nature reserves above noise limits
- % nature reserves above noise limits
- Emissions of:
  - NOx
  - People above NOx standard
- Emissions of:
  - O3
  - People above O3 standard
- Rate of fragmentation
- Rate of land take by infrastructure
- Noise annoyance
- Noise annoyance
- End-of-life vehicles
- Used tyres
- Discharges of oil by area

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III. Data are problematic – focus the more important

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Time</th>
<th>Space</th>
<th>Accuracy</th>
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<tr>
<td>Emissions of climate gases</td>
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<td>1</td>
<td>&lt;5%</td>
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<tr>
<td>Accident fatalities</td>
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<td>2</td>
<td>&lt;5%</td>
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<tr>
<td>Accidental oil discharges at sea</td>
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<td>2</td>
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<tr>
<td>End-of-life vehicles</td>
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<td>1</td>
<td>2</td>
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<tr>
<td>Oil slicks discovered</td>
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<td>1</td>
<td>30-50%</td>
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<tr>
<td>Emissions: Acidifying pollutants</td>
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<td>2</td>
<td>30-40%</td>
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<tr>
<td>Emissions: Eutrophication pollutants</td>
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<td>Emissions: Ozone precursors</td>
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<td>30-40%</td>
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<tr>
<td>Emissions: Particle precursors</td>
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<tr>
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<td>Non-fragmented areas</td>
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<td>2</td>
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<tr>
<td>Exposure to NO₂, SO₂, O₃</td>
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<tr>
<td>Exposure to PAH</td>
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<tr>
<td>Exposure to traffic noise</td>
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<td>c</td>
<td>30-50%</td>
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<td>Annoyance by traffic noise</td>
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<td>30-50%</td>
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<tr>
<td>Land take</td>
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<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Used tyres</td>
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</tbody>
</table>

Quality/comparability as assessed in TERM fact sheets:
- Green: Good
- Yellow: Medium
- Red: Poor

Bold: Indicators suggested as key representatives.

IV. Summary on TERM indicators

Core indicators can help...
- ... to answer central question: „What is the environmental performance of transport?“
- ... to manage data improvements: Reliability, comparability, timeliness,
- ... to focus message.

Limitations:
- Beware of simplification: Other indicators needed for analysis of causes and potential measures,
- Selection represents a value judgement on importance and purpose => Review selection regularly,
- Use review as communication and education process!
Factors for success and failure of indicators - Theses

I. Concept must be sound:
- Focused on important issues, dynamics, policy levers
- Integrated in causal chain / explanatory model,

II. Data must be:
- up-to-date and reliable.

III. Integrated in a context:
- Institutional fit (purpose, detail, timing,...) and ownership.

IV. Routines help to gain
- trust, credibility, awareness.

References


