SEA and Sustainable Development

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Issues

1. Environmental **goals and indicators** reflecting Sustainable Development are necessary for SEA.

2. Environmental Impacts have to be integrated into **direct evaluation techniques**.

3. Strategic Assessment with the **Backcasting Approach** improves the integration of environmental issues into transport planning.
Sustainable Transportation

**Ideal** - Sustainable Development:

“Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” *(Brundtland)*

**Guidelines** - environmental, economic, social goals

e.g. “biodiversity should be protected” *(Baltic 21)*

**Quality Standards**
e.g. critical loads, critical levels, WHO-standards

⇒ **Indicators**
Indicators and Quality Standards

SEA Environmental Indicators and Quality Standards System

Policy, Plan, Programme

Transport Forecast

Measure Indicators
Activity Indicators

Environmental Impact Prediction

Pressure Indicators
State Indicators

Sensitivity Indicators

Standards
Evaluation

Decision
Application at European Level

**Activity** Indicator: Road Traffic Flows

**Pressure** Indicator: Noise Level

**Quality Standard:** 55 dB(A) nighttime
Integrating Environmental Impacts into Cost-Benefit-Analysis

Additional Impacts

- Tropospheric Ozone
- Carcinogenic Air Pollutants
- Anthropogenic Greenhouse Effect
- Outdoor Noise
- Nature and Landscape
Integrated Strategic Assessment with the Backcasting Approach

- Network level:
  - Definition of environmental targets
  - Definition of transport policy scenarios
  - Transport forecast
  - Environmental Impact prediction
  - Targets achieved?
    - Yes: Environmentally favourable scenarios
    - No: Assessment of economic impacts
      - Environmentally favourable scenarios
      - Economic benefit maximising scenario
  - Sustainable Transport Plan

- Project level:
  - Cost-benefit analysis
  - Compatibility

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Example Calculation Shadow Price

**Scarce Resources:**

- CO₂ emissions: 1,001,000 t/a
- CO₂ target: 1,000,000 t/a
- Additional reduction: -1,000 t/a
- Reduction costs: 500,000 DM

**Shadow Price:** 500 DM*a/t
# Environmental Indicators and Target Values

<table>
<thead>
<tr>
<th>Environmental Impact</th>
<th>Indicator</th>
<th>Environmental Target Case Study 1992 - 2010</th>
<th>CEEC Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global warming</td>
<td>CO₂ emissions in transport</td>
<td>-30%</td>
<td>?</td>
</tr>
<tr>
<td>Tropospheric ozone</td>
<td>transport related emissions of NOₓ, VOC</td>
<td>-80%, -70%</td>
<td>?</td>
</tr>
<tr>
<td>Atmospheric pollution</td>
<td>ambient concentration of benzene, particulate matter</td>
<td>2.5 µg/m³, 1.5 µg/m³</td>
<td>?</td>
</tr>
<tr>
<td>Noise</td>
<td>daytime level for noise exposure of inhabitants</td>
<td>≤ 65 dB(A)</td>
<td>?</td>
</tr>
<tr>
<td>Nature protection</td>
<td>further fragmentation of protected areas, additional sealing</td>
<td>not allowed, not allowed</td>
<td>?</td>
</tr>
</tbody>
</table>
Definition of Transport Policy Scenarios

- **Framework Scenario 1**
  - Regulatory Instruments
  - Technology
  - Pricing

- **Framework Scenario 2**
  - Reduced Infrastructure Construction
  - Less Regulatory + Pricing Measures
  - Improved Traffic Management/Organization

Review
Noise Disturbance

Inhabitants Affected by
Road Transport Noise ≥ 65 dB(A)

Number of Inhabitants
Affected by Noise ≥ 65 dB(A) Daytime

- 0 to 500
- 500 to 1,000
- 1,000 to 2,500
- 2,500 to 5,000
- 5,000 to 12,000

Main Roads
- Motorway
- Federal Road

1992

2010 Framework Scenario 2

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Transport Emissions

Emissions of Road, Rail and Inland Waterway Transport in Baden-Württemberg

- CO₂
- NOₓ
- Benzene
- Particulate Matter

Legend:
- Passenger Road
- Passenger Rail
- Freight Road
- Freight Rail
- Freight Water
Urban Peak Concentrations of Particulate Matter Along Roads in Baden-Württemberg

Concentration of Particulates Annual Average [µg/m³]

- 0 to 1.5
- 1.5 to 3
- 3 to 6
- 6 to 12
- 12 to 24

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Nature and Landscape Conservation

New Construction and Upgrade of Roads in Baden-Württemberg and its Risk for Effects on Nature Reserves

Risc Class
- low
- medium
- high
- very high

Construction Type
- New Construction
- Upgrade

Area Proportion of Nature Reserves
- 0 to 10%
- 10% to 25%
- 25% to 50%
- 50% to 70%
## Cost Values for Project Appraisal

<table>
<thead>
<tr>
<th>Environmental Theme</th>
<th>Differentiation</th>
<th>Cost Values</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO₂</td>
<td>global</td>
<td>400</td>
<td>DM/tonne</td>
</tr>
<tr>
<td>NO₂</td>
<td>global</td>
<td>17,850</td>
<td>DM/tonne</td>
</tr>
<tr>
<td>VOC</td>
<td>global</td>
<td>525</td>
<td>DM/tonne</td>
</tr>
<tr>
<td>Diesel Soot Particles</td>
<td>grid squares, where target is achieved in trend scenario</td>
<td>1,750</td>
<td>DM/(tonne inner-urban* Mio. inhabitants)</td>
</tr>
<tr>
<td></td>
<td>achieved in framework scenario 2</td>
<td>2,550</td>
<td></td>
</tr>
<tr>
<td></td>
<td>exceeded in framework scenario 2</td>
<td>4,050</td>
<td></td>
</tr>
<tr>
<td>Benzene</td>
<td>grid squares, where target is achieved in trend scenario</td>
<td>100</td>
<td>DM/(tonne inner-urban* Mio. inhabitants)</td>
</tr>
<tr>
<td></td>
<td>achieved in framework scenario 2</td>
<td>2,000</td>
<td></td>
</tr>
<tr>
<td>Noise</td>
<td>Road</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 65 to 67 dB(A)</td>
<td>41</td>
<td>DM per inhabitant exposed to noise above 65 dB(A)</td>
</tr>
<tr>
<td></td>
<td>&gt; 67 to 70 dB(A)</td>
<td>109</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 70 dB(A)</td>
<td>2,321</td>
<td></td>
</tr>
<tr>
<td></td>
<td>motorways rural roads</td>
<td>3,656</td>
<td></td>
</tr>
<tr>
<td></td>
<td>urban roads</td>
<td>5,324</td>
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<tr>
<td></td>
<td>Rail</td>
<td></td>
<td></td>
</tr>
<tr>
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<td>&gt; 65 to 67 dB(A)</td>
<td>4,420</td>
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<td>&gt; 67 to 70 dB(A)</td>
<td>9,665</td>
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<tr>
<td></td>
<td>&gt; 70 dB(A)</td>
<td>20,680</td>
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</tbody>
</table>
Conclusions

Strong link between SEA and Sustainable Development:

– SEA is objective-driven: Integration of goals from Agenda21 process
– Full integration of SEA into strategic planning process
– Backcasting approach integrates environmental, economic and social issues into a common assessment framework, based on sustainability goals
⇒ Commitment to and definition of sustainability goals is mandatory