

Geo Cities **s** Manual

Guidelines for Integrated Environmental Assessment of Urban Areas



Annex 1

Indicator sets

In this list you will find different sets of indicators from different levels. Most indicator sets were developed to cover not only the environmental pillar but all three aspects of sustainable development (economic, social, environmental). Please do not take them over blindly, but make a choice that suits your local circumstances. Many of these lists are much too extensive, but they are listed here because they contain some pertinent elements. As most of them are from official sources, they may constitute a reference and are therefore relevant.

1 The European Common Indicators towards sustainable cities

Very general indicators with the objective to make a general comparison among European cities: http://ec.europa.eu/environment/urban/common_indicators.htm

- Citizen satisfaction with the local community
- Local contribution to global climatic change
- Local mobility and passenger transportation
- Availability of local public open areas and services
- Quality of local ambient air
- Children's journeys to and from school
- Sustainable management of the local authority and local business
- Noise pollution
- Sustainable land use
- Products promoting sustainability

2 UNECE : Key environmental indicators for Central and Eastern Europe, Central Asia and the Caucasus

| INDICATORS | DPSIR | EPRI indicators | UNSD/UNEP environment statistics question name | WHO/Europe environmental health indicators | CSD indicators | "Kiev" indicators | EEA core set of indicators |
|---|-------|-----------------|--|--|-----------------|-------------------|----------------------------|
| A. Air pollution and ozone depletion | | | | | | | |
| 1. Emissions of pollutants into the atmospheric air | P | X | X | X | | X ^{1/} | X ^{1/} |
| 2. Ambient air quality in urban areas | S/I | X | X ^{2/} | X ^{2/} | X | | X ^{3/} |
| 3. Consumption of ozone-depleting substances | P | X | | | X | X | X |
| B. Climate change^{2/} | | | | | | | |
| 4. Air temperature | S | | | | | | X ^{6/} |
| 5. Atmospheric precipitation | S/I | | | | | | |
| 6. Greenhouse gas emissions | P/R | X | X | | X | X | X |
| C. Water^{4/} | | | | | | | |
| 7. Renewable freshwater resources | S | X | X | | | | X |
| 8. Freshwater abstraction | P | X | X ^{5/} | | X ^{2/} | X | X |
| 9. Household water use per capita | P | X | | | | | X |
| 10. Water losses | R | | X | | | | |
| 11. Reuse and recycling of freshwater | R | | X | | | | |
| 12. Drinking water quality | I | | | X | | | |
| 13. BOD and concentration of ammonium in rivers | S | X | X | | X | X | X |
| 14. Nutrients in freshwater | S | X | X | | | X | X |
| 15. Nutrients in coastal seawaters | S | | X | | | | X |
| 16. Polluted (non-treated) wastewaters | P/R | X | X | | | | |
| D. Biodiversity^{10/} | | | | | | | |
| 17. Protected areas | R | X | | | X | X | X |
| 18. Forest and other wooded land | S | X | X ^{11/} | | X | | |
| 19. Threatened and protected species | S/R | X | | | | | X |
| 20. Trends in the number and distribution of selected species | S/R | | | | X | | X ^{12/} |
| E. Land and soil^{13/} | | | | | | | |

^{1/} Subdivided into three indicators: emissions of acidifying substances, emissions of ozone precursors, and emissions of primary particulates and secondary particulate precursors.

^{2/} Annual mean concentrations of SO₂, NO₂ and PM₁₀ in ambient air in cities and at background sites.

^{3/} Population-weighted urban annual average concentration of NO₂, PM₁₀, PM_{2.5}, SO₂. Distribution of daily O₃.

^{4/} Supplemented by the indicator of exceedance of air quality limit values in rural areas.

^{5/} The EEA list also includes the indicator of atmospheric greenhouse gas concentrations.

^{6/} Global and European temperature.

^{7/} The EEA list also includes the following indicators: bathing water quality; chlorophyll in transitional coastal and marine waters. Both the EEA and WHO/Europe lists include the indicator of percentage of national population connected to wastewater treatment.

^{8/} Also by surface and groundwater, separately.

^{9/} As percentage of renewable freshwater resources only.

^{10/} The EEA list also includes three indicators under Fisheries: status of marine fish stocks, aquaculture production and fishing fleet capacity.

^{11/} Total area only.

^{12/} The species diversity indicator focuses on selected common birds related to farmlands, woodlands and wetlands.

^{13/} The EEA list also includes the indicator progress in management of contaminated sites.

| INDICATORS | D/PSIR | EPR indicators | UNSD/UNEPA environmental statistics questionnaire | WHO/Europe environmental health indicators | CSD indicators | "Key" indicators | EEA core set of indicators |
|--|--------|-----------------|---|--|-----------------|------------------|-------------------------------|
| 21. Land uptake | I | X ¹⁴ | X ¹⁵ | | X ¹⁶ | | X ¹⁷ |
| 22. Area affected by soil erosion | S | X | X | | X | X | |
| F. Agriculture ¹⁸ | | | | | | | |
| 23. Fertilizer consumption | P | X | | | X | X | |
| 24. Pesticide consumption | P | X | | | X | X | |
| G. Energy ¹⁹ | | | | | | | |
| 25. Final energy consumption | D | X | | | X | | X |
| 26. Total energy consumption | D | X | | | | X | X |
| 27. Energy intensity | R | X | | | X | X | X |
| 28. Renewable energy consumption | R | | | | X | X | X |
| H. Transport ²⁰ | | | | | | | |
| 29. Passenger transport demand | D/R | X | | X | X | X | X |
| 30. Freight transport demand | D | X | | X | | X | X |
| 31. Composition of road motor vehicle fleet by fuel type | D | X | | | | X | |
| 32. Average age of road motor vehicle fleet | D | | | X | | | |
| I. Waste | | | | | | | |
| 33. Waste generation | D/P/R | X | X ²¹ | | X ²² | X | X ²³ |
| 34. Transboundary movements of hazardous wastes | D/R | X | | X | | | |
| 35. Waste reuse and recycling | R | X | | X ²⁴ | X | X | X ²⁵ |
| 36. Final waste disposal | P/R | | | X | | X | |

¹⁴ Land use.

¹⁵ By transport infrastructure and urban development only.

¹⁶ EEA lists the following indicators: gross nutrient balance, area under organic farming.

¹⁷ EEA also lists the indicator renewable electricity.

¹⁸ EEA also lists the indicator use of cleaner and alternative fuels.

¹⁹ Includes waste from agriculture and forestry and from other activities.

²⁰ Excluding total waste generation.

²¹ Municipal and packaging waste only.

²² Municipal and hazardous waste by volume.

²³ Recycling and reuse of packaging waste only.

3 Key indicators from the TISSUE project
http://ce.vtt.fi/tissuebrowser_public/index.jsp

| | Core 1 | Core 2 |
|---------------------------------------|---|---|
| Sustainable Urban Transport | Passenger transport demand Modal split (share of trips) Pedestrian and bicycle infrastructure Traffic safety | Freight transport demand Modal split (share of kilometres) Quality of public transport |
| Sustainable Urban Design | Resident population density Brownfields vs Greenfield development Accessibility to open areas Accessibility to public transport stops | Consumption of land Accessibility to basic services Population and job density Jobs/housing rate |
| Sustainable Urban Construction | Energy consumption of buildings Share of sustainability-classified buildings Construction and demolition waste | Poor quality housing Soil sealing |
| Sustainable Urban Management | Adoption of environmental management systems Share of certified enterprises and public agencies Citizen satisfaction with the state of the environment | Citizens engagement with environmental and sustainability oriented activities Adoption of integrated urban plans (environment, land use, transport) Legal framework for active public participation |
| Sustainable Urban Environment | Water consumption Compliance with drinking water standards Compliance with urban waste water Air quality; Number of days with exceeding PM10 and O3 Air quality; Annual concentration of NO2 Share of population exposed to excessive noise Municipal solid waste generation Municipal waste collected separately Municipal solid waste treatment Greenhouse gases emissions | Air quality; Population weighted Exposure to PM10 and O3 Renewable energy consumption Intensity of energy use in transport Urban biodiversity |

4 The Urban Audit

<http://www.urbanaudit.org/>

The Urban Audit contains data for over 250 indicators across the following domains:

Demography

Social Aspects

Economic Aspects

Civic Involvement

Training and Education

Environment

Information Society

Travel and Transport

Culture and Recreation

5 STATUS (Sustainability Themes and Targets for the Urban Thematic Strategy)

A very comprehensive indicator set containing specific indicators to concretely measure performance of local authorities in sustainable development (response) combined with state and impact indicators based on 10 Aalborg commitments (<http://status-tool.iclei.org/content.php/demo>).

1 Governance

1.1 Capacity building

1.1.1 Share of all Local Authority (municipal) employees to complete sustainability training

1.1.2 Existence of a regular programme of awareness raising in schools on sustainable development issues

1.1.3 Existence of a cross departmental working group on sustainable development

1.2 Participation

1.2.1 Percentage of statutory planning processes involving stakeholders before a draft plan is developed.

1.2.2 Existence of a strategy and related activities to involve difficult to reach groups in local decision making

1.3 Transparency

1.3.1 Share of publicly available municipal documents published on Internet

1.3.2 Share of population regularly informed on Local Government Environmental activities

2 Sustainable Local Management

2.1 Integration of environment in other plans

2.1.1 Adoption of an Environmental Management Plan

2.1.2 Percentage of all statutory plans subject to an environmental assessment

2.2 Adoption of environmental management systems

2.2.1 Number of Local Authority departments with certified Environmental Management Systems (ISO14001/EMAS or other national system)

2.2.2 Number of private companies located in the municipality with certified Environmental Management Systems (ISO14001/EMAS or other national system)

3 Natural Environment

3.1 Water quality

3.1.1 Proportion of rivers classified at least as of 'good' status (according to EU classification)

3.1.2 Compliance with EU standards on wastewater treatment

3.1.3 Proportion of population connected to a wastewater treatment plant

3.2 Biodiversity

3.2.1 Local trend in EU threatened/protected species

3.2.2 Trend in locally relevant species and/or habitats (birds/ trees/other species)

3.3 Air quality

3.3.1 Number of days per year EC limit value was exceeded for PM10 (daily mean)

3.3.2 Number of days per year EC target value/long-term objective was exceeded for Ozone (8h mean)

3.3.3 Annual mean concentration of NO₂

3.3.4 Annual mean concentration of PM10

4 Sustainable Consumption

4.1 Waste

4.1.1 Per capita amount of waste

4.1.2 Proportion of total/biodegradable waste production sent to landfill

4.1.3 Share of Municipal waste collected separately

4.2 Sustainable Procurement

4.2.1 Percentage of the food purchased by the local authority which is EC certified as organic production

4.3 Water Consumption

4.3.1 Proportion of urban water supplies subject to water metering

4.3.2 Domestic consumption

4.3.3 Water loss in pipelines

5 Planning and Design

5.1 Re-use of land

5.1.1 Proportion of new developments on brownfield sites

5.2 Accessibility to basic public services

5.2.1 Population living within 300 metres to basic public services

5.3 Sustainable Urban Design

5.3.1 Population density for new developments

5.4 Sustainable Urban Construction

5.4.1 New buildings and renovations assessed in terms of environmental sustainability

5.4.2 Energy consumption of municipal buildings per square meter.

6 Sustainable Transport

6.1 Transport infrastructure

6.1.2 Share of population living within 300 m from an hourly (or more frequent) public transport service

6.2 Transport Use

6.2.1 Proportion of all journeys under 5 km by private car use

6.3 Low Emission Vehicles

6.3.1 Proportion of public transportation classed as low emission

7 Health

7.1 Decent Housing

7.1.1 Proportion of dwellings classed as being of adequate or decent standard

7.2 Access to Green Areas

7.2.1 Proportion of population able to access public open areas within 300 m

7.3 Quietness

7.3.1 Share of population exposed to noise values of L (den) above 55 dB (A)

7.3.2 Share of population exposed to noise values of L(night) above 45 dB(A)

7.4 Traffic Safety

7.4.1 Number of pedestrian and cyclist fatalities as a result of road traffic accidents/year/10000 inhabitants

7.4.2 Number of car driver or passenger fatalities/year/10000 cars

8 Vibrant and Sustainable Local Economy

8.1 Support and develop local employment

8.1.1 Percentage of early school leavers within the municipality

8.1.2 The percentage of the working-age population employed in the locality.

8.1.3 Proportion of children under the mandatory school age for whom childcare is provided by the local authority

8.1.4 Existence of a social and community enterprise strategy

8.1.5 Percentage of new business start-ups in the locality each year

8.1.6 Existence of regular forums between local government and local business representatives on issues of local concern.

8.2 Support markets for high quality local and regional produce

8.2.1 Existence of a farmer's market co-ordinator in a local authority

8.3 Promote sustainable local tourism

8.3.1 Existence of a Sustainable Tourism strategy for the locality

9 Social Equity and Justice

9.1 Poverty

- 9.1.1 Local Unemployment rate in %
- 9.1.2 Share of households reliant upon social security
- 9.1.3 Ratio of first to fifth quintile earning

9.2 Social Inclusion and Gender Equality

- 9.2.1 Share of Women in local leading positions
- 9.2.2 Female unemployment compared to male unemployment
- 9.2.3 Number of homeless people
- 9.2.4 Literacy rate (%) in population aged 15+

9.3 Safety/Security

- 9.3.1 Total number of recorded crimes per 1000 population per year
- 9.3.2 Percentage of residents who feel safe whilst outside during the day / after dark
- 9.3.3 Children's journeys to and from school (ECI)

10 Global Responsibility

10.1 Greenhouse gas emissions

- 10.1.1 Total CO2 equivalent emissions per capita
- 10.1.2 Total electricity consumption per capita

10.2 Renewable Energy

- 10.2.1 Share of energy consumption produced by renewable sources
- 10.2.2 Capacity installed for renewable energy production

6 CEROI (cities' environment reports on the Internet)

<http://www.ceroi.net/>

Indicator set recommended by the CEROI programme in 2003 compiled from different sustainable development indicators. Core indicators and comparison with other indicator sets.

| CEROI core set | European Common Indicators | European Environment Agency | European Foundation for the Improvement of Living and Working Conditions | ICLEI | UNHCS (Habitat) |
|---|----------------------------|-----------------------------|--|-------|-----------------|
| Access to drinking water | | | | ✓ | ✓ |
| Air emissions | ✓ | | ✓ | | |
| Air quality | ✓ | ✓ | ✓ | | ✓ |
| City product | | | | | ✓ |
| Energy consumption | | ✓ | ✓ | ✓ | |
| Green areas | | ✓ | ✓ | | |
| Health care | | | | | |
| Housing price | | | | | ✓ |
| Infant mortality | | | | | ✓ |
| Investments in green areas | | | | | |
| Investments to water supply systems | | | | | |
| Organizations using environmental audit systems | ✓ | | | | |
| Participation in decision-making | | | | ✓ | ✓ |
| Participation in elections | | | ✓ | | |
| Poor households | | | | ✓ | ✓ |
| Population density | | ✓ | | | |
| Population growth | | ✓ | | | ✓ |
| Presence of LA 21 process | | | | | |
| Price of water | | | | | ✓ |
| Quality of drinking water | | ✓ | | ✓ | |
| Recycling | | ✓ | | ✓ | |
| Rent-to-income ratio | | | | | ✓ |
| Safety | | | ✓ | ✓ | ✓ |
| School attendance | | | | | |
| Transport modes | | ✓ | ✓ | | ✓ |
| Travel times | | | | | ✓ |
| Waste production | | ✓ | | | ✓ |
| Wastewater treatment | | ✓ | | ✓ | ✓ |
| Water consumption | | ✓ | ✓ | ✓ | ✓ |

7 EMAS indicators (European *Eco-Management and Audit Scheme*)

EMAS indicators are divided in three categories:

1. Environmental condition indicators - EPI (corresponding to state and some impact indicators in the DPSIR framework)
2. Operational performance indicators - OPI (corresponding to pressure indicators in the DPSIR framework), and
3. Management performance indicators MPI (corresponding to response and impact indicators in the DPSIR framework)

| ENVIRONMENTAL CONDITIONS: ENVIRONMENTAL MEDIA INDICATORS | | |
|---|---|---|
| Category | Examples of indicators | Examples of measurement units |
| Air | Specific substances in the air such as sulphur and nitrogen oxides, ozone, volatile organic compounds, fine and ultrafine particles, etc. | milligrams per litre parts per million) |
| Water | Specific substances in rivers, lakes, groundwater such as nutrients, heavy metals, organic compounds, etc. | milligrams per litre |
| Land | Natural habitats, protected areas Soil contaminated by heavy metals, pesticides, nutrients, etc. | percentage of area (per year) change in square kilometres per year square metres/cubic metres of contaminated soil per cubic metre (per year) |

| ENVIRONMENTAL CONDITIONS: BIO- AND ANTHROPOSPHERE INDICATORS | | |
|---|--|--|
| Indicator category | Examples of indicators | Examples of measurement units |
| Flora | Extinguished and endangered species | number/percentage compared with natural habitats |
| Fauna | Extinguished and endangered species | number/percentage compared with natural habitats |
| Humans | Human life expectancy of local population, environmental diseases of local population, concentration of contaminants in blood of local population (lead, etc.) | life expectancy in years percentage of local population with specific (chronic) diseases milligrams of contaminant per litre |
| Aesthetics, heritage and culture | Natural monuments | square kilometres |

| OPERATIONAL PERFORMANCE: INPUT INDICATORS | | |
|---|--|---|
| Indicator category | Examples of indicators | Examples of measurement units |
| Materials | Raw materials, operating and auxiliary materials, ground water, surface water, fossil fuels, wood, etc. | tonnes per year tonnes per tonnes of product per year tonnes of hazardous/harmful substances per year tonnes of hazardous/harmful substances per tonnes of product per year cubic metres per year cubic metres per tonnes of product |
| Energy | Energy Electricity, gas, oil, renewables, etc. | megawatt hours per year kilowatt hours per tonnes of product |
| Products (to be co-ordinated with functional area 'purchasing and investments') | Preliminary products, auxiliary and office products, etc. | tonnes per year kilograms of hazardous/harmful material per tonnes of product number/percentage of products with eco-labels (per year) |
| Services (to be co-ordinated with functional area purchasing and investments') | Cleaning, waste disposal, horticulture, catering, communication, office services, transport, travel, education, administration, planning, financial services, etc. | tonnes per year kilograms of hazardous/harmful material per service unit (and year) number/percentage of services with eco-labels (per year) |

| OPERATIONAL PERFORMANCE: PHYSICAL FACILITIES AND EQUIPMENT INDICATORS | | |
|--|---|---|
| Indicator category | Examples of indicators | Examples of measurement units |
| Design | Buildings, machinery, equipment, etc. | heat loss of buildings in Watts per square metres and Kelvin percentage of equipment with reusable parts (per year) |
| Installation | Buildings, machinery, equipment, etc. | percentage of machinery parts designed for reuse (per year) percentage or number of equipment with eco-labels or environmental declarations (per year) |
| Operation | Buildings, machinery, equipment, etc. | hours per year specific machinery or equipment is in operation tonnes of substances, materials or products per year used for operation |
| Maintenance | Maintenance Buildings, machinery, equipment, transport vehicles, etc. | hours per year specific machinery or equipment needs maintenance tonnes of substances, materials or products per year used for maintenance |

| | | |
|-----------|---|--|
| Land use | Natural habitats, green area, paved area, etc. | square kilometres (per year) |
| Transport | Fuel consumption, emissions from vehicles, business travels by type of transport (plane, car, bus, train), etc. | fuel consumption in tonnes per year by vehicle fleet greenhouse gas emissions emitted in tonnes per year by vehicle fleet mass or number of fine and ultrafine particles emitted per year by vehicle fleet person kilometres per year |

| OPERATIONAL PERFORMANCE: OUTPUT INDICATORS | | |
|--|--|--|
| Indicator category | Examples of indicators | Examples of measurement units |
| Emissions | Air emissions such as greenhouse gases, volatile organic compounds, fine and ultrafine particles, etc. Effluents such as discharge of specific hazardous substances, process water or cooling water, etc. Waste such as hazardous wastes, non-hazardous waste, sludge, heat, noise, etc. | tonnes per year kilograms per tonnes of product cubic metres per year cubic metres per tonnes of product kilograms of substances per cubic metre of waste water percentage of waste recyclable (per year) megajoules per year megajoules per tonnes of product decibels (at specific location) |
| Products (design, development, packaging, use, recovery, disposal) | Substances in products, packaging material, energy consumption of appliances, etc. | tonnes of hazardous/harmful material per year (and product unit) mass percentage of product parts designed for reuse per year number and percentage of products with eco-labels (2) (per year) tonnes of packaging material per year |
| Services (design, development, operation) | Cleaning, waste disposal, horticultural, catering, communication, office services, transport, travel, education, administration, planning, financial services etc. | tonnes or kilograms of hazardous/harmful substances used per service unit and year fuel consumption in litres per service unit and year number and percentage of services with eco-labels (per year) |

| MANAGEMENT PERFORMANCE: SYSTEM INDICATORS | | |
|--|---|---|
| Indicator category | Examples of indicators | Examples of measurement units |
| Implementation of policies and programmes | Environmental objectives and targets, workplace conditions, data management, etc. | percentage of objectives and targets reached per year percentage of units/workplaces with environmental requirements (per year) percentage of units/workplaces integrated into environmental measurement and data management systems (per year) |
| Conformance | Auditing, conformance with voluntary environmental agreements, etc. | percentage of units/workplaces audited per year number of targets of voluntary agreements achieved (per year) |
| Financial performance | Resource savings, etc | Euro per year |
| Employee involvement | Environmental training, employee consultation, suggestions by employees for improvements, etc | days of training per employee and year percentage of total training per year number of meetings with employee/employee representatives per year number of suggestions per employee and year number/percentage of suggestions implemented per year |

| MANAGEMENT PERFORMANCE: FUNCTIONAL AREA INDICATORS | | |
|---|--|--|
| Indicator category | Examples of indicators | Examples of measurement units |
| Administration and planning | Direct and indirect environmental aspects and impacts of planning decisions, policies, land-use planning, engagement in green markets, etc.. | number of policy developments for which an environmental impact analysis was made (per year) percentage of land planned to remain or become natural habitats or green areas (per year) total value in euro or percentage of products sold on green markets |
| Purchasing and investments (to be co-ordinated with input indicators related to products and | Environmental performance of suppliers and contractors, etc. Investments in environmental projects, etc. | number/percentage of suppliers and contractors with environmental policies or management systems total value in euro or percentage of capital investments into environmental projects per year |

| | | |
|---------------------------------|--|---|
| services) | | |
| Health and safety of workplaces | Environmental accidents, illnesses, indoor air quality, water quality at workplaces, noise, etc. | number of employee accidents per year sick days per employee and year concentration of harmful substances in milligram per litre or parts per million level of noise in decibels at location |
| Community relations | Discussions with stakeholders groups (meetings, active participation in events), etc. External requests for the environmental statement, etc. | number of discussions in person days per year number of external request per year number of external website downloads per year |

8 The Nordic Council's Set of Indicators (used by the city of Oslo)

In the report [A Nordic Set of Indicators](#), published in 2003, The Nordic Council proposes [20 key indicators](#), and 14 specific sets of indicators connected with each of the 14 action areas described in the [Nordic strategy](#). *The interesting part about this set is that the key indicators are drawn up in connection with 11 targets (T1 to T11) and measures described in the Prime Ministers' Declaration.*

T1 Present and future generations must be assured of a life in safety and good health

1 Demographic profile

- 1.1 Age distribution
- 1.2 Life expectancy

2 Cases of lung cancer

3 Air quality in urban areas

- 3.1 Particles
- 3.2 Ozone

T2 A sustainable society must be based on democracy, openness and participation in local, regional and national co-operation

4 Implementation of the Aarhus Convention

- 4.1 Countries having ratified the convention
- 4.2 Countries having implemented parts of the convention

5 Local Agenda 21 activities in the municipality

- 5.1 Number of municipalities or counties in the Nordic countries which have initiated Local Agenda 21 activities.
- 5.2 Number of Local Agenda 21-network or similar voluntary network

T3 Biological diversity and the productivity of the ecosystems must be maintained

6 Biological diversity

- 6.1 Developments in pasture and meadow
- 6.2 Developments in old woodland
- 6.3 Size of protected natural areas (special control + Natura 2000)
- 6.4 Number of endangered species and groups of species

T4 Emissions and discharges of pollutants into air, soil and water must not exceed the limits nature can sustain

7 Polluting emissions

- 7.1 Greenhouse gasses (the 6 Kyoto gasses)
- 7.2 Nutrients (nitrogen and phosphorus) going into the sea
- 7.3 Acidifying substances

T5 Renewable natural resources must be utilised and protected efficiently within their capacity to renew themselves

8 Exploitation of natural resources

- 8.1 Volume of fisheries in relation to fish stocks
- 8.2 Volume of marine mammals caught in relation to stocks
- 8.3 Volume of tree felling in forestry in relation to growth

T6 Non-renewable natural resources must be utilised so as to protect natural systems, and renewable alternatives must be developed and promoted.

9 Consumption of various energy sources (oil, coal, gas and renewable energy)

9.1 Use of renewable energy in relation to electricity consumption

10 Volumes of waste and the rate of reuse

10.1 From households

10.2 From manufacturing industry

11 Nordic Direct Material Consumption (DMC) and Direct Material Input (DMI)

T7 A high degree of awareness concerning the measures and processes leading to sustainable development must be created in society.

12 Consumption (private and public) aggregated

12.1 Of selected products with eco-labels

T8 The principles pertaining to sustainable development should be integrated into all societal sectors on an ongoing basis.

13 Number of Nordic or national Sectorial Action Plans integrating environmental protection or sustainable development (Energy, agriculture, business and industry, fisheries, transport, forestry, chemical industry or the food sector)

14 Indicator for decoupling economic growth from harmful environmental impact in selected fields

T9 The role of indigenous peoples for the creation of sustainable development must be stressed.

15 Participation of indigenous peoples in local, regional, national, and international processes to promote sustainable development and Agenda 21 activities, including efforts to establish whether an autonomous strategy for sustainable development can be devised

T10 In the longer term, xenobiotic substances and substances which are harmful to people and nature must be eliminated.

16 Consumption of selected dangerous chemicals and the number of chemicals surveyed and examined

17 Chemical residues in selected products

17.1 PCB in fish from the Baltic Sea

18 Chemical residues in the Arctic

T11 Necessary innovative thinking should encourage more efficient use of energy and natural resources.

19 Energy intensity

19.1 Private consumption per capita and in relation to GDP

19.2 Energy consumption of passenger transport per passenger kilometre and for freight per ton-kilometre

20 Energy consumption of manufacturing industry in relation to Gross Value Added by industry

10 ECO-budget list of indicators used in cities working with ECO budget (©ICLEI)

Ecobudget works with resources that can be budgeted and used, thus indicators for measuring the consumption of these resources were defined, allowing to also determine a target of maximum annual use.

| Resource | Indicator | Measurement / Unit |
|---|---|--|
| AIR | Ozone | Days / year with > 110 µg ozone / m ³ air (8h-average) |
| | Dust | Amount of days / year with > 40µg PM10/m ³ (8h-average) |
| | | Ambient Average for PM ₁₀ in µg/m ³ |
| | Greenhouse gas | In t / inhabitants / year (just energy, but also Energy & traffic) |
| | Natural Gas driven Cars | Amount |
| | Sulphur Dioxide-Immission | Amount of days / year with > 125 µg/m ³ (24h average) |
| | Nitrogen oxide emission | Amount of days / year with > 100 µg/m ³ (24h average) |
| | Carbon dioxide emission | in t/year |
| | | in 1000 t/year |
| | | in t / inhabitant / year |
| | Volatile hydrocarbons emissions | in t/year (industry / traffic) |
| | Nitrogen Oxide emission: Reduction of capacity of buffer of woodlands (Acid rain, Forest dieback) | NO _x emission in t / year (industry & traffic) |
| | Rate of air pollution 1 (max. peak load) | |
| Rate of air pollution 2 (average peak load) | | |
| STABLE CLIMATE | Energy efficiency in domestic dwellings | % improvement in energy efficiency |
| | Carbon Dioxide emissions from Council Buildings | Tonnes of CO ₂ |
| | Accommodation Establishments with energy management | Number of Establishments |
| | Emission of CO ₂ by consumption of fossil energy | in t/ inhabitant/ year |
| | Change of areas with a high climate sensibility | in ha / year |
| BIODIVERSITY | Schools with Wildlife Areas | % by number of schools |
| LANDSCAPE / HABITAT | Proportion of implemented to stated compensation and substitution measures | In % |

| Resource | Indicator | Measurement / Unit |
|-------------|--|--|
| | Use of Brownfield Sites for housing | % by area of developments that are approved during year |
| TRANQUILITY | Traffic Noise | Km roads ≥ 59 dB (A) during the day |
| | | Km roads > 55 dB (A) |
| | Aircraft Noise | Amount of noise events / year > 74 dB (A) |
| WATER | Consumption of Drinking Water | Litre / inhabitant / day |
| | Content of Phosphate in the sewage plant run-out | g / inhabitant / day |
| | BSB 5 in the sewage plant run-out | g O ₂ / inhabitant / day |
| | CSB in the sewage plant run-out | g O ₂ / inhabitant / day |
| | Water Quality | Length / m with at least GK II |
| | Pesticides in the drinking water | Amount of measurements $> 0,1\mu\text{g} / \text{l}$ |
| | Nitrate in the drinking water | Amount of measurements > 50 mg/l |
| | Pollution of running water by a mixed sewage water system - overflow | Kg chemical oxygen demand (COD) / ha _{red} and year |
| | Decontamination of groundwater and soil-air-damages | Amount |
| SOIL / AREA | Newly Sealed Surface | Hectare / year |
| | Sealing | Newly sealing / Desealing |
| | Change of settlement area | in ha / year |
| | Change of areas to be left clear | in ha / year |
| | Renewed Areas of old deposits | Proportion of Renewals in % of the total area |
| | Area with measures for replacement and compensation | in ha / year |
| | Unworked old deposits | Amount |
| | Amount of reduction of gypsum / anhydrite | in t / year |
| | Amount of reduction of gravel sand | in t / year |
| | Settlement and traffic area with a sealing degree $> 20\%$ | % proportion of total urban area |
| | Change of priority areas for natural reserve | in ha / year |
| | Change of landscape area with high nature conservancy | in ha / year |

| Resource | Indicator | Measurement / Unit |
|------------------------|--|---|
| | Modal Split; Proportion of the amount of routes | Proportion of public transport in % |
| | Modal Split: Proportion of motorised private transport | In % |
| RAW MATERIALS / ENERGY | Consumption of electricity of private homes per capita | In kWh / year |
| | Gas consumption of private households per capita | In kWh / year |
| | Consumption of electricity of municipal institutions (heat current excluded) | In kWh / year |
| | Municipal consumption of heat energy | In kWh / year |
| WASTE | Amount of waste | In kg / inhabitants per year |
| | | Average tonnes of waste per household |
| | Residual waste | kg / inhabitant / week |
| | | kg / inhabitant / year |
| | Recycling rate waste from private households | In % |
| | Recycling Rate | % by weight (tonnages of materials collected for recycling as % of total waste) |
| | Population served by kerbside collection of recyclables | % by population |
| | Waste disposal | in t / year |
| | Organic waste | in kg / inhabitants / year |

11 Examples of indicator sets used for sustainable development assessments by Russian municipalities

Analysis of Ecological Situation in the City of Novozybkov (“Ecologically Oriented Strategy”)
<http://localstrategy.seu.ru/LA21/texts-LA21/LA21-Novozybkov.html>

- Historical overview
- Socio-economic factors
- Government
- Infrastructure
- Culture
- Education
- Health system
- Social protection system
- Urban violence and security
- Public organisations
- Demographics and population
- Radioactive pollution
- Chemical pollution
- Solid wastes
- Microbiological pollution
- Environmental policy

Analysis of Ecological Situation in the City of Ryazan (“Ecologically Oriented Strategy”)
<http://localstrategy.seu.ru/LA21/texts-LA21/LA21-Ryazan.html>

- Historical overview
- Socio-economic factors
- Finance system
- Industry
- Air pollution
- Water resources
- Wastes and soils contamination
- Urban management
- City infrastructure
- Demographics and population
- Urban green areas
- Solid wastes
- Environmental policy

Analysis of Ecological Situation in the City of Moscow (Environmental Agency “Ecology”)
http://www.ecology.ru/index.php?area=1&p=static&page=ec_med

- Demographics
- Air pollution
- Transport
- Soils contamination
- Urban green areas
- Health impacts

Ecological Situation in the City of Serpukhov
<http://www.erh.ru/biblio/biblio014.php>

- Environment and natural resources
- Air pollution
- Vegetation Cover
- Soils
- Surface and groundwater resources
- Ornithofauna
- Socio-economic factors
- Environmental threats
- Environmental impacts and responses
- Health impacts
- Risk reduction policies
- Heavy metals
- Waste water treatment
- Detoxication of soils

Independent Ecological Rating Agency
<http://nera.biodat.ru/ratings/regions/procedure-and-results.php>
Indicators for the City Regions of Russian Federation
(includes not only a city itself but also its entire region)

- Air pollution
- Water pollution
- Wastes
- Ecosystem transformation
- Biodiversity
- Atmospheric pollution
- Water resources
- Ecological transparency of business
- Ecosystems protection
- Attention of media to ecology

Criteria and Indicators of Sustainable Natural Resources Management
("Natural Resources of Krasnoyarsk Region") <http://nature.krasn.ru/criteria.php>

- Soils
- Water resources
- Air pollution
- Wastes
- Biological resources
- Mineral resources

Analysis of Ecological Situation in the City of Donetsk (Organisation "Roza Vetrov")
<http://www.ecology.donbass.com/pages/publ/indicators2002.htm>

- Air pollution
- Water pollution
- Solid wastes
- Recreational areas
- Health impacts
- Social activities
- Unemployment
- Children without parents
- Public transportation
- Public Violence and security
- Environmental resources and energy
- Social wealth
- Accommodation availability