

## B-1: Air temperature

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## 1) General description

### 1.1) *Brief definition*

The indicator shows the annual average temperature of the air, its development over a given period of time, and deviations from a long-term average in the country as a whole and in particular regions.

### 1.2) *Units of measurement*

Degrees Celsius (°C)

### 1.3) *Context*

Relation to other indicators from the Guidelines - This indicator relates to indicators "B-2: Atmospheric precipitation" and „B-3: GHG emissions“.

## 2) Relevance for environmental policy

### 2.1) *Purpose*

The air temperature is directly linked to the state of the Earth's climate system. The indicator shows trends in the variation of the annual average temperature and provides a measure of changes that can be related both to cyclic natural changes in the climate and to anthropogenic impact on global climate change.

### 2.2) *Issue*

Change in air temperature - observed over a long period of time - is an evidence of one of climate change's most serious effects, which has been especially noticeable in recent decades. There is mounting evidence that the increase of anthropogenic emissions of greenhouse gases (GHG) is one of the reasons for recently observed rapid increases in average annual temperature. Absolute temperature changes and the rate of change are

both important determinants of the possible effects of climate change. These effects include melting of glaciers, rising sea levels, floods and droughts, changes in biota and many others. Trends and projections of the annual average temperature can be related to policy targets in climate change mitigation. Next to the global average value, the rate and spatial distribution of temperature change are important for determining the capacity of natural ecosystems to adapt to climate change.

### **2.3) International agreements and targets**

#### *a) Global level:*

The Convention of the World Meteorological Organization (WMO) facilitates worldwide cooperation in establishing and operating networks of meteorological stations, including measurements of air temperature and hydrological, meteorological and geophysical observations. Countries which are Parties to the United Nations Framework Convention on Climate Change (UNFCCC) have to carry out systematic observations of the climate change parameters, create databases and conduct research related to the climate system.

#### *b) Subregional level:*

On the European level, the European Union takes the lead in climate change related issues including reduction of GHG emissions and has established a General Directorate on “Climate Action” within the European Commission. The 2nd European Climate Change Programme has been launched in 2005 followed in 2011 by the “Roadmap for moving to a competitive low-carbon economy in 2050”. The European Union proposed in its climate policy that the global average temperature increase should be limited to not more than 2°C above “pre-industrial” levels.

## **3) Methodology and guidelines**

### **3.1) Data collection and calculations**

The network of hydro-meteorological stations in a given country collects data over long periods of time. Temperature should be measured eight times a day at the same time at all network stations with an accuracy of at least 0.2°C. Data treatment should be carried out by national hydro-meteorological services, which assess the quality and consistency of the data and calculate various parameters (including annual averages). The relationship of the temperature in a given year to the long-term standards is determined in terms of deviation from the standard, i.e. is calculated as the difference between the observed annual average temperature and the long term average temperature for 1961 - 1990. Data should be

provided at least for the country as a whole, the capital, a second major city, and the areas or regions with the highest and lowest long-term average temperature 1961-1990.

### **3.2) Internationally agreed methodologies and standards**

The best practices and concepts for climate monitoring developed in the framework of the Global Climate Observing System (GCOS); the *Guide to Meteorological Instruments and Methods of Observation* prepared by the Main Geophysical Observatory in coordination with WMO.

Climatic standards recommended by WMO are the calculated standards based on 30-year observation data (1961–1990).

## **4) Data sources and reporting:**

Temperature is measured systematically by the institutions responsible for meteorology or hydrometeorology in countries of South-Eastern and Eastern Europe, Caucasus and Central Asia. Data on meteorological observations are published regularly via different media. All target countries are members of the WMO and Parties to the UNFCCC. As part of their reporting obligations as parties to the UNFCCC the countries prepare reports on the results of air temperature measurements and include this information regularly in their national communications.

## **5) References at the international level:**

- Convention of the WMO (1950);
- United Nations Framework Convention on Climate Change (1992);
- Intergovernmental Panel on Climate Change (IPCC) Special Report, Climate Change Consequences for the Regions: Vulnerability Assessment. Summary for decision-makers (IPCC, 1997) (ISBN 92-9169-410-4);
- Guide to Meteorological Instruments and Methods of Observations; WMO-No-8, 2008, updated 2010: [http://library.wmo.int/pmb\\_ged/wmo\\_8\\_en-2012.pdf](http://library.wmo.int/pmb_ged/wmo_8_en-2012.pdf);
- WMO: <http://www.wmo.int>;
- UNFCCC: <http://www.unfccc.int>;

- IPCC: <http://www.ipcc.ch>;
- EEA: <http://themes.eea.europa.eu/IMS/CSI>.