

EUPORIAS WP22 Climate Impact Indicators (CII)

Based on **Milestone 19 from WP22**, a preliminary set of Climate Information Indices (CII) was defined to cover different economic sectors. These CII are: the Fire Weather Index (**FWI**), the Physiological Equivalent Temperature (**PET**), the Occurrence of Temperatures below -17°C (**T<-17°C**), the Growing Season Suitability (**GSS**), the Growing Season Precipitation (**GSP**), the Cool night Index (**CI**), the Hugin Heliothermal Index (**HI**), the Hydrothermic Index (**Hyl**), the Upper Wind Speed (**CFU**), the Temperature related Mortality Index (**UDIC**) and the Heating Degree Days (**HDD**). Below, all of them are briefly described.

- **FWI**: The Fire Weather Index represents the intensity of a spreading fire as energy output rate per unit length of fire front, which is used as a general, daily-based indicator of fire danger.
- **PET**: The Physiological Equivalent Temperature (PET) is a universal index for characterizing the thermal bioclimate at any given place (outdoors or indoors). This index is equivalent to the air temperature at which, in a typical indoor setting, the heat balance of the human body is maintained with core and skin temperatures equal to those under the conditions being assessed.
- **T<-17°C**: Annual mean number of days with minimum temperature below -17°C .
- **GSS**: The Growing Season Suitability represents the fraction of days from April to September with daily mean air temperature above 10°C .
- **GSP**: The Growing Season Precipitation is the precipitation accumulated from April till September.
- **CI**: The Cool night Index average minimum air temperature in September.
- **HI**: Hugin Heliothermal Index is a degree-day formulation that weights maximum temperatures above daily mean temperatures and applies a latitude-varying day-length adjustment.
- **Hyl**: The Hydrothermic Index is just the product of temperature and precipitation from April to September.
- **UDIC**: Temperature-related mortality index. A transfer function (i.e. temperature/mortality relationship) is calculated using historical data and a statistical model is fit to cold and warm tails to estimate future mortality using forecast daily temperatures.
- **CFU**: Upper wind speed threshold for wind turbine operation: This wind speed threshold is approximately 16 m/s (depending upon turbine specifications), above which a turbine braking system is applied to slow down or stop it from spinning, to protect mechanical equipment from damage. The Index would be based on the number of days above this wind speed threshold, over seasonal timescales.
- **HDD**: Heating Degree Days

All these CII require different variables with different temporal frequencies as input data.

| Variables needed by the CII's | Time Frequency | CII's |
|------------------------------------|--|-------------------------|
| Surface temperature | Daily mean | GSS, HI, Hyl, HDD, UDIC |
| Surface temperature | Instantaneous at 7am, 2pm and 9pm (local time) | PET |
| Surface temperature | Instantaneous at noon local standard time or daily maximum | FWI |
| Minimum temperature | Daily mean | T<-17°C, CI |
| Maximum temperature | Daily mean | HI |
| Dew point temperature | Daily mean | UDIC |
| Wind Speed | Monthly mean | CFU |
| Wind Speed | Instantaneous at 7am, 2pm and 9pm (local time) | PET |
| Wind Speed | Instantaneous at noon local standard time or daily mean | FWI |
| Surface moisture | Daily mean | UDIC |
| Precipitation accumulated over 24h | Instantaneous, Daily | FWI |
| Precipitation | Daily mean | GSP, Hyl |
| Relative Humidity | Instantaneous at noon local standard time or daily mean | FWI |
| Relative Humidity | Instantaneous at 7am, 2pm and 9pm (local time) | PET |
| Short wave radiation flux | Instantaneous at 7am, 2pm and 9pm (local time) | PET |
| Long wave radiation flux | Instantaneous at 7am, 2pm and 9pm (local time) | PET |
| Cloudiness (in octas) | Instantaneous at 7am, 2pm and 9pm (local time) | PET |

Note that, in some cases, the calculation of these CIIIs involve the used of data at specific local times. However, the SPECS-EUPORIAS data portal does only intend to make available a reduced number of variables (typically surface variables such as precipitation and temperatures) at certain UTC times. Therefore, end-users' feedback is needed in order to define the common set of variables/UTC times which will be stored, taking into account the requirements needed for (among others) the calculation of the above CIIIs (further details on this can be found [here](#)).