# WORKLIMATE Project

The prototype forecasting system developed by WORKLIMATE uses an indicator widely used in the occupational field at international level for a first assessment (first screening) of heat stress. The forecasting system developed by WORKLIMATE uses an indicator widely used in the occupational field at international level for a first assessment (first screening) of heat stress. The chosen indicator, the Wet Bulb Globe Temperature (WBGT), is the result of a literature review, carried out during the activity 1 of the Work Package 4, whose results are available in a "Report" available on the project website in the "Publications" section (https://www.worklimate.it/category/report/).

The WBGT (UNI EN ISO 7243:2017) is an empirical index developed in the 1950s as a basis for monitoring heat stress in US military training camps. Subsequent implementations have allowed an expansion in its field of use, taking into account fundamental aspects in the occupational field, such as clothing, personal protective equipment, as well as the level of acclimatization of the subject and the type of activity performed (metabolic rate). It is now the most commonly used thermal stress index in the workplace to ensure that the average body temperature of a worker does not exceed 38°C. A detailed description of the indicator can be found on the Physical Agents Portal (PAF) website (https://www.portaleagentifisici.it/fo_microclima_metodiche.php?lg=IT).

This index is used for the heat stress prevention on healthy subjects in the absence individual thermal susceptibility conditions. (https://www.portaleagentifisici.it/fo_microclima_index.php?lg=IT).

The WBGT was also chosen as an indicator in the prototype forecasting system (probabilistic forecasts with low spatial resolution and without any intra-day detail) dedicated to the occupational sector, developed within the European project (H2020) HEAT-SHIELD (https://www.heat-shield.eu/).

The meteorological model used for the prototype WORKLIMATE forecast platform is a deterministic model a spatial resolution of 7 km and a temporal resolution of 120 hours (BOLAM model, http://www.lamma.rete.toscana.it/modelli/atmo/bolam-e-moloch -info-about-models) initialized at 00 UTC on a GFS (Global Forecast System) basis. The meteorological data forecasted by the model are by their nature affected by an intrinsic uncertainty, which varies with the characteristics of the territory as well as the weather situation.

For these reasons therefore, the information that derived from the WORKLIMATE platform is to be understood as a decision support tool, the assumption of which is not it can ignore the direct microclimatic observation at the workplace. This uncertainty may be particularly relevant in areas with complex orography and consequently with possible underestimates of the expected risk levels (such as for example in the Alpine and Apennine valleys or in some coastal areas) or overestimates (such as on some higher reliefs) due to models limits in correctly representing the territory as a consequence of their spatial resolution.

The customized risk calculation procedure used in the WORKLIMATE forecast system is available in a recent publication (https://www.mdpi.com/1660-4601/16/16/2890/htm) and a summary in Italian is available in the project report mentioned above.

The heat risk forecast is customized on a profile of a standard worker (175 cm tall, 75 kg weight) who is not acclimatised to heat, who performs moderate to intense activity directly exposed to solar radiation or shade. The standard worker does not wear personal protective equipment or at least wears clothing that does not lead to an additional increase in risk.

The predicted level of risk is defined by the percentage ratio between the predicted WBGT and the customized WBGT threshold of the standard worker described above. If the expected WBGT is below 80% of the personal WBGT threshold, the resulting risk is nil (green), if instead it is between 80 and 100% the risk is low (yellow). If, on the other hand, the expected WBGT is above the personal threshold, the risk is either moderate (between 100 and 120%, orange) or high (above 120%, red).