

# Climate modeling for Iran with ECHAM/REMO and downscaling of meteorological surface parameters (ID: 570)

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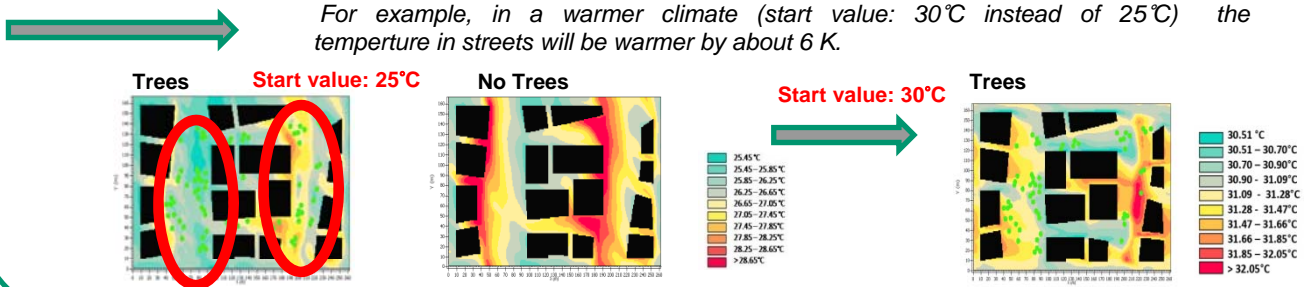
**Objective:** One of the objectives of the climatological part of the project Young Cities 'Developing Energy-Efficient Urban Fabric in the Tehran-Karaj Region' is to simulate the micro climate (with 1m resolution) in 35ha of new town HASHTGERD (IRAN), which is located 65 km far from mega city Tehean considering climate change till 2060. The three-dimensional microclimate model ENVI-met (Bruse, 1999) is used to simulate the micro climate and the regional climate model COSMO-CLM has been used for the future climate simulations. The ENVI-met model has a temporal resolution of 24- 48 hours and a spatial resolution of 0.5 – 10 m. The type of buildings, vegetation, soils surfaces and pollutant sources can be placed inside the model area. The model combines fluid dynamics (wind flow, turbulence) with thermodynamic processes taking place at the ground surface, at walls and roofs or at plants.



By configuration of buildings and open spaces according to solar radiation, wind and vegetation, climate sensitive urban form can create outdoor thermal comfort. The Model area of the 35 ha area in Hashtgerd is shown on the right site, with the sub grid of 270 x 170 meters in the middle. The grid resolution is 1m and the trees have a height of 3 and 9 meters. The trees were simulated by the Leaf Area Density (LAD) and are also shown in the middle.

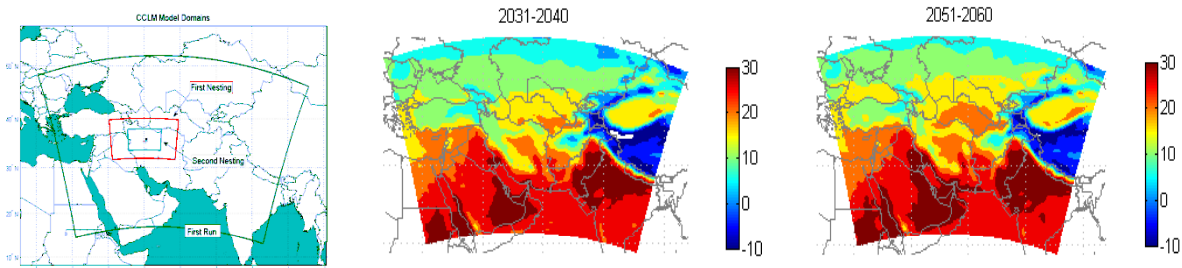
## Temperature 2m height (35 ha area) simulated by Envi-met real time : 15.7.2005, 12:00 UTC

In semi-arid climates the protection from solar radiation is of major importance. This can be achieved by implementation of vegetation and geometry of buildings. Due to the geographical location and related sun's orbit the degree of shading in this area is rather low. Technical construction such awning have to be implemented. Through the arrangement of the buildings and the vegetation, the climate in 35 ha area is colder by about 2 K and leads for a better ventilation. **The trees reduce overheating.**



## How is the climate for new town HASHTGERD in future?

Using regional climate model COSMO-CLM and boundary data from ECHAM5 the climate simulations have been generated for Province Tehran for 3 time slices between 2001 and 2060. In the next part of the project, it will be investigated if the mentioned urban and landscape planning for the 35 ha in Hashtgerd leads to a better micro climate in the future. The extreme temperatures and wind from the time slices will be considered as input for the micro climate model and the results will show how can we mitigate the climate change with urban and landscape planning.



Bruse, M.(1999): ENVI-met, Die Auswirkung kleinskaliger umweltgestaltung auf das Mikroklima-Entwicklung des prognostischen numerischen Modells zur Simulation der Wind- Temperatur- und Feuchteverteilung in städtischen Strukturen, Dissertaion an der Fakultät für Geowissenschaften, Uni Bochum.