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# Management of urban climate adaptation with NBS and GREENPASS®

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In Europe today more than 70 % of the population lives in urban areas (EU, 2016). The process of urbanisation is continuing worldwide. According to United Nations prognosis (UN, 2018) about 68% of the European population will live in cities until 2050.
Urbanization alters local environments (wind flow, thermal conductivity of materials, impervious surfaces etc.) and can strengthen and/or increase the range of the local urban heat island and local flooding that can be exacerbated by climate change (Jackson et al., 2010). With respect to different climate models, the global average temperature is expected to increase until mid of the century by 2 to 2.5 °C compared to the preindustrial time. On top of this, the Urban Heat Island effect has to be considered, resulting in a temperature increase of 4 to 5 °C for cities in Europe.
The impacts and risks for people and urban infrastructure are manifold and affect areas as water supply, wastewater and sanitation, energy supply, transportation and telecommunication, social and health services. The Intergovernmental Panel on Climate change report (IPCC, 2018) presents in chapter 8 (Noble et al., 2014) different options to adapt urban areas to climate change.
Numerous guidelines and directives dealing with climate adaptation and mitigation of urban areas as the European strategy for green infrastructure (European Commission, 2013), the German Weißbuch Grün (Bundesminsiterium für Umwelt, Naturschutz, Bau und Reaktorsicherheit, 2007), the le Permis de végétaliser de Paris (Paris, 2018) or the Vienna Urban heat island strategy (Brandenburg et al., 2015), that was passed by the government in 2018, highlight the importance of green infrastructure.
But all guidelines and directives remain conceptual. The expectable effects of applied green infrastructure on specific projects cannot be projected because they differ strongly and cannot be predicted accurately.
In a research and development process of more than 8 years, a technology has been developed that enables to assess and evaluate the effects of green infrastructure on the climate resilience of urban areas or single architectures (Kraus, 2017; Scharf et al., 2017). The technology named GREENPASS has been applied in different urban development projects (Scharf, 2018). By means of selected projects, as the Biotope City project in Vienna, the valuable effects of urban green infrastructure are demonstrated and highlighted. The GREENPASS technology regards 5 scores, 7 climate resilience key performance indicators and 20 performance indicators in total. For the Biotope City Vienna project, a reduction of air temperature by up to 3° Celsius has been assessed with a total invest of only approx. 40 € per square metre of green infrastructure. The Biotope City Vienna is further an official candidate for best practice social housing within IBA_Vienna – new social living.