

BeBrit Extreme Heat Risk Project City Case Study

Sofia, Bulgaria

Future Heatwaves - Sofia will be one of the most affected European capitals (Smid et al., 2019)

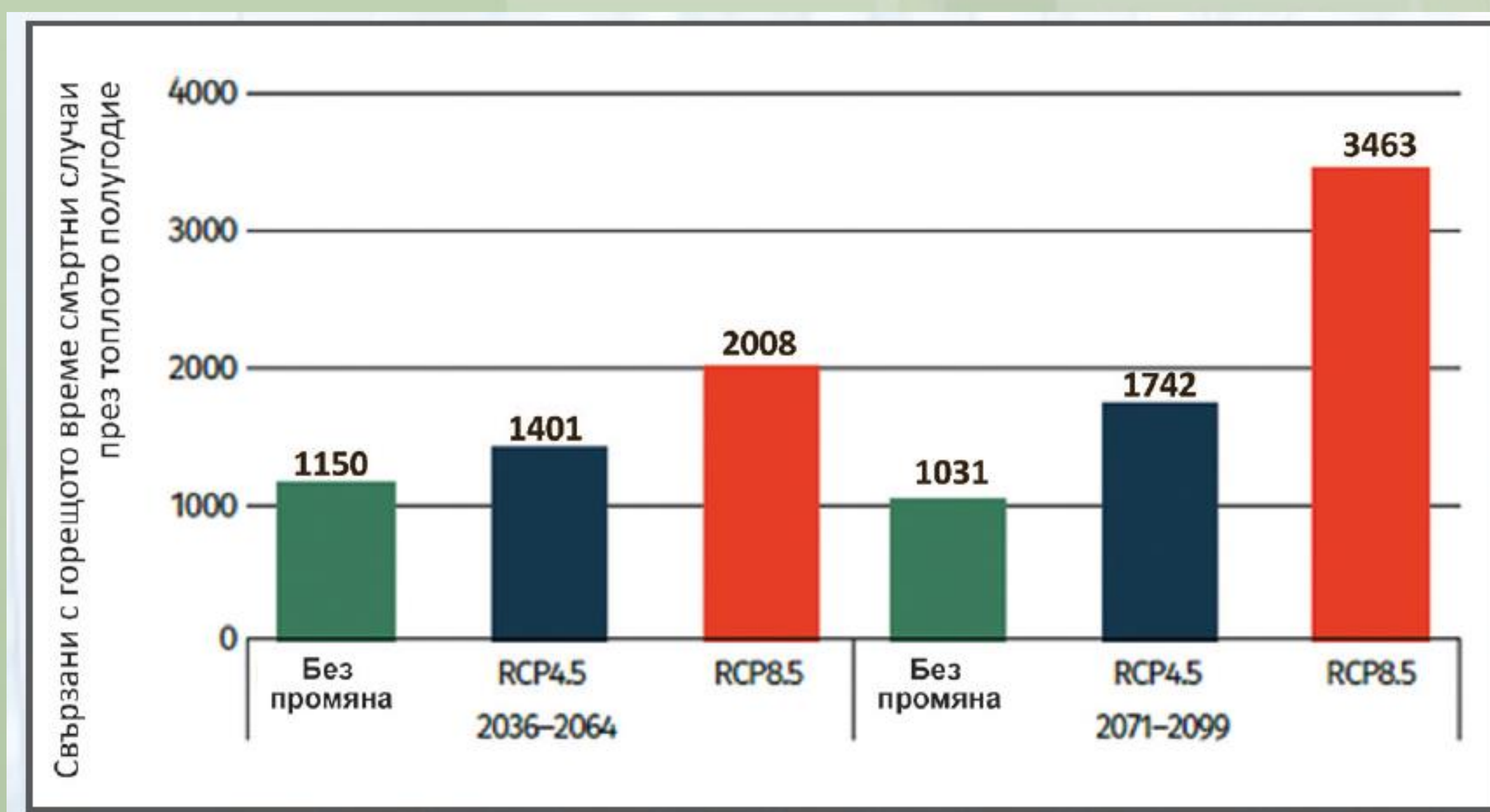
About Sofia

Sofia is the capital and largest city of Bulgaria. It has a continental climate. Being in the centre of the Balkans, it is midway between the Black Sea and the Adriatic Sea. Sofia hosts some 1.28 million residents within a territory of 500 km²

Key climate change challenges

- **Heatwaves:** Over the last 20 years in Sofia, on average per year: 2-3 cases of heat waves lasting 9 days; about 20 days on average per summer with warm intrusions. Summer 2012: the hottest summer since the beginning of regular meteorological observations (for a period of 125 years); 5 heat waves, with a total duration of 65 days (2/3 of the days of the season were extremely hot).
- **Urban Heat Island:** Over the last 145 years, the temperature in the central parts of Sofia has risen by approximately 4 °C, due to increasing urbanization, energy consumption and as a result of climate change. By 2050, the temperature increase in the central part of Sofia is expected to be approximately 0.4 °C compared to 2012.
- **Drought and health risks of air pollution**

Figure 1: Heat-related deaths in Bulgaria - projections for the periods 2036-2064 and 2071-2099 under different greenhouse gas emission scenarios. Source: WHO.



Vulnerability Assessment of Sofia

As part of the development plans for a Sustainable Energy and Climate Plan, the city conducted an **Assessment of vulnerability and climate change risks for Sofia Municipality: analysis of the current situation by sectors in 2020.**

Figure 2: Summary of indicators for the impact of extreme heat in Sofia

Sector	Vulnerability Indicator	Unit
Forestry and agriculture	Areas affected by heat stress and wildfires	Ha/year
	Number of trees damaged	No/year
Urban Planning	% of inhabitants and users of (residential / public) buildings / spaces and green / blue / green areas affected by extreme heat, including: mortality, disease, disability, overheating deformations; overheating drying	%
Environment and biodiversity	• Reducing the area of ecosystems (Difference between the spatial coverage of ecosystems in the baseline (mapping from 2017 outside NATURA 2000, and Corine Landcover 2018 for NATURA 2000) and the new values determined by monitoring the same ecosystems)	Ha
	• Deterioration of ecosystems: the difference between the state of ecosystems in the baseline and the new values determined by monitoring the same ecosystems	No of units on the rating scale for each ecosystem
	• Reduction of the populations of protected species (according to the reporting on NATURA 2000 and the monitoring within the framework for Sofia)	No of identified individuals
Transport	• Number of registered cases of damage to transport infrastructure due to climate hazards.	No/year
	• Part of relevant transport infrastructure (street network, railroad, metro stations, subways, bridge facilities, traffic lights, contact cable network, etc.) damaged by extreme weather events.	%
Human Health	• Increase in the total mortality above the expected (average for the respective period) level during the periods with heat waves and up to three days after their passing (due to the so-called delayed impact).	%
	• Number of emergency calls	No/year
	• Number of accidents at work	No/year

Key climate-related policies

- Sustainable Energy and Climate Action Plans of Sofia Municipality, 2021 – 2030:
- Action Plan for Green City in Sofia
- Climate Change Adaptation Plan of Lyulin Region based on Digital Twin and Nature-based Solutions

What can be improved?

- Further research is needed on heatwaves and mortality to point out the tipping point and temperature above which general mortality rises
- The codes for the Meteoalarm system should be adjusted accordingly following the research above. At the moment the codes for Meteoalarm have higher thresholds compared with neighbors in Serbia and Croatia for example. 38 degrees Celsius for orange code, 41 for red and 35 for yellow. The early warning system BG Alert doesn't alarm for heat waves at the moment. The heat waves are now listed in the low category. This should be altered.

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