## **KEY MESSAGES**

### Air quality in Bishkek:

This study is the first comprehensive analysis of key emission sources and their impact on air pollution concentrations in Bishkek. For the first time, decision-makers have a scientific basis for developing policies to tackle air pollution.

#### Bishkek experiences poor air quality throughout



**the year, with extremely dangerous levels during the wintertime heating period.** Across 2010-2019, 12-13% (approximately 4,100-5000) of all annual deaths in Kyrgyzstan were attributed to air pollution. The health costs of air pollution in Kyrgyzstan were estimated at USD 388 million or 6% of Gross National Income in 2015.

**Reducing fine particulate matter (PM<sub>2.5</sub>) pollution is the highest priority.** Particulate matter (PM) poses the most severe health risk of all air pollutants. PM<sub>2.5</sub> refers to microscopic particles that can penetrate deep into the lungs, cross the lung barrier and enter the blood system. This study found that in Bishkek, annual mean PM<sub>2.5</sub> concentrations exceed by far Kyrgyzstan's national and all international (EU, US EPA and WHO) health-based limits and guidelines.

## Action plans should be developed for episodes with severe or poor air quality so that government and public can take action to protect health.

Air pollution and climate change are interlinked and tackling air pollution is part of the climate agenda. Burning of fossil fuels is by far the largest source of air pollution. Reducing the use of fossil fuels is therefore not only a priority for improving air quality, it is also a priority action for climate change mitigation. Investments in climate action often pay off quickly in the short-term through air quality co-benefits via savings in the health sector.



# What causes air pollution in Bishkek?

The most dangerous levels of fine particulate matter (PM<sub>2.5</sub>) pollution are caused by residential heating with (sulphur-rich) coal during the wintertime exacerbated by poor mixing conditions of the air.

Emissions from the CHP have a limited impact on ground-level air pollution in Bishkek. This

study was the first to model emissions from the CHP. Results show that the CHP may contribute less than 1% to ground-level pollution concentrations of  $PM_{2.5}$  and  $PM_{10'}$  and less than 10% to ground-level sulfur dioxide (SO<sub>2</sub>) levels in other parts of the city.

**Transport is another key source of air pollution in Bishkek.** Road transport was assessed as the greatest source of nitrogen oxides (NO<sub>x</sub>) and a considerable source of fine particulate matter (PM<sub>2.5</sub>).

Bishkek landfill has a continuous uncontrolled fire that has a strong impact on the air quality in surrounding areas. Uncontrolled burning of the waste causes many toxic compounds and carcinogenic air pollutants, particularly on the people living nearby.

# What about air pollution emissions in the future?

Emissions of all key pollutants are expected to grow significantly towards 2040 under a 'business as usual' scenario. An emissions inventory was developed for Bishkek, showing estimates on volumes of priority air pollutants emitted from different sources in the city over 2000-2040. By 2040, PM<sub>25</sub> emissions are estimated increase by three-fifths (60%), driven to predominately by increases in emissions from residential combustion; NO<sub>x</sub> emissions are estimated to increase by almost two-thirds (63%), driven largely by increased emissions from transport, notably petrol-powered cars; and SO<sub>2</sub> emissions are estimated to increase by half (50%), driven by emissions from CHP.





### What are the solutions?

Individuals have limited opportunities to control air pollution, thus action at the local, national, and regional level is needed. Emissions reductions can be achieved across many sectors:

• Emissions from private housing can be reduced through promoting affordable clean energy alternatives to coal, such as heat pumps, via bolstering the electricity sector through substantially increasing the capacity of renewable energy generation, and through investments in energy efficiency in buildings.

• Emissions from transport can be reduced through reforming fuel standards, tightening emissions regulations, enhancing urban planning, and improving technologies used in transport to decrease emissions (such as catalytic converters). Major improvements and investments in public transport are also vital.

• Emissions from power generation can be reduced through transitioning to low-emissions fuels and renewable combustion-free power sources such as solar, wind and hydropower.

• Strategies supporting waste reduction and separation, recycling and reuse, and application of best available technologies can reduce emissions from municipal and agricultural waste.



Air quality management in Bishkek needs to be strengthened to protect against the health and environmental impacts of air pollution:

• Air quality monitoring is one of the cornerstones of air quality management. The current air quality monitoring network is not sufficient for providing reliable air quality data to support decision-making and to inform and protect citizens. There is a need to improve Bishkek's air quality monitoring network and to



enhance the capacity of an expert organization responsible for operating the network, processing and analysing data. Enhanced monitoring will also show what policies are effective in reducing air pollution, providing a guide for policy decisions.

• Low-cost air quality sensors have played a significant role in informing the population about air pollution in Bishkek, and providing actionable information on air quality to the public. Dense sensor networks, such as those in Bishkek, can also provide a map of air quality across the city, and can be used to assess air quality hotspots.

• Modernizing air quality legislation is essential. Existing legislation does not align with international norms that are based on the latest science. Modernising air quality standards, such as through a transition to an Air Quality Index (AQI), will support an accurate understanding of air pollution on population health.