Achieving Clean Air in Cities

Air pollution is the world’s fourth leading fatal health risk and the top environmental health risk. One in nine deaths globally are attributed to ambient air pollution, with poor people being disproportionately affected. More than 90 percent of these deaths occur in Asia and Africa. The climate impact is also significant: “super pollutants” are responsible for nearly half of the earth’s accumulated warming to date. They also affect crop yields, solar energy generation, and some aspects of rainfall patterns and storm intensity.

Cities are pollution hotspots and residents are calling for rapid action for cleaner air. Local governments need to invest in addressing air pollution through clean power generation and fuel switching, industrial efficiency and controls, transport upgrades and modal shifts, and, in certain areas, agricultural improvements. Innovative financial solutions are needed to enable cities to access the funding required for these investments. Instruments such as the proposed Breathe Better Bond being developed by IFC can incentivize cities to borrow specifically to address air pollution, as the instrument incorporates results-based incentives such as lower interest rates for meeting agreed performance milestones.

While many of the policy levers and investment decisions required for clean air are beyond cities’ reach, because borrowing conditions are often set at a national level, their consumption choices, positive examples, and political voices matter. Cleaning up the air ultimately requires public discourse based on scientific evidence, and integrated action across sectors and administrative geographies. It also requires political stamina and neighbors to follow suit. The high cost of controlling or eliminating emissions often falls on particular industries or individuals, but the benefits of cleaner air are felt by all of us.

A TWO-PART CLEAN AIR AGENDA

Local action

Much of cities’ attention has been on reducing local emission sources: fossil-fuel transport, solid waste burning, high-emitting household energy sources such as coal or biomass, and control of volatile organic compounds. Reducing household emissions is often a matter of prioritizing energy access programs—households typically prefer electricity, gas, and other...
locally less-polluting forms of energy when they can afford it. Solid waste burning is more challenging, since it requires not only having a comprehensive and functional system for collective solid waste, but also attention to landfill management in order to avoid spontaneous combustion. Solid waste burning is an intermittent pollution source, making it hard to build sustained action for reducing it. The 2016 fire in Mumbai’s Deonar dumpsite, for example, blanketed much of the city in toxic smog and provoked a media frenzy, but as the smog dissipated, so too did attention on the issue.

Passenger and freight vehicles are often among the largest contributors to urban air pollution. Strategies for comprehensive control have three prongs: Avoid the need for transport by optimizing land use; shift to lower-emitting modes; and improve the cleanliness of vehicles through cleaner fuels and tighter emission standards. Cities are increasingly looking at traffic management interventions, such as congestion charging, vehicle restriction, and low-emission or clean air zones as options to address urban air pollution. São Paulo, for example, adopted “car-free Fridays”, restricting personal vehicles from entering the downtown area on the last Friday of every month and encouraging cleaner modes of transport instead. The World Resources Institute is tracking effects locally with the city’s Secretary of Mobility through an air quality monitoring project.

While drivers may protest, traffic management measures are politically popular. In China, the World Resources Institute’s feasibility assessment of a low-emission zone found public opinion to be evenly split on the proposal, even before implementation. The demonstrable impact often wins more support: In Stockholm, for example, only 34 percent of the residents initially supported congestion charging and low-emission zone initiatives, but that percentage increased to 72 percent six years after implementation. Low-emission zones can also drive broader fleet changes if strategically placed in high vehicle pass-through areas such as ports or high-density business districts.

Airshed leadership

Most cities cannot achieve clean air without addressing the emission sources around them. Sometimes the flows are visible—smoke from crop burning can easily be seen from space. Other times they are subtler. Gaseous ammonia emitted from manure and excess synthetic fertilizer use can combine with vehicle, power plant, and industrial emissions to form micro particulate pollution (PM2.5) that travels downwind easily.

Cities need to collaborate with higher levels of government on policies, regulations, and approaches to reducing emissions within their boundaries, as fuel quality standards are typically set by national policy. Urban infrastructure investments, which form the foundation for shifting people to low-emitting public transport, are typically financed by national and international sources.

Strategies to consider include multi-city airshed coalitions emerging as a voice in state and national policies, creative institutional design in which cities invest in emission reductions in surrounding areas as a cost-effective way to clean up their territory’s air, and cities starting to use their power as consumers to demand lower-pollution supply chains.
Unlike other regions, populations in cities in Europe and Central Asia are declining, with 61 percent of these cities losing an average of 11 percent of their population between 2000 and 2010. Urban population growth is increasingly concentrated in a fewer number of cities.207 On average, 67 percent of the region’s population lives in urban areas. Some of these cities are attempting to alleviate infrastructure stresses from economic migration, and they might need to find ways to mitigate the need for environmental migration in future.208

Cities with populations over 100,000 in Europe and Central Asia are vulnerable to the effects of climate change, including heatwaves, infection outbreaks, and air and water pollution.209 Municipalities in the region have significant autonomy as countries have decentralized and public investment decisions are increasingly made by local authorities.210 This gives city governments significant influence over low-carbon, resilient growth.211

Urban water management, solid waste management, urban transport, and social inclusion are development priorities for cities looking to grow in a sustainable manner. For example, Warsaw in Poland is moving away from coal-based heating and aims to supply 50 percent of its heat from gas, biomass, and waste-to-heat sources.
by 2020. Tashkent in Uzbekistan is working with private company Khizmatrasonnii Naglyi Sanitari to transform its solid waste management infrastructure with assistance from the European Bank for Reconstruction and Development (EBRD). The Greater Antalya Municipality in Turkey has committed to reducing its emissions by at least 20 percent by 2020 through its Sustainable Energy Action Plan, which covers energy-efficient buildings, improved solid waste and wastewater management, and the promotion of renewable energy. Cities in eight countries in the region, along with Jordan, are receiving support from the EBRD’s Green Cities Facility for climate-focused sustainable development, which has received an €87 million contribution from the Green Climate Fund to help cities develop and implement Green City Action Plans. The Green Climate Fund and the EBRD will work together to provide financing through concessional lending and investment grants, as well as technical assistance, as the first tranche in the €228 million Green Cities Facility.

Cities in the region are linking their climate targets with their urban development strategies. IFC estimates a climate-smart investment potential of $1.2 trillion in cities in Europe and Central Asia to 2030.
INVESTMENT SPOTLIGHTS

INTEGRATING GREEN INFRASTRUCTURE IN ATHENS (EUROPEAN INVESTMENT BANK)

The European Investment Bank (EIB) is providing a €55 million loan and technical assistance to Athens to help the city implement its resilience strategy for 2030, developed in cooperation with 100 Resilient Cities. The loan will support projects in different sectors and areas of the city, with technical assistance to ensure that these projects are resilient to the effects of climate change and reduce greenhouse-gas emissions. Examples of technical support include integrating energy-efficiency measures into the renovation of historic buildings and schools, redesigning public spaces and streets to reduce urban heat island effects, improving water infiltration and air quality, and creating green corridors for the city’s plants and animals.

GREEN SPACE IN VARNA (EBRD)

In 2018, the EBRD provided a €10.1 million loan to Varna in Bulgaria to help fund a €39.3 million project to invest in climate resilient infrastructure and establish paid parking zones in the city center. The project will also explore opportunities for privately funded climate-smart investment. The city will prepare a Green Cities Action Plan, address flooding by increasing storm water drainage capacity, and reduce fuel usage and improve air quality by installing electric vehicle charging stations and removing about 3,500 vehicles as a result of new parking zones.

PUBLIC TRANSPORT IN ANTALYA (IFC)

Antalya is one of Turkey’s most popular tourist destinations. To strengthen its sustainable future and respond to a population boom, the municipal government, with support from IFC, is investing in an 18km tram line that will connect the northern suburbs to the commercial center. IFC is spearheading a €140 million financing package for the tram line, including its own investment of €80 million. The remaining €60 million is being mobilized through the Managed Co-Lending Portfolio Program, which allows institutional investors to participate in IFC’s investments. The investment is coupled with comprehensive advisory support to help the city improve the efficiency, safety, and environmental and social performance of its public transport system. Once fully operational in 2021, the new line will reduce greenhouse-gas emissions by about 35 percent as congestion drops and there are fewer vehicles on the road. The system is expected to carry 25 million commuters a year, up from 13 million a year carried by the existing two-line tram system.

60 Climate Investment Opportunities in Cities
BIOMASS DISTRICT HEATING PLAN IN BANJA LUKA (EBRD)

In 2018, the EBRD provided an €8.3 million loan to Banja Luka, in Bosnia and Herzegovina, to provide working capital and finance for its minority stake (49 percent) in a newly created district heating company. The company, in partnership with a local private sponsor, developed a new 49 megawatt (MW) biomass boiler plant. Previously, Banja Luka’s district heating system was heavily reliant on heavy fuel oil, which, due to high prices, put pressure on the city’s finances. The EBRD’s loan helped the city introduce a private sector solution. It is envisaged that future dividends from the company will help to service the EBRD loan.

WASTEWATER TREATMENT PLANT IN IZMIR (IFC)

In Turkey, Izmir’s metropolitan municipality and municipal water utility needed to raise funds to expand the utility’s services in order to serve a considerably larger area. This area included districts with inadequate water supply facilities and households using septic tanks for human waste.

IFC formed a strategic partnership with the municipality and the water utility to implement high-impact infrastructure projects that support the large capital outlay needed and leverage innovative approaches to address emerging challenges. IFC’s engagement opened up opportunities to raise non-sovereign-backed financing for investment in wastewater treatment and disposal. IFC provided about €48 million on commercial finance terms to support investments in the water utility.

In addition to providing finance, IFC also provided technical recommendations based on its experience with private sector solutions for improving the operations and reducing the carbon footprint of wastewater treatment plants.
“Belgrade is keen to improve environmental sustainability and become a smart city. We are working with IFC to attract private sector investors through public-private partnerships and we plan to implement several projects under this model, including the Vinca waste-to-energy project. We are also working to improve the energy-efficiency of public buildings and to modernize the public transport sector. These projects will benefit the citizens of Belgrade but also serve as an example for other cities in Serbia and the region.”

— Zoran Radojicic, Mayor of Belgrade

Serbia’s capital Belgrade seeks to be “the smart city on the two European rivers”. Belgrade’s new urban development vision provides for the design and implementation of new urban regulations; development of rivers, waterfronts, and public spaces; deployment of new technologies; and adaptation to climate change. The city will apply for the European Green Capital Award in 2018, with support from Ljubljana in terms of knowledge transfer, to highlight its successes in sustainable mobility and transit-oriented development. IFC estimates a climate-smart investment opportunity of almost $5.5 billion in key sectors of Belgrade till 2030.
Mitigation and Adaptation Plans

In 2015, Belgrade adopted its Climate Change Adaptation Action Plan and Vulnerability Assessment, which is linked to various plans including the National Sustainable Development Strategy, the National Environmental Program, and the Development Strategy of the City of Belgrade.218 The Adaptation Action Plan presents a list of measures from the short term to 2025. It includes developing green infrastructure, reinforcing the city’s flood protection by reconstructing the embankment, implementing urban planning and regulations for green construction and extreme temperature management, and increasing water supply capacity.219

While a formalized mitigation target has not yet been announced, Belgrade’s Development Strategy prioritizes sustainable urban development that emphasizes the need for environmental sustainability across sectors.220 Belgrade seeks to achieve its strategic priorities by implementing new transportation, environmental, and spatial city policies, as well as introducing urban revitalization principles.221 A key tenet of this Development Strategy and the city’s Master Plan 2021 is to focus on transit-oriented development as the primary approach to urban planning. The targeted increase in the use of public transport is one example of the measures outlined in Belgrade’s urban development policies that will directly lead to the mitigation of the city’s greenhouse-gas emissions.

Although the city has not yet developed formal policies for water and waste management, it is inviting and financing such projects, signaling the opportunity for investment in these sectors. In addition to the $160 million investment opportunity in solid waste management till 2030, the city has worked with IFC on a $370 million waste-to-energy PPP that will begin construction by the end of 2018.222 In 2017, Belgrade also announced its intention to construct its first wastewater treatment facility, marking a significant shift towards better management of its water and wastewater sector, and creating positive climate-related benefits for the city.223 Belgrade’s water utility has applied to the EBRD for a loan to finance this project.224 The city has also contracted the construction and operation of a waste-to-energy facility for the collection and disposal of its waste through a PPP, discussed in further detail below.
**Priority Sectors for Investment**

**RENEWABLE ENERGY $740M**

Ranked second out of all Eastern European cities in Siemen’s European Green City Index, Belgrade’s electricity grid has a relatively high share of hydroelectricity. The city also fulfills some of its energy needs from other renewable sources, including biomass, geothermal, and solar energy. While the contribution of these sources to the city’s overall energy supply is still relatively small, there is huge potential to increase their installed capacity. To help meet Serbia’s commitment to the Kyoto Protocol, Belgrade will have to at least match Serbia’s target of reducing its emissions by 20 percent by 2020. Enhancing the contribution of these renewable energy sources to its energy supply will be integral to achieving this.

While much of the city’s energy supply and distribution is the domain of the national energy company, the city is responsible for its own district heating and is making efforts to increase its efficiency and decrease emissions. District heating metering is mandatory for all new buildings, built since 2012, and in all public buildings. Additional support and incentives are being considered for enabling the switch to metering systems in older residential buildings. Belgrade’s district heating company is already beginning to close down the city’s boiler stations, currently powered through a mix of heavy fuel oil and coal. While the immediate goal is to connect the city’s heating entirely to gas-fired plants, there is opportunity for Belgrade to increase the share of renewable energy to meet its heating, cooling, and electrification needs in the medium term. IFC is supporting Belgrade in preparing a pre-feasibility study for solar district heating including seasonal heat storage options to further explore this potential. In addition, the city has installed a pilot solar-powered electric vehicle charger and intends to power its electric vehicle infrastructure through renewable sources rather than coal-fired power plants.

According to IFC’s estimate, there is a climate investment opportunity of $740 million in Belgrade’s renewable energy sector to 2030.

**PUBLIC TRANSPORT $1.2B**

The city’s Development Strategy and Master Plan 2021 both emphasize the importance of transit-oriented development. Increasing the share of and access to public transport is a key policy objective. The Development Strategy’s proposed overhaul of the transport sector includes introducing the city’s first metro line, enacting pedestrian zones in the city center, and constructing bridges and bypass roads. The Master Plan 2021 prioritizes the development of a peripheral tangent road, the Belgrade Bypass, industrial parks along the bypass, and the Port of Belgrade. The $1.2 billion Belgrade light metro project has completed construction of line one, with lines two and three expected to be developed within the next few years. The project is expected to save an estimated 300,000 tons of CO2e over a decade. Belgrade also intends to develop a network of bike lanes and city bike systems, and promote sustainable mobility.

Buses are the most popular type of public transport, but the current fleet is old and requires upgrading. The city’s mayor has already announced the intention to buy 80 electric buses, up from the five that have been operating in the city since 2016, and electric vehicle chargers are being rolled out across the city in anticipation of an increase in electric vehicles on Belgrade’s roads. The private sector recognizes the city’s commitment to developing electric vehicle infrastructure and promoting the rollout of public and private electric vehicles. The Chinese company Yinlong has expressed interest in introducing its electric bus line in Belgrade as the city’s existing tram network can be adapted for its needs.

As part of the effort to achieve its smart-city objectives, Belgrade is also developing geospatial tools and data governance for the transport sector including e-cards and the central management of the public transport system. The city is using the EkoBus program to apply the internet of things to its transport sector as a testbed for the European Union-led SmartSantander project, which aims to support research.
and development into new technologies for the city. In this instance, the SmartSantander project uses public transport vehicles to collect and monitor a set of environmental parameters, including CO₂ and other emissions, and provides feedback to both the end-user and policymakers.235

To achieve Belgrade’s smart-city objectives and implement its transit-oriented development, IFC estimates that the city will require climate-smart investments till 2030 amounting to over $1.2 billion in public transport and almost $620 million in electric vehicles.

Belgrade is one of two deep-dive cities in the region for the Building Efficiency Accelerator public-private collaboration, which channels global expertise to help local governments implement building efficiency programs.236 In 2017, Belgrade launched its Energy-efficiency Fund, which is intended to support and encourage the city’s residents to upgrade the energy-efficiency of residential and commercial buildings.237 Structured as a revolving fund, with initial funding from the city itself and the intention to secure funding from commercial banks and international financial institutions, the fund will allow the city to assume all upfront financial liability for such upgrades, which will then be repaid by Belgrade’s residents over several years. The project is still at an initial phase and is expected to connect up to 75 percent of the city to energy-efficient district heating systems when fully operational. Such interventions will make a significant improvement to the city’s housing standards, where 40 percent of the 320,000 apartments connected to the central heating network do not meet basic standards.

The Belgrade district heating company has also launched the MOEEBIUS energy-efficiency project. The project is financed by the European Union fund Horizon 2020 and piloted in Belgrade, London, and Mafra. It aims to monitor energy-use patterns and offer solutions for green savings, and has also led to the development of an application to provide data and advice on energy consumption to the residents of Belgrade’s Stepa Stepanovic neighborhood.

IFC is using the Excellence in Design for Greater Efficiencies (EDGE) tool to improve the energy-efficiency of buildings in Belgrade. EDGE, a simple green building rating online software platform, helps developers and builders identify the most cost-effective ways to reduce energy use, water use, and embodied energy in materials. IFC has performed energy audits to assess the efficiency of public buildings in Belgrade, and used EDGE software to recommend energy-efficient solutions to the city.240 This engagement aims to identify opportunities related to buildings, district heating, street lighting, and other urban infrastructure, as well as to help create a plan for phasing in investments and improvements.241

To achieve Belgrade’s energy-efficiency and green building objectives, IFC estimates an investment opportunity of over $1.8 billion to 2030.

Financing and Policy Instruments

The city’s Development Strategy and Master Plan include land value capture tools, such as providing new land for buildings and development, encouraging higher urban density near transit nodes through business-commercial streets, providing special zoning ordinances related to distance to public transport, and supporting iconic city projects in special districts.242

The Development Strategy also focuses on developing policies and passing new regulations on PPPs, land-use according to new market demands, and new models of investment for the city’s priority projects.243 IFC has been advising Belgrade on structuring and implementing PPPs for waste management and wastewater treatment.244 One successful outcome of this engagement is the remediation of the Vinca waste-to-energy plant in Belgrade, for which IFC organized a tender through a 25-year PPP.245 The bid to construct the $370 million facility was won by the Suez Group in consortium with a subsidiary of the Japanese company Itochu.246