

THE CITY RESILIENCE PROGRAM

PPP scenarios in promoting low-carbon and resilient urban development

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Established in **June 2017**, the City Resilience Program (CRP) is a multi-donor initiative and partnership between the **World Bank**, the **Swiss State Secretariat for Economic Affairs (SECO)** and the **Austrian Federal Ministry of Finance**.

CRP aims at increasing financing for urban resilience while catalyzing a shift toward longer term, more comprehensive multi-disciplinary packages of technical and financial services, building the pipeline for viable projects at the city level that, in turn, build resilience.

The Program is built upon 3 strategic Pillars:



CRP SUPPORT TO CITIES AROUND THE WORLD



THE RESILIENCE CHALLENGE IN CENTRAL ASIA

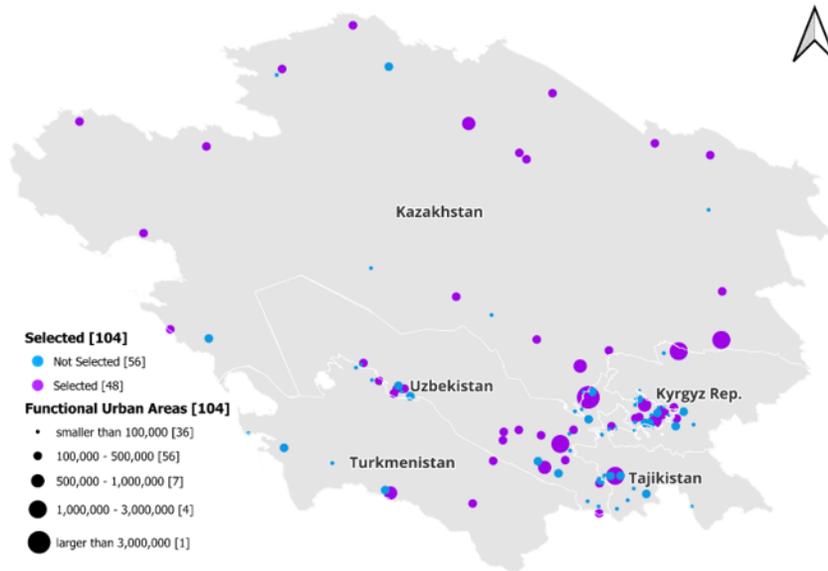
- ❑ Urban infrastructure is becoming increasingly stressed by natural disasters, climate change and other threats
- ❑ The resulting lack of adequate infrastructure and land use planning exacerbates the risks to which urban dwellers are exposed
- ❑ Cities need to increase their investment in infrastructure but face financing and implementation (planning/ capacity) constraints
- ❑ Central Asian countries—Kazakhstan, Uzbekistan, Kyrgyz Republic, Tajikistan, and Turkmenistan—are heavily reliant on carbon-based energy, with many cities ranked among the world's most polluted
- ❑ Cities in Central Asia, such as Almaty (Kazakhstan), Bishkek (Kyrgyzstan) or Dushanbe (Tajikistan), are experiencing rapid population growth and urbanization.



INTRODUCTION

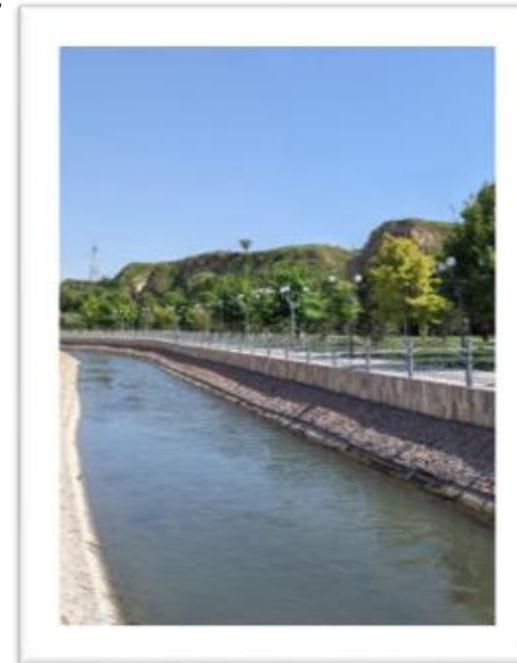
Sources

- Reports to identify mitigation and resilience focused priority investments for selected cities, ideally with the potential to mobilize private sector investment.



Objectives

- Identified current challenges and opportunities in Central Asian cities.
- Suggested policies for low-carbon, resilient urban development.
- Recommended investments and policy options for five cities: Almaty, Bishkek, Dushanbe, Namangan, and Shakhrisabz.



ALMATY, KAZAKHSTAN

CHALLENGES:

Almaty faces significant challenges related to sustainable development and climate resilience. The city is highly affected by the urban heat island effect, leading to increased heat waves. Additionally, Almaty experiences frequent floods and has limited green spaces and public areas, which are not easily accessible. Waste management is another issue, with low-grade waste processing and a high rate of open dumping.

Proposals:

- Developing multifunctional green corridors to provide green spaces and mitigate the urban heat island effect.
- Building a biogas facility to improve waste management and produce renewable energy.
- Electrifying the waste collection fleet to reduce emissions and improve air quality.



BISHKEK, KYRGYZSTAN

CHALLENGES:

Bishkek faces significant urban resilience and sustainable development issues. The city provides only 4.5 square meters of green space per inhabitant, which is much lower than the regional average. Additionally, less than 1% of the population has walkable access to public amenities. Over 10% of the population is exposed to the urban heat island effect, and around 7% is at risk of floods.

Proposals:

- Creating green corridors to increase the availability and accessibility of green spaces.
- Expanding the existing hybrid trolleybus network to provide sustainable transportation options and reduce emissions.



NAMANGAN, UZBEKISTAN

CHALLENGES:

Namangan is one of the fastest-growing cities in Uzbekistan, experiencing a significant shortage of urban services and amenities. These services have low accessibility and are often overburdened. The city is also facing increasingly hot summers, making the need for green public spaces more critical.

Proposals:

Developing a multifunctional center that integrates a secondary school, a semi-public library, shared sports halls, open public spaces, and a community and cultural center.



DUSHANBE, TAJIKISTAN

CHALLENGES:

Dushanbe is a rapidly growing city with significant infrastructure strains and insufficient urban amenities. The city faces a critical shortage of secondary education institutions, which are struggling to keep up with the increasing student population. Other amenities, such as cultural, sports, and green areas, also have low pedestrian accessibility.

Proposals:

Constructing two school-based multifunctional centers to provide additional educational facilities and enhance accessibility to cultural and sports amenities.



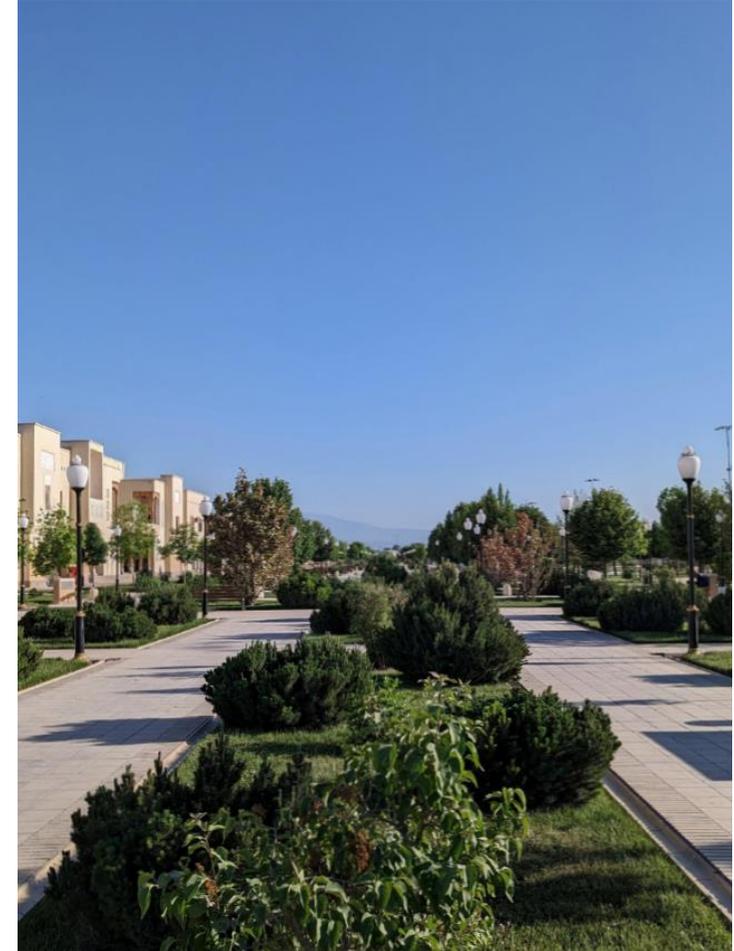
SHAKHRISABZ, UZBEKISTAN

CHALLENGES:

Shakhrisabz faces multiple urban challenges, including a severe lack of green public spaces and a heavy dependence on fossil fuels for energy, leading to an unstable energy supply.

Proposals:

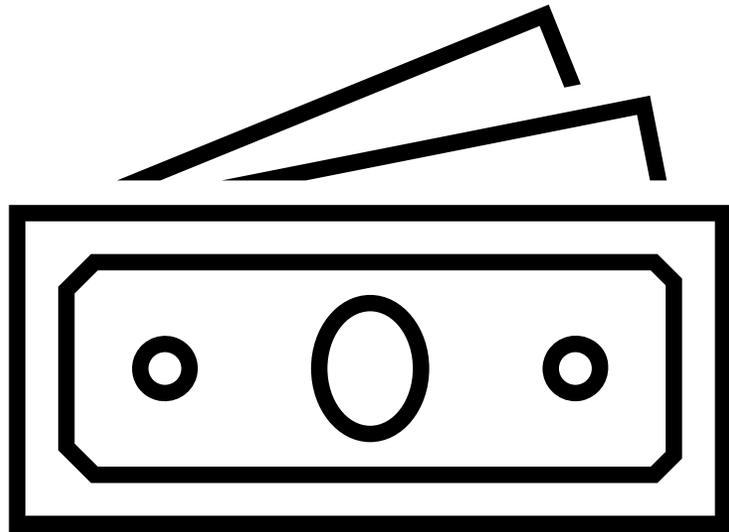
- Developing multifunctional green corridors to provide green spaces and recreational areas.
- Installing rooftop solar PV systems to diversify the city's energy sources and increase energy stability.



How often do you think about how to pay for an investment in your everyday work?



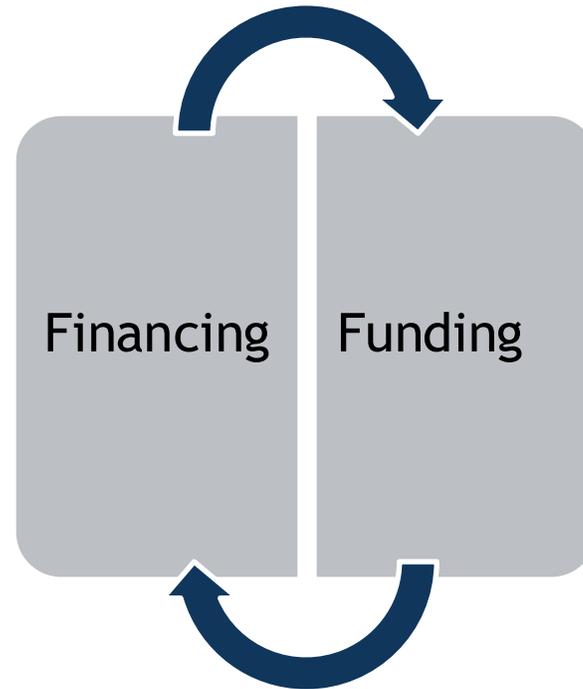
NAVIGATING FINANCIAL FEASIBILITY



- The study also reached an important conclusion: the cost of investing in these is no more than the cost of dealing with the impact of not doing so.
- There is, however, a more short term, practical issue in that, although the investments make economic sense and do not, per se, cost more, they do require cash in order to get built and then be operated correctly.

HOW TO FINANCE/FUND IT?

- Financing being how to finance a project (ex: green bonds) and funding how to make viable.
- If the project is economically viable, securing financing won't be a major hurdle.



FUNDING

User fees

- Private partner collects revenues directly from users.

Availability payment

- Government pays private partner for services.

Land Based Revenues

- Land value capture is a set of policy instruments that enables governments to share in the economic value generated as a result of public interventions.

Public budget

- Public sector funds used to build and maintain city facilities and services.

Monetizable cost savings

- Reduction in expenses that can be directly converted into increased profits or financial benefits.

FUNDING

User fees

Private partner collects revenues directly from users

Users pay private partner

Transfer of revenue risks

Transfer of performance risks

USER FEES

- Example: Hybrid trolleybus (Bishkek)

Investment costs of hybrid trolleybuses system for 50 km network			
Budget breakdown	Units	Unit price, USD	Total cost, USD
Items			
Rolling stock	78	280,000	21,840,000
Infrastructure (feed-in catenaries, substations, charging stations)	For 78 hybrid trolleybus units	120,000	9,360,000
Subtotal I			31,200,000
Works: fleet and infrastructure preparation (Assumed 20%)	-		6,240,000
Subtotal II	-		37,440,000
Contingencies (5%)	-		1,872,000
Total	-		39,312,000

Item	Indicator	Annual O&M expenditures
		USD/year
78 units maintenance (including battery replacements)	7,000 USD/unit/year	546,000
Infrastructure maintenance	6,500 USD/unit/year ²⁴	507,000
Electricity consumption	-	195,000 (+7.5% annually)
Labor (tax excluded)	-	471,744 (+7.5% annually)
Total	-	1,719,744

USER FEES

- Example: Hybrid trolleybus (Bishkek)

Name	Quantity	Units	Price per unit, USD	Total receipts for 1 st year, USD
Financial and economic benefits				
Fares	12,600,000	Trips	0.22	2,772,000
Employment benefits		-		52,416
Total financial				2,824,416
Additional economic benefits				
CO ₂ reduction due to modal shift	16,535	tCO ₂	44.3	732,501
Health benefits from electric transition	2,835,000	km	0.00873	55,565
Total economic				788,066
Total benefits				3,612,482

USER FEES

- Example: Hybrid trolleybus (Bishkek)
- Case:
 - Yearly trips: 12.6 millions
 - Present fares 0.22 USD/trip
 - Future fares:0.2687USD/trip
- CO₂ reduction from car:
 - Avoided emissions from private cars will equal 24,822 units *
 $8.58 \text{ km} * 300 \text{ days} * 148.4 \text{ gCO}_2/\text{km} / 1,000,000$ (gram to ton conversion factor) = 9,482 tCO₂ annually.
- The social return (ex: noise)

AVAILABILITY PAYMENT

- Government assumes part or all of the demand / performance risk.
- These payments could be:
 - Usage-based
 - Based on availability
 - Based on achieving certain milestone

LAND VALUE CAPTURE

Leveraging public real assets	Disposition (sale or lease) of excess/underutilized public assets (land, property) for cash that is re-invested in local infrastructure.
Development charges	Developer receives development rights (or tenure rights in land, or approval of land use changes) in exchange for obligation to compensate in cash (or provide in-kind) the cost of certain items of public infrastructure benefitting larger area.
Sale of development rights	Development rights or certificates of additional density are sold for cash to finance infrastructure improvements.
Land pooling /readjustment	Land owners or occupants voluntarily contribute part of their land for infrastructure development and for sale to cover some project cost. In return, each land owner receives a serviced plot of smaller area with higher value within the same neighborhood.
Special assessments/ betterment levies	Locally administered tax increments (property taxes, sales taxes, etc.) that generate additional tax revenues for re-investment in local infrastructure.
Tax increment financing	Capturing increases in property/land tax base (after infrastructure upgrades) and using such incremental tax proceeds as collateral and refinancing source for infrastructure loans.

LAND VALUE CAPTURE

- Example: Green corridor (Shakhrisabz)
 - **Initial Investment:** The city invests in creating the green corridor.
 - **Increase in property values:** The presence of the green corridor makes nearby properties more desirable. People are willing to pay more to live or do business close to these green spaces.
 - **Capture Mechanism:** The city implements mechanisms like special assessment districts, tax increment financing (TIF), or impact fees. These tools help capture the increase in property values and funnel that money back into paying for the green corridor. The revenue generated from this levy helps pay back the initial investment or fund further enhancements

LAND VALUE CAPTURE

- Example: Green corridor
 - Studies suggest that they can add up to 19.2% to initial market value of the properties within 500 m buffer.
 - Scenario: 2.5% increase within 100 m buffer.
 - The total property area reaches 851,018 m².
 - Average property price in Shakhrisabz: 200 USD.
 - If 2.5% increase is applied: 4,255,090 USD benefits to economy.

FUNDING

Public budget

Public sector funds used to build and maintain city facilities and services.

Complete controle

Public ownership

Public risk bearing

PUBLIC BUDGET

- Example: Multifunctional social infrastructure (Namangan)
 - Avoided trips
 - Ensure access to services for 6,200 in walking distance.
 - 66% of mahalla (Namangan district) population travel to urban amenities destinations.
 - On non-working days, 100% of the mahalla population is assumed to visit multifunctional centers.
 - The motorization rate in Namangan Region is 60.7 vehicles per 1,000.
 - One average car carries 1.4 persons.
 - total avoided emissions will reach 2.05 tCO₂ daily during workdays and 2.64 tCO₂ daily during non-working days, leading to total 813.15 tCO₂ annually which results in 37,080 USD considering 45.6 USD/tCO₂

FUNDING

Monetizable cost savings

Reduction in expenses that can be directly converted into increased profits or financial benefits

Measurable Financial Impact

Sustainability and Recurrence

Operational Efficiency

MONETIZABLE COST SAVINGS

- Example: Biogaz facility (Almaty) / Waste landfill

Name	Quantity	Units	Price per unit, USD	Total receipts for 1 st year, USD
Financial benefits				
Gate fees	1,167,600	m ³	0.822	959,767
Electricity sales	41,360	MWh	71.66	2,963,621
Heat sales	58,954	Gcal	10.94	644,957
Fertilizers sales	2,800	m ³	12	33,600
Total financial		-		4,601,945
Economic benefits				
Avoided emissions compared to open landfilling	585,095	tCO _{2eq}	44.3	25,919,710
Emissions reduction compared to traditional power generation	75,194	tCO ₂	44.3	3,331,094
Tax benefits	-	-	-	608,167
Social benefits (monetized difference per MWh)	41,360	MWh	31.08	1,285,470
Total economic		-		31,144,441
Total benefits				35,746,386

Which could have most potential in the cities where you work or live to help support climate investments?



Thank you

