

Bishkek Urban Transport Electrification Project



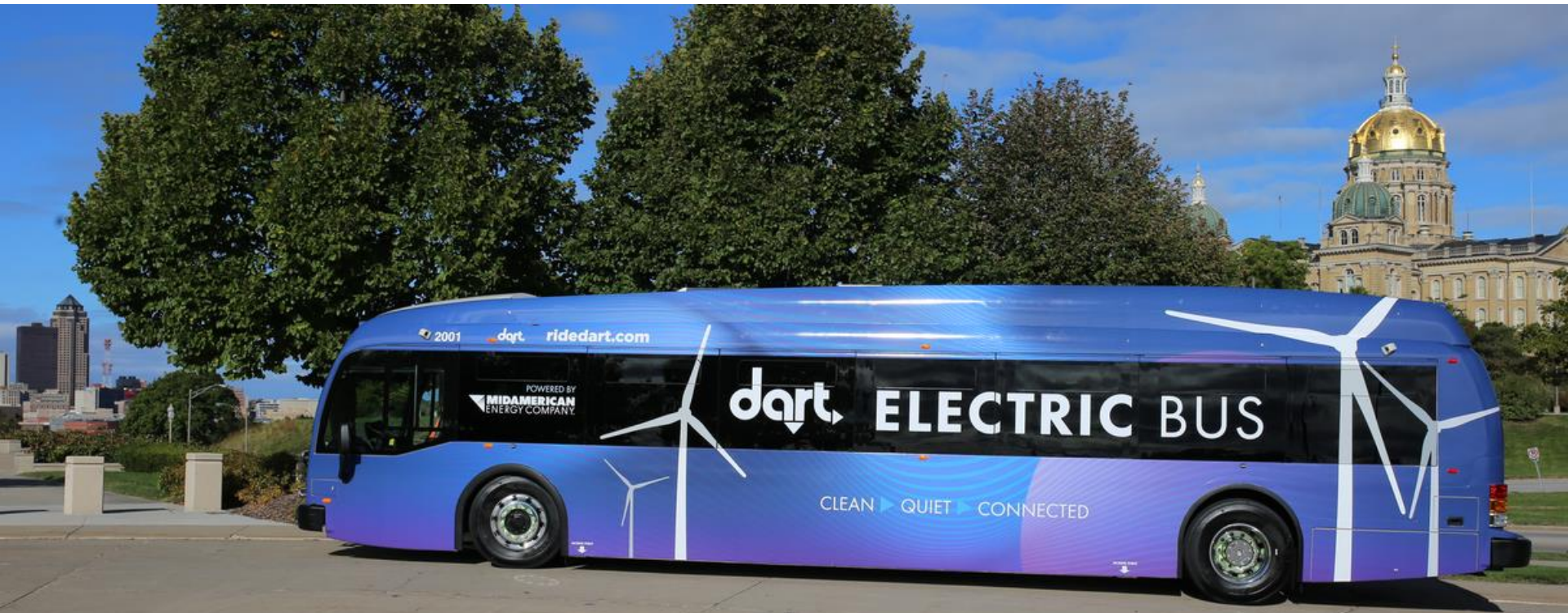
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Development Challenges



Project Component 1: E-Bus Fleet and Charging Infrastructure

- ✓ Fleet of 120 battery electric buses
- ✓ Procurement of 50 (100kW) and 35 (300kW) chargers
- ✓ Three-year spare parts and maintenance plan
- ✓ Power substations and electrical works
- ✓ Tow vehicle



Project Component 2: E-Bus Depot Facility

- ✓ Weather-protected parking
- ✓ Professional repair and maintenance area
- ✓ Pavement works



Project Component 3: Pilot Green Mobility Corridor

- ✓ Dedicated bus corridor and weather protected stations
- ✓ Traffic signal synchronization
- ✓ Quality pedestrian and bicycle facilities



Project Component 4: System Management and Operations

- ✓ Institutional support for Bishkek Municipality, Trolleybus Company, and Traffic Police
- ✓ Network operations optimization
- ✓ City parking strategy



Proposed Technology

- ✓ BEBs equipped with up to 350 kWh fast-charged batteries
- ✓ 300 kW chargers can charge the bus in 20 minutes for additional 100km of range
- ✓ Average usage of BEBs 16 years, with 1x battery replacement (after 8 years)



Project Benefits - Technical

- ✓ 60% lower less electricity usage compared to current trolleybus and 4 times more energy efficient compared to existing internal combustion buses
- ✓ Compared to trolleybuses no costly renewal of catenary infrastructure required
- ✓ Route flexibility and no dependence on trolleybus catenary infrastructure
- ✓ Different to trolleybuses, BEBs only use power during off-peak times (i.e. between 12AM-4PM or 11PM-5AM – Thus no stress on grid and less risk of power outages in Bishkek)



Project Benefits – Energy Security

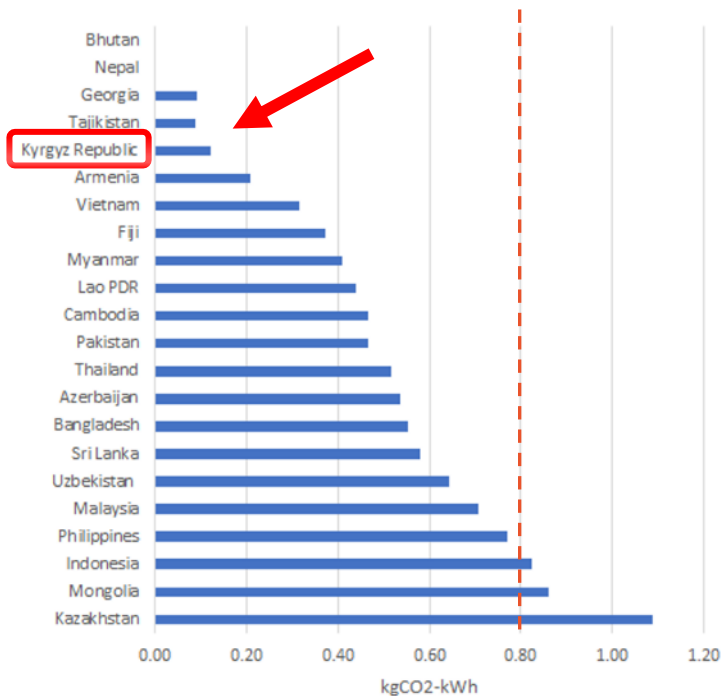
- ✓ Usage of clean national resources and decreased dependency from fossil fuel imports
- ✓ Decreased exposure to price fluctuations on international oil and gas markets



Project Benefits - Environmental

- ✓ Air Quality Improvement (no pm2.5 and NOx emissions)
- ✓ 90% Greenhouse gas emission reductions due to very low carbon grid factor of power system
- ✓ Battery-electric bus lead to 50% noise reduction

Grid Factor of selected countries in 2019 (kgCO₂e/kWh)



Project Benefits - Financial

- ✓ High CAPEX
- ✓ Battery-electric buses have 1/3 lower operational expenditures and resulting in lower total cost of ownership in USD/km

Financial Comparison of Technology Alternatives (all values in constant USD of 2019):

Item	Diesel	CNG	Hybrid Trolley	Conventional Trolley	Slow-charged BEB	Fast-charged BEB
Capital expenditure (CAPEX) Bus	120,000	140,000	250,000	150,000	300,000	250,000
CAPEX Trolley Infrastructure / Chargers	0	0	119,000	180,000	26,000	38,000
Replacement battery cost (yr. 8)	0	0	6,000	0	58,000	28,000
Energy cost per year	19,500	15,600	2,400	2,400	2,200	2,000
Maintenance costs (bus and infrastructure)	3,500	4,200	6,100	5,900	2,400	2,500
Finance cost (years 1-8)	1,600	1,800	3,400	4,300	4,300	3,800
Ave. annual operational expend. (OPEX), non-discounted	23,900	20,900	10,200	10,400	6,700	6,400
Total Cost of Ownership per km, non-discounted (\$/km)	0.46	0.44	0.46	0.41	0.44	0.37



Project Financing

Financing Plan	
Source	Amount (\$ million)
Asian Development Bank	
Concessional Loan (COL)	25.00
Special Funds Resources (ADF grant)	25.00
Cofinancing	
High-Level Technology Fund	0.65
Government contribution	8.90
Total	59.55

Project Alignment

ADB Energy Policy 2021 and ADB Strategy 2030

ADB Energy Policy 2021

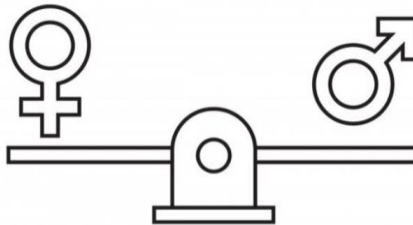
- ✓ Provide support to its DMCs to tackle climate change, enhance environmental sustainability, and build climate and disaster resilience.
- ✓ Deployment and transfer of technological innovation
- ✓ Increasing the share of electricity in the total final energy consumption
- ✓ Promoting battery-electric vehicles to decarbonize the transport sector

ADB Strategy 2030

- ✓ Operational Priority 2: Accelerating progress in gender equality
- ✓ Operational Priority 3: Tackling climate change, building climate and disaster resilience, and enhancing environmental sustainability.
- ✓ Operational Priority 4: Making cities more livable
- ✓ Operational Priority 6: Strengthening governance and institutional capacity

Gender Alignment

- ✓ Designated seats for women
- ✓ security features such as panic buttons and onboard CCTV cameras in buses
- ✓ an information campaign against violence against women,
- ✓ training of bus drivers on conduct in cases of violence, sexual harassment and crimes against women
- ✓ quota for female bus drivers (20%) and bus technicians (40%); and
- ✓ sufficient space for baby strollers



Future Projects

- ✓ Phase II planned for 2025
 - ✓ Consideration to non only support battery-electric large and minibuses
- ✓ Similar projects are planned and considered in Tajikistan, Georgia and other countries.





Transforming Bishkek



Thank you