United Nations Development Programme
Country: Kazakhstan
PROJECT DOCUMENT

Empowered lives.
Resilient nations.

Project Title:	City of Almaty Sustainable Transport
UNDAF Outcome(s)/Indicator(s):	By 2015, communities, national and local authorities use more effective mechanism and partnership that promote environmental sustainability and enable them to prepare, respond and recover from natural and man made disasters.
Expected Outcome(s)/Indicator(s):	Outcome 2. The Government, industries and civil society take steps to adapt to climate change and mitigate it's impact through energy efficiency measures and climate change adaptation policies.
Expected Output(s)/Indicator(s)	Outcome 2.3 The Government and energy consumers are better equipped with knowledge, policies and pilot cases on renewable energy market regulations and energy efficiency measures in sectors with high CO2 emission level.
Expected CPAP Outcome(s):	The Government, industries and civil society take steps to adapt to climate change and mitigate it's impact through energy efficiency measures and climate change adaptation policies.
Expected CPAP Output (s):	Improved regulations and practices developed for Public Transport in the City of Almaty.
Implementing agency:	Municipal Government of Almaty/ Department of Passenger Transport and Road (DPTAR) under the Municipal Government of Almaty

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Brief Description

The objective of the project is to reduce the growth of the transport-related greenhouse gas emissions in the City of Almaty, while simultaneously improving urban environmental conditions by 1) improving the management of public transportation and air quality in Almaty; 2) building capacity in Almaty to holistically plan and implement improvements in the efficiency and quality of public transport; 3) building capacity to holistically plan and implement integrated traffic management measures in Almaty City; and 4) implementing a demonstration project that raises awareness and increases knowledge of sustainable transport.

Programme Period:	2011 - 2015	
Atlas Award ID:	00060598	
Project ID:	00076355	
PIMS #	3757	
Start date:	20 June 2011	
End Date	20 June 2016	
Management Arrangements	NIM	
PAC Meeting Date	22 Oct 2010	

Total allocated resources:	
• GEF	$ 4,886,000
• EBRD	$ 45,726,000
• IFC	$ 700,000
• UNDP	$ 50,000
• Almaty City Admin	$ 30,050,000
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	$ 81,412,000

Agreed by (Government):
_____
Date/Month/Year

Agreed by (Executing Entity/Implementing Partner):
_____
Date/Month/Year

Agreed by (UNDP):
_____

Date/Month/Year

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ACRONYMS

Acronym	Meaning
ADB	Asian Development Bank
BAU	Business-as-usual
BRT	Bus rapid transit
CAST	City of Almaty Sustainable Transport Project
CDM	Clean Development Mechanism
CERs	Certified Emissions Reductions
CP	Country Programme
CPAP	Country Programme Action Plan
CSR	Corporate social responsibility
DPTAR	Department of Passenger Transport and Automobile Roads (under the Municipal Government of Almaty)
EBRD	European Bank of Reconstruction and Development
EE	Energy Efficiency
EIAs	Environmental Impact Assessments
EMPs	Environmental Management Plans
GEF	Global Environment Facility
GHG	Greenhouse Gases
GJ	Gigajoules
GoK	Government of Kazakhstan
HOV	High occupancy vehicles
IFC	International Finance Corporation (of the World Bank Group)
ITM	Integrated traffic management
LRT	Light rapid transit
MDG	Millennium Development Goals
MoEP	Ministry of Environmental Protection
MoF	Ministry of Finance
MoIPSI	Ministry of Industry and Trade
MoEMR	Ministry of Energy and Mineral Resources
MTDF	Medium Term Development Framework
NIM	National implementation modality
NGOs	Non Government Organizations
NMV	Non-motorized vehicles
PDD	Project design document
PMO	Project Management Office
Pro-Doc	UNDP Project Document

Acronym	Meaning
SMEs	Small and Medium Enterprises
SUT	Sustainable urban transport
TDM	Transport demand model
TJ	Tera joules
ToE	Tonnes of oil equivalent
ToR	Terms of Reference
UNDP	United Nations Development Programme
WB	World Bank

1. SITUATION ANALYSIS

Context and Global Significance

1. Since independence in 1992 and throughout 1990s-2000s, Kazakhstan has experienced a period of robust economic growth, rising personal incomes and massive inflow of migrant workers from rural areas and neighbouring countries. The primary impacts of this economic growth in Almaty as well as other cities of the former Soviet Union are:
    o growth of urban sprawl of these cities, and the rapid increase in the use of private motor vehicles for urban transport;
    o large increases in traffic congestion in these cities particularly during peak hours; and
    o irregular development of public transport and an associated deterioration in the quality of service delivery.

2. Kazakhstan is the largest GHG emitter in Central Asia with annual emissions of 243 MtCO2e[1]. The transport sector is its fastest growing source of CO_2 emissions projected to increase from 9 $MtCO_2$/yr in 2008 up to 22 $MtCO_2$/yr in 2012 and 36 $MtCO_2$/yr in 2020[2]. A significant share of transport emissions is associated with ground transportation in the former capital city of Almaty, the largest and most densely populated city in the country with a population of 1.6 million[3]. Its population is expected to exceed the 2 million threshold in the next 3 to 5 years. Despite losing its capital status, Almaty remains the major commercial and industrial center of Kazakhstan[4] contributing 22% to the national GDP and is rapidly transforming itself into Central Asia's regional financial and business hub. In 2011, Almaty will host the 7th Winter Asian Games and is preparing a bid to host 2018 Winter Olympic Games.
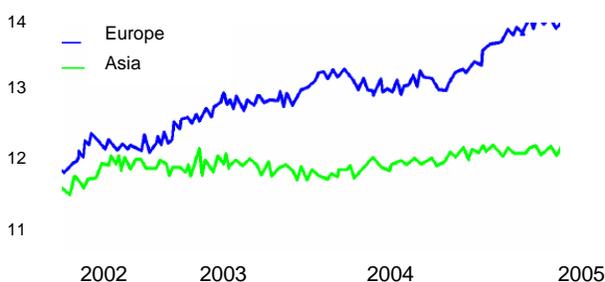
Fig 1: Average Age of Vehicles

3. In Almaty, there are currently more than 500,000 vehicles registered. According to local authorities, there is an average of another 200,000 vehicles that enter the city from outlying Almaty Oblasts during working hours. Based on motor vehicle growth trends of other cities of Europe and Central Asia, further increases in private car ownership are expected in Almaty. The growth of vehicle population in Kazakhstan and Almaty since 2003 is shown in Table 1. Vehicle growth is primarily associated with the increased number of inefficient second-hand cars from Europe and Asia; the average age of registered vehicles in Almaty is 10 - 14 years with almost 80% of the fleet being more than 7 years old as shown on Figure 1. Car ownership in Almaty is three times the national average as indicated on Table 2. In Almaty in 2008, there were about 340 vehicles per 1,000

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[1] Data for 2005, source 2nd National Communication of the Republic of Kazakhstan to the Conference of Parties of UNFCCC

[2] Second National Communication of the Republic of Kazakhstan to the Conference of Parties of UNFCCC

[3] Preliminary results of the 2009 Population Census, Agency of Statistics of RK

[4] Law on special status of Almaty as scientific, cultural, historical, financial and industrial center as of June 1, 1998

inhabitants compared to only 64 vehicles in 1995; the total number of private vehicles is expected to grow from current estimate of 500,000 up to 850,000 by 2020.

Table 1: Growth of Car Ownership in Kazakhstan

	Total Car Population ('000s)						
	2003	2004	2005	2006	2007	2008	2009
Kazakhstan (Total)	1149	1204	1405	1705	2183	n/a	n/a
Almaty	218	200	255	341	450	500	523

Table 2: Car Ownership per Inhabitant in Kazakhstan

	Car Ownership per 1,000 Inhabitants						
	2003	2004	2005	2006	2007	2008	2009
Kazakhstan (Total)	73	76	86	107	132	n/a	n/a
Almaty	180	161	191	251	321	340	377

4. According to Kazakhstan Research Institute of Transport and Communications, 70% of registered vehicles badly exceed emission standards. Catalytic converters are often being destroyed or removed from imported cars to allow the use of leaded petrol. The Balkhash-Alakol Department of Ecology reports that in the testing of the quality of fuel, 40% of liquid fuel samples failed to meet standards.

5. Moreover, estimates of CO_2 emissions from the transport sector in Almaty have grown from an estimated 2.3 million tonnes in 2003 to 5.2 million tonnes in 2008[5]. Using the annual growth factor of 18% for motor vehicles in Almaty from 2003 to 2008, a business-as-usual (BAU) approach to urban transport in Almaty will result in a steady increase in CO_2 emissions of 16.8 million tonnes by 2015 and 24.0 million tonnes by 2020. The main sources of GHG emissions from Almaty motor vehicles have been and will consist of the products of combustion from gasoline and diesel fuels.

6. With the municipality's intent to implement their strategic plan[6], Almaty municipal officials have sought foreign technical assistance to develop the strategic directions of the Plan and receive implementation guidance. The strategic directions of the Plan strongly align with GEF OP-11 priorities for the increased use of sustainable lower carbon emitting urban transport modes in Almaty. A GEF OP-11 project will also have the potential to leverage local and federal government allocations as well as direct domestic and foreign investments towards the municipality's vision of an improved urban transport situation and an enhanced image of Almaty as a modern business, cultural and tourist center for Kazakhstan and the Central Asian region.

Threats and Root Causes

7. The road network of Almaty has not grown since 1990 when the municipality estimated the number of cars in Almaty to be 100,000; in 2009, their estimate of cars in Almaty is 523,000, 5 times the number from 1990 without any growth of the road network in

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[5] Estimates from various transport documents from the Municipality

[6] Strategic Plan 2010-14 for City of Almaty, DPTAR, 2009

Almaty. With the projected growth in the number of cars in Almaty without any more planned increases in its road network, traffic conditions in Almaty will increase in intensity by an average of 7% annually, resulting in traffic congestion notably during business hours. In 2010, Almaty City planned a number of construction projects to improve traffic flows including traffic circles at ten busy intersections, an improved road from Kulzhinskogo to the new Almaty airport terminal, a new bypass highway east of Almaty, and new roads for housing estates that includes Duman, Aigerim, Kalkaman, Darkhan and Altyn Besik. This, however, has not increased the road capacity of key corridors throughout Almaty City.

8. Traffic congestion has been manifested by:

   - large increases in car traffic beyond the capacity of most city roads;
   - the reduction of available road space from unsupervised parking of vehicles along roadways and vehicles slowing down to search for parking spaces; and
   - the lack of synchronized lighting that increases waiting times at key intersections and inter-city trip times.

   This results in decreasing travel speeds cause road congestion and "stop and go" manoeuvring and higher GHG emissions. The impact of poor fuel quality, a fuel inefficient and aged car fleet, traffic congestion and poor road management is visible air pollution; since Almaty is located in a valley against the backdrop of 4,000 meter mountains, smog accumulates above the city on a regular basis due the inversion effects.

9. The viable alternative to private cars should be public transport. Unfortunately, Almaty's public transport has evolved into a system that does not provide for comfort, convenience and efficient services to commuting passengers. Almaty's public transport system was once owned by the government. Today, oversight to Almaty's public transport is provided by the municipality under the "Department of Passenger Transport and Automobile Roads" (DPTAR). Currently, almost all public transport has been privatized; only electric transport (i.e. trolleybuses and trams) is still owned and managed by the municipality under *Almatyelectrotrans,* a public utility company. Their service, however, is unable to compete with individual cars and private bus operators. As a result of its continuously shrinking client base, *Almatyelectrotrans* suffers from the lack of finances leading to degradation of vehicles, infrastructure and service. This includes decreases in the number of trolleybuses to 186 (from 413 in 1991), the number of trams to 49 (from 198 in 1991), the length of trolleybus and tram lines by 25% and 50% respectively, and the number of service routes from 20 to 9 for trolleybuses and from 10 to 2 for trams.

10. For the privatized portion of Almaty's public transport, DPTAR normally issue 3- to 5-year licenses through a tender to provide public transport services. In 2008, there were over 118 privatized bus routes using an estimated 1,875 buses. DPTAR provides orders to close unprofitable routes or reroute them. Peak passenger demand loads are managed through the leasing of an additional 600 buses. Bus fares throughout the city's privatized buses, however, are uniform (with an adult fare being 50 Tenge or USD 0.30) with concessionary fares available for students, pensioners and families with military service distinctions. It is highly probable that this fare does not cover the cost of operating these buses, and as a consequence, Almaty's public transit has evolved into a system characterized by:

- poorly maintained aged vehicles;
- overcrowding especially at peak hours that allows bus operators to maximize profits;
- lack of services in off-peak hours;
- poor mobility on roads due to traffic congestion and lack of priority for buses; and
- a lack of cleanliness on board.

11. These complaints, however, remain unaddressed by private bus operators, while the municipality lacks control and enforcement mechanisms to ensure compliance of operators with technical and safety regulations and schedules. This includes a lack of contract monitoring mechanisms and proper budgeting practices based on needs on the system to provide quality public transport services. As a consequence to deteriorating public transport services, there are modal shifts away from public transport to private car transport modes with the share of passengers on Almaty public transport significantly decreasing. Distribution of transport modes in Almaty is shown on Figure 2.
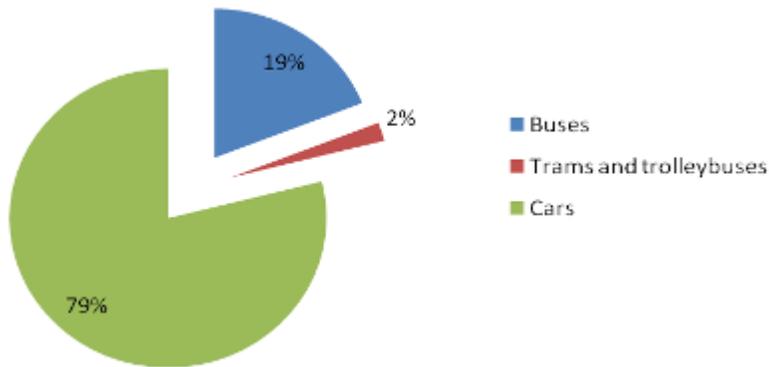
Fig. 2: Share of Various Transport Modes

12. The municipality through DPTAR has made attempts to respond to the deterioration of the quality of city life and economic losses from traffic congestion. In addition, it has also attempted to alleviate poor urban mobility in concert with the growth of Almaty city to the extent possible within its budgetary limitations. For example, the municipality introduced measures in 2005 to ameliorate the situation in public transport by:

- reducing the number of private carriers from 46 to 21 by giving preference to large and financially sustainable companies;
- reducing the number of buses from 3,500 to 2,000 by having private operators substitute microbuses and *marshrutkas* for buses with higher load capacity;
- abolishing some duplicating and marginally profitable routes; and
- introducing e-cash payment system and GPS-control in the electric transport along certain trolley and tram routes.

13. Despite these efforts, public transport sector in Almaty continues to be inefficient, poorly organized and of low quality. One metro line was planned for completion in 2010 but is likely to be delayed due to high capital costs and lack of available municipal finances. The municipality is also considering upgrades to tram routes and upgrading their tram system to a light rail transit (LRT) system along Tole-Bi Avenue to improved standards seen in other cities such as Istanbul; EBRD are currently providing the municipality with feasibility study support for a system with 150 to 250 passenger vehicles with a capacity of 77,200 passengers per day.

14. One serious competitive issue for public transport is the illegal operation of "shadow taxis". Shadow taxis are unregulated alternatives to public transport whose drivers and owners operate without insurance, vehicle inspections and any set fares. Legal taxis are managed by 10 companies with a total of 489 vehicles, all equipped with radios. In 2009, the municipality has been considering increasing the number of legal taxis to 1,800 to curb the growth of shadow taxis. This effort, however, is undermined by weak regulatory action to discourage the operation of shadow taxis who would continue to prosper by lowering their fares below set fares by the municipality. Moreover, shadow taxis will also continue to contribute to the overall traffic congestion in Almaty City.

Barrier Analysis

15. Notwithstanding large investments made by the municipal government on modernizing urban transport in Almaty City, the city still does not have an operational modern urban transport system. Key barriers and issues to modernizing urban transport in Almaty include:

- <u>Weak institutional coordination to develop a sustainable urban transport system and manage air quality management in Almaty City</u>: An institutional plan is required to coordinate and develop SUT and to monitor and manage transport-related GHG and other air pollution emissions. The roles and responsibilities of various government agencies need to be clarified and agreed upon to facilitate the development of SUT in Almaty, and to build municipality capacity to implement an SUT system and measure its related environmental impacts and resultant reductions in air pollution and GHG emissions;
- <u>Lack of capacity to holistically plan and implement improvements in the quality of public transport services.</u> Past efforts to implement sustainable transport measures have been done in isolation to the extent that the current urban transit system is not well integrated in terms of convenient bus routing and fare collection (different fare payments must be made to board each bus route). Without the capacity to holistically plan a sustainable urban transport system, the municipality will continue development of their other systems such as LRT and trolleys in isolation, thereby increasing the probabilities that there will be no modal shifts towards the new investments in new public transport;
- <u>Lack of capacity to holistically plan and implement integrated traffic management measures</u>: Past attempts to improve traffic management have involved the construction of additional roads, overpasses and ad hoc measures. The municipality, however, has an urgent need to plan and implement measures to increase the availability of existing road space and improve the efficiency of traffic flows. Without increasing available road space and synchronizing traffic signals, investments into public transport improvements will not be effective;
- <u>Low awareness of sustainable urban transport</u>: Most citizens and municipal officials are unaware of sustainable transport measures and concepts especially existing transport operators. More importantly, with little or no outreach to existing urban transport operators to discuss alternatives to the current urban transport scenario, they are likely to view new transit investments LRT and other modes as a threat to their livelihoods since they are unaware of the benefits to their own operations. The lack of awareness will hamper efforts to encourage transport modal switches from the private car to improved public transport.

Stakeholders Analysis and Baseline Analysis

16. The key stakeholder for the CAST project is the Municipal Government of Almaty. Within the Municipality, CAST will focus its project work with the Department of Passenger Transport and Road (DPTAR). DPTAR is the municipality's authorized body for the formulation and implementation of public policies for passenger transport, road construction and maintenance of Almaty, as well as administering programs for passenger transport, and the building and repairing of roads. More specifically, DPTARs functions include:

    - formulation of development strategies to maintain or improve urban public transport systems for Almaty;
    - regulation of urban public transport including:
        o oversight of ownership of *Almatyelectrotrans*, a public utility company that operates all trolley buses and trams under DPTAR management;
        o public contracts for outsourcing of services such as research, engineering and design, training, and human resource improvements;
        o management of the urban public transport network including its development and maintenance;
    - formulation of fare policies;
    - organization and conducting of tenders for the outsourcing of urban public transport routes;
    - safeguarding consumer rights on fare policies and urban transport services.

17. The functions of the public utility company *Almatyelectrotrans* includes:

    - scheduling and management of trolley and tram routes;
    - maintenance and management of bus and tram stops and dispatching of rolling stock into service;
    - development, management and control of power supply for rolling stock including high and low voltage cables;
    - estimation and allocation of subsidies from the budget for the transport of passengers eligible for reduced fares (i.e. seniors and students);
    - sale of monthly tickets;
    - formulation and implementation of plans to increase efficiency and growth of ridership; and
    - emergency and safety planning.

18. Other departments within the Municipality with whom DPTAR will be collaborating includes:

    - Department of Economy and Budget Planning who provide the annual budget allocations for all departments within the Municipality;
    - Department of Architecture and City Planning;
    - Department of Land Use;
    - Department of Natural Resources and Regulation of Natural Use in charge of monitoring and management of hazardous emissions and greenhouse gases;
    - Department of Interior who oversee traffic enforcement.

19. The Ministry of Environmental Protection (MoEP) of the Republic of Kazakhstan is the GEF focal point and is responsible for the overall environmental quality in the country. Their role on CAST is to ensure close alignment of the project's activities with other on-going relevant initiatives. MoEP is the regulatory agency overseeing

implementation of environmental protection and climate change mitigation policies at the national level and coordination of GEF-funded technical assistance. Moreover, MoEP developed and now implements the "Sectoral program Zhasyl Damu for 2010-2014", an action plan on environmental protection in Kazakhstan that, *inter alia*, includes (i) strengthening regulatory control of municipalities on permissible automobile emissions vehicles and the quality of retail automobile fuels; (ii) reducing the environmental impacts of automobile transport through synchronized traffic signals along selected corridors, and encouraging the use biofuels and fuel additives; and (iii) implementing automated real-time emissions monitoring at the source notably for major industrial enterprises. The project will build on results and achievements of the program and incorporate them into the project design during the preparation stage;

20. In Almaty, car ownership is three times the national average as indicated on Table 2. With more than 500,000 vehicles registered and another 200,000 vehicles that enter the city from outlying Almaty Oblasts during working hours, Almaty City recognizes the limits to the capacity of its road network and the need to improve urban mobility through the Strategic Plan of DPTAR (2010-2014). This plan defines the City's strategic directions to improve delivery of urban transport services through institutional strengthening, reducing urban traffic loads, improving traffic management, improving the quality of public transport services, reducing the environmental impact of urban transport, and improving the repair and maintenance of urban transport infrastructure;

21. There are challenges, however, for the Municipality to implement their strategic plan from both resource and capacity perspectives. In this regard, the EBRD are currently assisting the DPTAR with various improvements to the trolley bus and tram systems managed under Almatyelectrotrans. The baseline conditions of the urban transport system in Almaty are provided in the following sections.

Passenger Transport System

22. Almaty has an extensive surface passenger transport system comprised of autobus, trolleybus and tram routes. The system, however, is poorly regulated delivering urban transport services that cannot compete with the private car for efficiency and comfort. With a lack of technical, managerial and fiscal capacity to deliver safe reliable public urban transport, there is a wide variance of service quality and a low public perception of the system.

23. Electric Transport Systems. The trolley bus and tram network is currently managed by Almatyelectrotrans, a public sector electric utility transport company. Since 1991, there have been insufficient funds to properly maintain and manage the trolley and tram systems; notwithstanding the formation of the PUC Almatyelectrotrans, the trolley and tram systems have been steadily deteriorating with decreases in the number operational trolley routes from 20 to 9 and tram routes from 10 to 2. Trolley and tram infrastructure (i.e. trolley and tram wires, tram tracks and power substations) have not been properly repaired or replaced. Characteristics of the electronic transport of Almaty are provided on Table 3.

24. Within Almatyelectrotrans, there are a number of sections for maintenance and service of the electronic transport network:
   - *Power network section* manages and maintains 23 power contact lines (11 tram lines and 12 trolley lines);

- *Tram railway service* includes 59.9 km of operational tram railways and 4.1 km of track at the tram depot.

Table 3: Data on Almatyelectrotrans Assets

Indexes	Unit	Electric Transport Fleet				Total
		TF-1[7]	TF-2[8]	TF-3	Trams	
Year of establishment	Year	1944	1973	1985	1937	-
Total area of enterprise	Hectare	4.18	3.89	3.92	3.07	15
Passenger capacity of bus or tram	Unit	150	100	100	100[9]	450
Number of operational routes	Unit	5	-	4	2	11
Total length of routes	Km	130.3	-	121.5	59.9	313.7

25. The poor state of the trolley contact lines and tram tracks is shown on Figures 3 and 4.

Figure 3: State of Power Contact Lines Along Trolley Routes

26. <u>Bus system</u>. The bus system in Almaty is now 100% private and provides the majority of urban transport with approximately 1900 buses[10]. The system, however, is highly fragmented with 25 bus companies; moreover some of these companies are companies only in name with several private bus owners operating under the umbrella of the person holding the concession.[11]

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[7] TF stands for trolley fleet

[8] Fleet is currently not in operation

[9] For single wagons only

[10] The Municipality has 49% ownership in 2 bus parks.

[11] The Almaty City Development Center has produced a report advocating a single holding company for operating all passenger transport services along the lines Prague model. While the Prague system is well run and is a good example of how to manage a public transport system, this model does not appear to be pragmatic at least in the near term future given the highly fragmented and private sector dominated passenger transport services in Almaty.

Figure 4: State of Tram Railways

27. To improve its control over the growth of inter-city public transport, the Municipality started contracting public transport services in Almaty along selected routes in the late 1990s. Unfortunately, this outsourcing of bus services to the private sector resulted in bus fleets with small vehicles with few seats, under-qualified operators, poor financial and administrative management of the contracts by the Municipality, and a decline in the quality of urban transport services.

28. In 2005, the Municipality instituted tougher higher requirements for tender procedures for route operation, reducing the number of operators to 26 (from 46 in 2005), and the number of buses to 1,900 buses (from 3,500 buses in 2005). Bus routes are tendered out, not on the basis of price, but rather on an assessment of the capabilities of the competing companies. Unlike other regional countries, mini-buses have been removed from operating in the city center with operators having to provide mid to full sized buses of higher quality. This has been achieved in part by a somewhat higher base fare level as well as subsidies to the bus companies based on estimates on the number of exempted passengers they carry.[12]

29. There are still deficiencies in the public transport services of Almaty notwithstanding the subsidies. For example, of the 25 municipal motor transport operators, only 6 have proper facilities for buses maintenance. The remaining operators who are mainly medium-sized businesses do not have the financial capacity to own land for bus maintenance depots. Moreover, the larger operators are challenged by capping of passengers tariffs and rising prices for fuel, spare parts, other costs; as such, a number of operators have opted to lease their buses and shift maintenance responsibilities to the drivers. This is clearly not a sustainable situation. The system to outsource public transport services needs to be overhauled to sustain a quality public urban transport service.

30. Another significant deficiency of the public transit systems is the absence of bays for buses on the bus stops. The lack of a bay creates additional obstacles for traffic flows most notably when there is heavy road traffic as shown on Figure 5. In the suburbs of Almaty, bus stops are usually marked only with a special sign with no other infrastructure.

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[12] The Municipality estimates that there are about 550,000 legally exempted passengers in Almaty or about 1/3 of the total city population. This includes children, students and retired military personnel.

Moreover, most bus terminuses in the suburbs are usually located in areas without any turning circles, dispatching points and facilities for drivers and their buses such as rest rooms, canteens, medical facilities for drivers, areas for technical inspection and parking lots. There are proper municipal bus terminals at Syakhat and Sairan designed for passenger exchanges between municipal and suburban and interurban buses. A large problem with this arrangement, however, is the need for non-resident carriers to travel through the city. This exacerbates the current traffic situation in Almaty and worsens the conditions of road and environmental safety in the city. Figure 6 shows some examples of these observations.

Figure 5: Lack of Bays for Bus Stops

Figure 6: Typical Bus Terminus Areas without Services

31. Another threat to these tendering efforts is the fact that buses from the Almaty Oblast administration do not have to comply with the stricter municipal regulations in the operation of these bus services. This raises an even broader issue of the need for metropolitan regional cooperation in overall transportation matters and regional road development.

32. The Municipality of Almaty has been working since 2006 on issues concerning bus route infrastructure in the city and the suburbs. However, the barrier to resolving these issues is

the absence of a precise legal framework and cooperation between municipal, suburban and intercity carriers, bus terminals, and auto service enterprises.

33. <u>Metro System</u>. A metro system is currently under construction clearly signifying that the city government wishes to place considerably more importance on passenger transport as a means of addressing the mobility of Almaty citizens. The initial metro line is 8.3 km in length with 7 stations, mostly along Abai and Furmanov Streets, and terminating in the central business district. The estimated cost of this initial line was about $840 million or slightly over $100 million per km. While the planned total length of the system is 27 km, it is unclear as to when there would be sufficient funds to operationalize the 8.3 km route. Furthermore, the 8.3 km segment is not likely to secure the designed ridership of 341,000 passengers per day due to its short length and lack of feeder bus services. Clearly, feeder bus services and the provision of a park and ride facility at the outer end of the system would enhance metro system patronage.

34. <u>Fare Collections</u>. Trip payments by passengers are usually paid in cash. Private operators under contract with the Municipality usually hire a driver on minimum salary as a hired employee. The driver must pay the bus owner a minimum amount of money to operate the bus. The driver, in turn, tries to best recover his costs (that includes fuel, routine inspections and maintenance, conductor salary and fines) and maximize his profits during the trip. Hence, the main incentive of the driver is fare collection and not the provision of quality and safe public transport service. In 2008, a system of payment for trip with application of electronic cash register-validator was implemented to improve tracking of fare collections. The system was partially successful in its accounting of fare collections despite sabotage on the part of the drivers. To further increase ridership throughout all modes of public transport, DPTAR is planning to implement a smart card system or validation machines. In addition to the convenience to the riders, DPTAR would be able to better monitor actual ridership and the expected increases in the ridership of the entire system.

<u>Traffic Management</u>

35. Similar to other ex-Soviet cities, traffic management functions are handled principally by the road traffic police of the Republic of Kazakhstan under a department under the Ministry of Internal Affairs. The police maintain control over road traffic, takes measures to maintain road safety, determine rules, regulations and standards for the design of most traffic management schemes and are in charge of contracting out the operation of the traffic signal system as well as road signing and marking. Funds for these measures come from the Almaty city government budget.

36. There are still deficiencies in the road infrastructure that reduce the efficiency of traffic flows including:
- dedicated left turn lanes and poor intersection geometry;
- poor synchronization of traffic signals due to the fact that 139 out of 290 intersections that have traffic signals are centrally controlled.
- too many two-way traffic roads.

37. To improve traffic flows throughout Almaty, the municipal government are considering a number of improvements that includes:
- dedicated left turn lanes with left turn signals;

- increasing the number of one-way streets that will increase the speed of traffic, reduce trip times, improve the safety of traffic and pedestrians, and reduce vehicle delays at intersections;
- introduce the "reversible" lane whose direction can be changed during the morning or afternoon hours to improve traffic flows;
- introduce a new ITS (intelligent transportation systems) center as part of the overall preparations for the Asian Olympic Games planned for 2011. It is not clear what role the traffic police will have with respect to this center.[13]

Air Pollution Abatement

38. Air pollution is a serious problem in Almaty. This was clearly brought out in mission meetings with city officials and even more dramatically seen over the city as seen on Figure 7. Due to the geographic location of Almaty at the foot of mountains, and prevailing wind directions, pollutants are trapped in the city. Since Almaty does not have a high concentration of industries, it is estimated that 85% of air pollutants are caused by motor vehicle emissions.[14] Total pollutant emissions are estimated at 190,000 tons per year.

Figure 7: Smog and Temperature Inversion Over Almaty City (December 2009)

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[13] Representatives of the City Architect Bureau indicated that the police will not be in charge of this new center.

[14] By comparison, the other city in Kazakhstan with a significant air pollution problem is Ust-Kamenogorsk which suffers from severe industrial air pollution.

39. The Ministry of Environmental Protection (MoEP) has 5 stationary points in the city where air quality is monitored for 5 basic pollutants. There is a comprehensive action program in place to address the air pollution problem. This includes, *inter-alia*:

- establishing motor vehicle emission standards;
- improving the quality of fuels;
- introducing improved traffic management measures including parking;
- greater reliance on electric transport (metro, trolleybus, light rail transit); and
- vehicle emissions testing.

40. "RPE "Kazgidromet" monitors air quality in Almaty using 16 monitoring stations including 5 automated stations in the city and 6 high altitude automated stations situated in the mountains to the south of Almaty. These stations monitor SO_x, NO_x, CO_2, phenols, and formaldehyde. The Department of Natural Resources and Regulation of Nature Use in the Municipality provides management oversight to the RPE Kazgidromet monitoring program. In July 2009, Euro 2002 emission standards were to be applied to all newly imported motor vehicles and all motor vehicles manufactured in Kazakhstan.

41. The Municipality was also pushing plans for vehicle emissions testing to be conducted by a combination of mobile and stationary testing approaches. Mobile motor vehicle emission testing is currently undertaken by the traffic police. There was also a planned budgetary allocation in 2009 for the construction of testing stations that has still not been implemented. Stationary motor vehicle testing is managed by the Ministry of Transport.

2. STRATEGY

Project Rationale and Policy Conformity

42. A continuation of the "business-as-usual" growth of the transport sector without interventions will be counter to Millennium Development Goals (MDGs*)* of "ensuring environmental sustainability" (MDG-7) and to develop global partnerships to achieve development. CAST has been designed to contribute to the outcomes and outputs of UNDP Kazakhstan Country Program (CP) and the 2010-2015 UNDAF[15]. Specifically, CAST aligns with Kazakhstan's UNDAF Outcome 2: Environmental Sustainability, Agency Outcome 2: Government, industries and civil society take steps to mitigate climate change impacts through energy efficiency measures, and Output 2.3: Government and energy consumers are better equipped with knowledge, policies and pilot cases on energy efficiency measures in sectors with high CO_2 emission levels.

43. The project will support achievement of GEF-4 Strategic objective-CC 5: Promoting Sustainable Innovative Systems for Urban Transport with a particular emphasis on "non-technology" options, such as planning, traffic management and modal shift to low-GHG intensive transport modes. The global objectives of CAST will be to facilitate GHG reductions through these modal transport shifts. As a consequence, urban mobility will improve through the use of efficient transport modes of lower carbon intensity and increased fuel efficiency of a modernized bus fleet.

Country Ownership: Country Eligibility

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[15] http://www.undg.org/docs/10125/Kazakhstan-UNDAF_eng_FINAL.pdf

44. Kazakhstan commitment to addressing environmental concerns, specifically in relation to climate change, is well documented. The country ratified the UN Framework Convention on Climate Change on 17 June 1995 and the Government of Kazakhstan (GoK) ratified the Kyoto Protocol on 26 March 2009.

45. Kazakhstan has also maintained a comprehensive inventory of GHG emission sources and sinks since 1990. In May 2010, the GoK submitted an annual status report for their GHG inventories[16], and defined its strategy for addressing climate change concerns in the Second National Communication to the UNFCCC in 2009[17].

Country Drivenness

46. The project is in line with the municipality's vision of the growth of Almaty's transit system as well as Kazakhstan's national priorities in the area of climate change mitigation, promotion of sustainable mobility in urban areas and environmental protection. These are defined in:

- Strategic Plan of DPTAR (2010-2014) that outlines strategic directions to improve delivery of urban transport services through:
  o maintaining and strengthening public authorities responsible for the formulation and implementation of public policies on urban transport;
  o increasing the efficiency of urban transport infrastructure through improved traffic management;
  o reducing urban traffic loads;
  o improving the quality of public transport services;
  o reducing the environmental impact and improving the safety of the urban transport system; and
  o improving the repair and maintenance of urban transport infrastructure as part of the strategy of regional employment and retraining;

- Plan of Almaty 2020, approved by the Government of the Republic of Kazakhstan dated 19 December 2002, No. 1330 which defines the architecture, urban planning and construction activities of Almaty City to 2020 to accommodate the growth of Almaty City to 1.5 million;

- Decision VI session maslikhat Almaty IV convocation on December 12, 2007, "Approval of the Comprehensive Program to Improve the Ecological Situation of Almaty" Taza Java - Zhang da'wa "2008-2015" that includes restrictions on building developments that do not have appropriate transport infrastructure and on vehicle parking in strategic areas where there is heavy traffic flows.

Design Principles and Strategic Considerations

47. This project focuses on elimination of the aforementioned barriers and proposes interventions in the Almaty public transport sector with the main objective to ensure modal shifts towards more sustainable transport such as public and non-motorized modes. Ultimately, the project aims to reduce GHG emissions from the transport sector in Almaty by 31 ktonnes CO_2 annually from its demonstration project.

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[16] http://unfccc.int/resource/docs/2010/asr/kaz.pdf
[17] http://www.climate.kz/tmp/eng_SNC.pdf

48. GEF-funded interventions will constitute policy development and capacity building through provision of technical assistance and investment in demonstration activities. No loan or revolving-fund mechanisms are considered appropriate, and therefore grant-type funding is considered most adequate to enable successful delivery of the project outcomes.

49. Key guiding principles that will create an enabling environment for sustainable transport include:

- *Streamline institutions and regulatory policy framework for planning and implementing improved urban public transport services.* CAST will need to assist the Municipality in providing planning tools in building their capacity to use transit-demand modelling software. This software will be used with legal and regulatory support for planning optimized bus route networks, adopting sustainable transport principles in planning, and strengthening strategic plans and sustainable transport policies;

- *Adopt holistic planning approaches towards a successful "demonstration" of improved public urban transport services.* Holistic planning for improved bus, BRT and LRT systems will improve the chances of increased ridership of the demonstration SUT system. A holistically planned SUT system would include space requirements related to land-use planning, physical integration of BRT and feeder routes with the urban transport network, organized parking lots near bus stations, user-friendly transfer points including safe pedestrian walkways between bus stops, economic incentives for commercial development near BRT and main transfer stations, financial sustainability of an integrated BRT system, enhanced public outreach and fostering the formation of public-private partnerships;

- *Demonstrate a public transit system that competes with private transport and shifts travellers from privately owned vehicles to more efficient and environmentally friendly modes of road travel such as bus rapid transit.* A modal shift to public transit will need to overcome common perceptions; owners of personal motor vehicles prefer the use of their vehicles in part to display a higher economic status but also because it is the most efficient option available. Current public transport services currently serve low-income commuters. Few efforts have been made at providing quality intra-city transit services that target middle-income commuters; a modal shift of middle-income commuters would result in less private cars on urban roads;

- *Assist the municipality in the implementation of a successful SUT demonstration projects for improved public urban transport services and integrated traffic management measures.* As such, the demonstration project should be located along a corridor that has the best probability of success and highest profile. In this regard, corridors such as Abai Blvd and Tole-Bi Avenue have been targeted by the municipal government for improvements. This will enable the demonstration projects to raise awareness and knowledge levels of improved urban public transport, integrated traffic management measures, reduced transport-related GHG emissions, and improved urban air quality through publicity campaigns. Moreover, the demonstration project will be adaptively managed to ensure examples of best practices for SUT systems are

implemented and effectively demonstrated, replicated and sustained well after GEF support is withdrawn;

- *Engagement of all existing transit operators in Almaty City and the outlying oblasts in the development of improved public urban transport services*. This may include:
  - upgrading the skills of these operators including proper maintenance of their assets;
  - facilitating exchanges of old buses for fuel efficient models that will operate on high volume routes such as a new BRT route;
  - shifting operations of some existing bus companies to support feeder routes to transport passengers to the new bus system and BRT routes; and
  - employing displaced bus operators within the new public transport service.

50. The design of CAST will focus on the removal of these barriers through institutional and regulatory strengthening, and building capacity for the planning of improvements to urban public transport delivery and improving traffic management. To strengthen the sustainability aspects of these barrier removal activities, the proposed CAST approach will;
    - assist the Municipality to plan a "successful" demonstration projects on improved and holistically planned urban transport services that will facilitate modal switches from private cars to public transport;
    - assist the Municipality to plan a successful "demonstration" of integrated traffic management measures that will improve the efficiency of traffic movement throughout the City. This will include possible measures such as a selected corridor with the holistically planned public transit services along a selected corridor, leasing of the municipality's own parking concessions (that will generate revenue for the City), synchronized lighting improved sidewalks and lanes for pedestrian and NMV traffic, and planned areas for retail economic development;
    - result in direct annual emission reductions of 31 ktonnes of CO_{2eq} from demonstrations initiated from this project. If these demonstrations were replicated 2.3-fold, cumulative emission reductions over a 10-year period will be 718 ktonnes CO_{2eq} from the LRT/BRT systems.

51. The project is expected to have four outcomes: Outcome 1 will be improved public transport and air quality management; Outcome 2 will be improved efficiency and quality of public transport services; Outcome 3 will be integrated traffic management; Outcome 4 will be the demonstration and awareness raising of sustainable transport.

52. Outcome 1: Improved public transport and air quality management in Almaty City:
    - Streamlined institutional arrangements for developing and regulating urban transport services within the Municipality;
    - Improved capacity to request, award, monitor and manage urban transport delivery contracts;
    - Strengthen legal regulatory instruments to enforce urban transport delivery contracts;
    - Broad understanding of sustainable transport costs, benefits and expected subsidy payments;
    - Strengthen instruments to manage and enforce mobile emission standards.

53. <u>Outcome 2: Improved efficiency and quality of public transport in Almaty:</u>
    - A detailed analysis of the bus sector and existing regulatory framework is prepared;
    - Municipality has prepared a public transport development strategy with solid justification of the proposed urban transport regulatory reform;
    - Public transport improvements are holistically planned and coordinated through a new regulatory authority that will include the proposed LRT and trolley bus routes with BRT and feeder routes to enhance ridership of the public transport;
    - Changes are proposed in urban land use around transfer points in new sustainable transport system;
    - The Municipality has adopted plans to modernize existing transit rolling stock through a bus exchange program;
    - The Municipality has adopted plans to sustain quality public transit service through staff training on maintenance and operation of public transit company assets;

54. <u>Outcome 3: Integrated traffic management in Almaty city:</u>
    - Municipality has developed plans to improve management of road space through implementing parking concessions in the City;
    - Municipality has developed plans to decrease inter-city trip times of public transport through synchronized lighting and dedicated lanes; and
    - Plans developed for restricting vehicle movements in certain areas to encourage pedestrian and non-motorized vehicle traffic and retail economic development.

55. <u>Outcome 4: Demonstration and raising awareness of sustainable urban transport:</u>
    - Operational demonstration for holistically planned BRT/LRT/Metro system along Tolebi and Abai Avenues and other selected corridors;
    - Trend of increased passenger mode share of public transit resulting from the demonstration;
    - Operational demonstration for efficient traffic management corridor along Abai Avenue;
    - Experience of demonstration projects is shared;
    - Municipality has approved plans for replicating demonstration projects in place

56. Without GEF-assisted interventions, increases in GHG emissions from the transport sector are unlikely to change. A business-as-usual (BAU) approach to urban transport in Almaty will result in a steady increase in CO_2 emissions of 16.8 million tonnes by 2015 and 24.0 million tonnes by 2020.

57. The project will support achievement of GEF-4 Strategic objective-CC 5: Promoting Sustainable Innovative Systems for Urban Transport with a particular emphasis on "non-technology" options, such as planning, traffic management and modal shift to low-GHG intensive transport modes.

58. CAST will also enhance sustainability aspects through other key activities including:
    - Awareness programs that provide messaging on specific topics on sustainable urban transport, climate change, transport-related air pollution, and vehicle fuel efficiency;

- Targeted research that will increase the knowledge base of urban and transport fuel efficiency issues and assist in preparing GHG emissions baselines. This would include specific fuel consumption and GHG emissions data for various road transport vehicles used in Kazakhstan.

*Project Goal, Objective, Outcomes and Outputs/Activities*

59. The project will bring about the reduction of GHG emissions from the transport sector in Almaty by creating an enabling investment environment for projects that improve urban mobility. Moreover, the project will guide the development of this intervention through:
    - the demonstration of international best practices for the holistic planning and implementation of integrated urban transport systems;
    - strengthening the institutional and policy framework for urban transportation development at the municipal government level;
    - raising public awareness and knowledge of issues in sustainable urban transport and fuel efficient transport.

60. The proposed project is comprised of 4 components consisting of complementary activities designed to remove barriers to achieve the project objectives:
    - Outcome 1: Strengthened institutional and regulatory framework for the delivery of improved public transport services and management of air quality;
    - Outcome 2: Improved capacity for holistic planning and implementation of improvements to the efficiency and quality of public transport in Almaty;
    - Outcome 3: Improved capacity for holistic planning and implementation of integrated traffic management measures in Almaty City;
    - Outcome 4: Demonstration of public transport rapid transit and non-motorized modes to raise awareness and knowledge of sustainable transport.

   Figure 8 provides a flowchart of the interrelationship of CAST activities.

61. *Outcome 1: Improved management of public transport and air quality management.* This outcome will be achieved through:

    - Output 1.1: Streamlined institutional arrangements for developing and regulating urban transport services, and monitoring transport-related GHG emissions and other air pollutants for Almaty. This would include support to develop an institutional approach and management plan that will define the roles and responsibilities of various municipality agencies in developing sustainable urban transport (SUT) in Almaty City. Barriers that would be overcome include the lack of communication between various municipal agencies and departments on transport planning, urban planning, environmental and air quality, health, economic development and budget planning. Examples of the new institutional approach includes defining a wider role of an municipality agency such as DPTAR, and protocols for improving coordination amongst municipality agencies developing and sustaining an SUT system in Almaty. An output of this activity would be the institutional analysis, identification and formalization (via respective municipal acts and decrees) of the roles and mandates of various agencies in the managing of public transport system, as well as provisions on how the institutions should be monitored and better coordinated. Subject to the results of institutional analysis, some capacity building measures (i.e. training or on-the-job consultations on public transport management) will be provided. Information

about streamlined institutional arrangements will be communicated to various groups of transport stakeholders via updated web-site, leaflets and other media. This institutional output would complement EBRD efforts identifying the agency to introduce multi-year public service contracts and managing the integration of ticketing systems for all public transit modes. Streamlined institutional arrangements for developing and regulating urban transport services is an important building block in ensuring enhanced quality of public transit operations in Almaty (buses and trolleybuses); its realization will increase the attractiveness of public transport for urban transit and facilitate transport modal switches towards less carbon intensive modes. Also, GEF technical assistance and support is required to assist the municipality in the planning of the management information systems to provide for better management and monitoring of public service contracts, as well as GHG emissions and air quality in Almaty.

Figure 8: Flowchart of Activities during Project Implementation
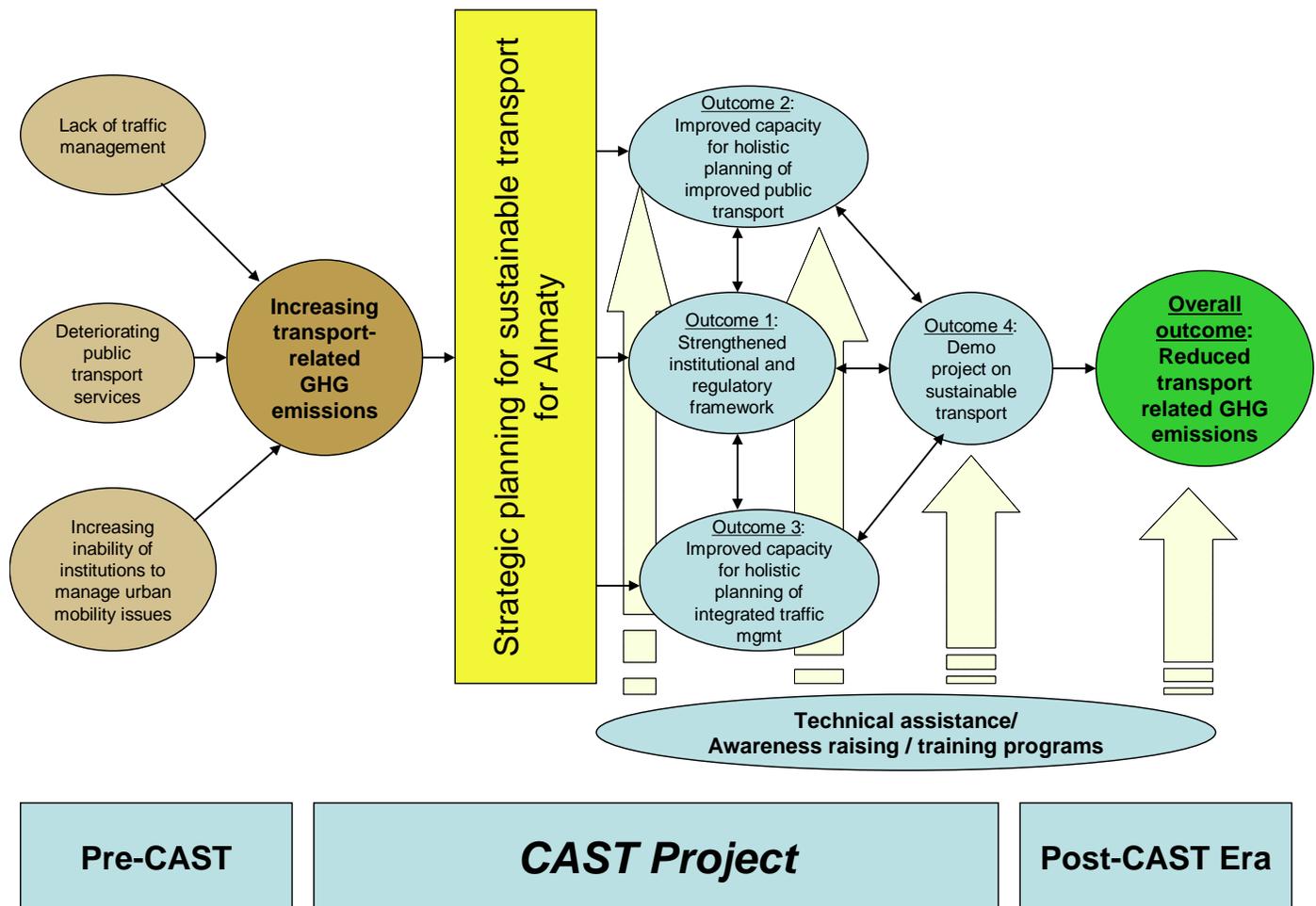
- Output 1.2: Strengthened public services contracts used to issue licenses for public transit routes. The use of the best available international standards for contracting private operators would be introduced with stronger instruments that would

encourage contract compliance and strengthen the municipality's ability to manage and enforce urban transport delivery contracts under multi-year Public Service Contracts (PSCs). The PSCs will be reviewed to ensure it specifies the routes to be serviced for public transport; the types of buses with the number of seats; appearance and minimum features on the buses (including advertisement limitations, color specifications, interior specifications, lighting, etc.), specified bus stops and schedule and fare collection procedures. PSCs will undergo a legal review on options for recourse by the municipality in the event a service carrier does not comply with the terms and conditions of the PSCs. This output would be developed for the municipality (DPTAR) in close collaboration with EBRD who are providing technical assistance to *Almatyelectrotrans*, operators of the new LRT system and trolley buses on the introduction of a new tendering regime for bus service procurement. it is a necessary activity to ensure that quality public service contracts and enforcement of their conditions results in improved urban transit services, increased ridership and increased transport modal switches to less carbon intensive forms of transport.GEF support is not required for this output;

- Output 1.3: M&E system for tracking performance of licensed private operators and state enterprises. This output envisages actual development of a management information system (MIS) by an IT or database specialist for monitoring bus operators' performance (either contracted or state enterprises). Training of an MIS caretaker within the Municipal Government is also included in this activity. The system will provide records of an operator's public service contract, completed bus routes, compliance with bus maintenance requirements, fuel consumption and collected revenues all of which to provide indicators for compliance to the service contracts. The M&E system can be used to evaluate an operator's performance, to assist city staff into improving the performance and profitability of the various bus routes, and to provide data to a GHG emissions inventory to evaluate global environmental benefits. CAST will assist in designing the system and train municipal staff in its operation. GEF support is required to assist the municipality in developing a functional management information system as a tool to improve the preparation, management and monitoring on public service contracts;

- Output 1.4: Study of the true costs and benefits and expected subsidies to sustain public transport quality. Assistance will be provided to the Municipality to determine the real costs and benefits of sustaining quality public transport in Almaty city. The study will determine the required subsidies that can be financed by the Municipality and development partners, and will contribute to the improved management of the proposed improved public transport system. Aside from the capital barrier towards the finance of the public service system (i.e. LRT, trolleys, BRT and HOV lanes) and the reduced operations costs, SUT projects have numerous benefits including economic benefits (from improved urban mobility and increased employment), health cost benefits (from reduced air pollution), and environmental benefits (from reduced fuel consumption and carbon emissions) and foreign exchange reserve benefits (from being able to increase hydrocarbon fuel exports as Kazakhstan is a net exporter of fossil fuels). All costs and benefits from an improved public transport system should be compiled into a comprehensive document that will provide the municipality with valuable information to justify additional financial or subsidy incentives into the improved public transport and integrated traffic management system. This output (by the end of Year 3) will aid municipality in facilitating private-

public partnerships that accelerate and sustain implementation of improvements to the public transport system. GEF support is required for this output;

- Output 1.5: Monitoring system for tracking GHG emission and transport-related air pollutants. Initial activities supporting this output would include setting up of the monitoring system based on recommendations from the EU-funded Almaty Air Quality Management Project. The system would be developed within a revised legal framework, through the use of available emission equipment from the EU, implementation by public-private cooperation arrangements between the Balkhash-Alakol Department of Ecology, an NGO and an entity representing public interests, and management oversight by the Department of Natural Resources and Regulation of Natural Use. The system will be set up in such a way to allow monitoring of CAST direct and indirect GHG emission reduction impacts in conformance with Manual for Calculating GHG Benefits for GEF Transportation projects as follows:

- **CAST Direct Emission Impact** will result from project investments under Outcomes 2.3 (transit fleet modernization), 3.1 (parking scheme), and 4.1-4.3 (SUT demonstration) in selected public transit corridors as specified in Annex E. For this purpose, at project inception phase, monitoring programme will be designed and implemented along pilot transit routes to collect/estimate the following data and thus enable preparation of demo-project GHG emission baseline (to be done using TEEMP model as recommended by the above GEF Manual): average vehicle speed (cars, public transport, NMT), distribution of vehicle by technology type (Euro I, Euro II, Euro III, etc), fuel type (diesel, LNG, petrol, etc) and fuel efficiency, km/l, average occupancy (all day and at peak hours) for cars and all public transport modes, mode share and average trip length. Following the completion of pilot activities, same monitoring programme will be repeated along selected transit routes at least twice at project mid-term and by its end to effectively monitor and report on direct GHG emission reduction impacts.

- **CAST Indirect Emission Impacts** resulting from the creation of the enabling institutional capacity and regulatory environment (under Outcomes 1.1-1.4), integrated traffic management (Outcomes 2.1 and 3.2), awareness raising and PR campaign based on SUT demonstration (Outcomes 4.4-4.6) will also be monitored. For this purpose Almaty's city-wide transport sector GHG emission inventory will be prepared during the first year of project implementation. Available IPCC guidelines/tools on transport sector inventories are not applicable at city scale[18]. Therefore, project will support development of new or approbation of existing software programme (such as for instance Clean Air and Climate Protection Software (CACPS[19]) developed by Local Governments for Sustainability and US National Association of Clean Air Agencies) to enable the Municipal Government of Almaty to develop and regularly (annually) update its GHG inventory from the transport sector as a tool to monitor indirect emission impact of the CAST (with the use of appropriate GEF causality factor). The system will be setup to build a baseline transport-related GHG

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[18] IPCC Guidelines recommend calculating transport CO2 emissions based on the quantity of fuel consumed. However, even if local data on fuel dispensed is available, fuel consumed cannot be taken to be equivalent to fuel sold, and thus fuel sales data is of limited use unless municipal government knows the net effect inter-jurisdictional trips have on fuel consumption, which would be highly problematic to accurately assess in the case of Almaty.

[19] The default method in the CACP 2009 software uses a framework based on fuel consumption and emission factors as prescribed by IPCC. But, fuel consumption is calculated as a function of VMT, vehicle mix, and average MPG. Local government users may use defaults or overwrite any of the values for vehicle mix, MPG, or fuel emissions factors.

emission inventory that includes emissions through surveys on vehicle fuel consumption, traffic counts and estimation of average air pollutant loads from motor vehicles. Data collected via Management Information System in Output 1.3. on bus operations will also serve as important input data for the model. Additional data would need to be collected to monitor fuel quality and arrive to country-specific carbon content factors.

As such, GEF support is required to:
a) Develop and implement monitoring program for SUT demo-projects in order to measure direct emission impact of the project in line with GEF guidance;
b) Develop, maintain and train municipal stakeholders on the use of the inventory model for transport-related GHG emissions in Almaty City in order to measure indirect emission impact of CAST (via top-down approach), as well as of any other subsequent sustainable transport initiatives implemented by the City Government.

62. *Outcome 2: Improved efficiency and quality of public transport in Almaty City.* This outcome deals with holistic planning of transport fleet modernization, the optimal use of the transport assets, designs that will enhance ridership and minimizing "leakage" through the removal of fuel inefficient buses out of service. These outputs are all necessary to enhance and maximize the GEBs from this project. This outcome will be achieved through:

- Output 2.1: Transport-demand model and strategic master plan for developing sustainable urban transport (SUT) in Almaty. To strengthen Almaty's public transport development strategy, technical assistance will be provided to create a transport-demand model (TDM) that assesses the viability of all transport modes (i.e. trolley buses, LRT, metro and feeder buses). The key benefits of a TDM are: i) its use as a planning tool for the municipality in deciding how to prioritize public transit corridor projects throughout the city so as to enhance the global environmental benefits (GEFs); ii) projecting mobility impacts of various transit modes resulting from road improvements proposed by the municipality over the next 10 years; and iii) design of a new bus route network for Almaty. CAST can provide assistance for the TDM in data collection, transport network modelling software and international transport modelling expertise. The outputs of this model can strengthen updates to the 2010-2014 DPTAR Strategic Plan. CAST would facilitate the addition of holistic components to the Development Strategy that would include optimization of the route network and the justification of the choice of transport mode of various corridors (such as LRT, trolleys and buses) with a key focus on increasing ridership of the improved public transit system and encourage modal switches from the private car to maximize GEBs. Using a pre-designed framework, the TDM model will assist the Municipality in the preparation of the public transport development strategy and proposing urban transport regulatory reform that will include:
  - o a vision of improvements in urban mobility efficiency and air quality in urban areas with short, medium and long term goals;
  - o objectives of a new regulatory authority for developing and sustaining urban transport within the institutional framework from Output 1.1;
  - o prioritization of corridors where SUT activities such as integrated BRT will be developed;

- identification of sources of finance and subsidies to build and sustain all integrated BRT systems;
- actions to ensure continuous policy and organizational development as well as enhance and increase capacity of local institutions for transport planning, urban planning and traffic demand management measures;
- actions for the development of bicycle and pedestrian corridors in the city;
- actions to holistically plan and implement sustainable transport projects; and
- an annual review of the development strategy.

GEF support is required to continue development of the TDM model for Almaty City initiated by EBRD, and to train municipal appropriate stakeholders on the use of the model;

- Output 2.2: Bankable feasibility studies for improved public transport in Almaty City. These plans will address data collection for passenger loads; integrate BRT routes with feeder lines; justify appropriate bus technologies for BRT and feeder routes; provide designs for passenger platforms (along segregated high-occupancy lanes to be designed from Output 3.2), fuelling depots, safe pedestrian walkways at interchange bus stops and organized parking spaces near bus stops; harmonizing fare system between various public transit modes and estimate revenue streams and operational costs to determine required subsidies. These plans are closely linked with Output 3.2, i.e. the feasibility plans for capital works required to provide measures that increase the city's traffic flow efficiencies. Bankable feasibility plans for a selected demonstration corridor (or pilot project along Tole-Bi Ave., Abai Ave., Seifullin or Dostyk) will be submitted by Year 2 to the municipality for their action to submit to an appropriate financing agency. CAST will work closely with EBRD who will be providing technical assistance and loans to the municipality for improvements to the LRT, the trolley system and feeder bus routes. GEF support is required for the preparation of bankable feasibility plans for the development of infrastructure for the demonstration SUT corridor. To maximize the modal transport switching potential, the SUT demonstration must be designed to attract passengers and compete as a viable transport alternative to the private car;

- Output 2.3: Program for bus fleet modernization. This program will be designed to modernize public transport rolling stock as well as to assist the City in sustaining the quality of public transport services through the establishment of a new municipal bus park. The program will consist of the involvement of current bus operators who will be encouraged to exchange their old energy inefficient buses for jobs operating new buses under the municipality and under improved employment conditions. Other bus operators should find employment conditions under the new public transport system to be attractive, sustaining the trading of energy inefficient buses after the completion of the project. With the municipality's plans for investments into 200 buses (trolleys and low-floor Euro IV-VI compliant buses with EBRD financing) and the new municipal bus park, new buses can be managed and maintained to the quality the city requires to enhance ridership of the new public transit system. Without this measure, these vehicles would still be in service diminishing any global environmental benefits derived from the other activities. GEF assistance is required to assist in the

facilitation of current bus operators to turn in their fuel inefficient buses and to train these operators to become valuable contributors to the new bus system. GEF assistance will also be required to provide the requisite training in proper bus operation, bus fleet maintenance and system maintenance.

63. *Outcome 3: Integrated traffic management measures in Almaty City*. This outcome deals with measures to reduce traffic congestion in Almaty through a combination of removal of parked cars from the main transport corridors or Almaty and encouraging transport modal switches by re-zoning areas for retail use. This will result in further GEBs through:

- Output 3.1: Plans and implementation program for parking schemes in Almaty. The lack of parking regulations in Almaty results in parked vehicles that affects the efficiency of moving vehicles resulting in traffic congestion. By placing a value on parking spaces in Almaty, more road space would be made available for more efficient traffic flows, reducing energy consumption and increasing global environmental benefits. In addition, the municipality would generate a source of revenue to support other urban transport improvement measures. Using the initial studies of the parking schemes being conducted by the IFC, parking concessions will be planned and implemented under this activity. This would include allocating a pre-determined parking area in the city, designing parking spaces on-road or off-road, costing of parking meter infrastructure, and the finding of private operators to manage and collect revenue from the system. This activity will done jointly with the IFC. GEF support is required to partially to support the planning and implementation of parking schemes in Almaty;

- Output 3.2: Feasibility plans for integrated traffic management and retail economic stimulus areas. Integrated traffic management plans will target high volume corridors for improved efficiencies of traffic flow preferably the same corridors where improved public transit is being developed in Outcome 2 such as Abai Avenue or Tole-Bi Street to further maximize the achievement of GEFs. Plans would include corridors for synchronized lighting and high occupancy vehicle (HOV) lanes, closing selected blocks and lanes for pedestrian and non-motorized vehicles and enhancing these areas for local retail economic development (preferably in areas where there are transfers between several public transport routes). Transport plans will be integrated with urban land use planning in Almaty where proposed land use changes would favour increased use of public transport and bicycles as well as the encouragement of more pedestrian traffic and retail economic development. These feasibility plans for the selected corridor will be submitted by Year 2 to the municipality for budgetary allocation from the municipal budget and revenue from the sale of municipal bonds. GEF support is required for this output;

64. *Outcome 4: Demonstration and raising awareness of SUT.* This outcome will be achieved through:

- Output 4.1: Implementation and engineering plans for a demonstration project on SUT (improved public transport services and integrated traffic management). Implementation plans will be developed to implement SUT initiatives along corridors as selected by the municipality. The SUT demonstration would include strengthening the trolley bus system and adding buses to provide feeder bus

services to the LRT and trolley bus system, designing synchronized lighting and HOV lanes, and developing retail economic stimulus areas and improved traffic intersections. Two of the corridors identified by municipal officials was Abai Avenue with a peak hourly traffic flow of over 4,000 passengers (53,000 daily), and Tole-Bi Avenue with a peak hourly flow of over 3,000 passengers (40,000 daily)[20]. CAST assistance will include a capacity building program for the municipality and their consultants who will develop implementation and engineering plans for the demonstration on the SUT demonstration. Technical assistance for preparing implementation plans for the demonstration corridor for SUT will include the detailed engineering design of all infrastructure works (i.e. BRT and feeder bus stops, dedicated bus lanes, bus depots, and fuelling stations), HOV lanes (which could also be for buses), synchronized lighting and improved traffic intersections; detailed cost estimates of these works, construction planning, and operationalization plans of the completed SUT system. The plans will also include detailed financing requirements in coordination with the municipality and will be done in concert with EBRDs planned assistance to the municipality for improvements to the LRT and trolley bus system. GEF support is required for this output;

- Output 4.2: Technical assistance for construction of the SUT system. This would include ensuring compliance of construction work to the detailed engineering designs of the improved public transport system, integrated traffic measures, and managing construction contracts to completion. This will be done in close consultation with the Almaty municipal officials and other planned transport-related infrastructure construction activities such as EBRDs planned financing of LRT and trolley bus improvements, re-fuelling and bus maintenance depots. GEF support is required for this output;

- Output 4.3: Technical assistance for operation and maintenance of the SUT demonstration. This would include start-up of operations of the improved public transport system, synchronized lighting system and enforcement of new traffic rules for the SUT demonstration. The assistance would be geared towards management actions to sustain efficient passenger movement in the SUT. This will also include knowledge transfers to municipal personnel, public transit operators, maintenance personnel and managers on best international practices of SUT operations. GEF support is required for this output;

- Output 4.4 An urban transport information center and website. An urban transport information center will be setup at one of the system's busiest transfer points where there are stimulated retail economic activities. This information center will contain information that links all modes of public transport in Almaty (i.e. trolleys, LRT, metro and feeder buses), and increase awareness of sustainable urban transport and increase ridership on the new systems, thus increasing transport modal switches to less carbon intensive modes. GEF support is required for this output;

- Output 4.5 Workshops and paper that document the performance of the demonstration projects at reducing transport-related GHG emissions. Periodic

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[20] From 2009 survey data from NIITK LLC.

workshops will be held to report on the progress on demonstration project amongst the numerous stakeholders, and to receive feedback on adaptively managing implementation. Stakeholders will share outcomes and impacts of demonstration projects at workshops and through awareness raising campaigns. GEF support is required for this output;

- <u>Output 4.6 Replication plans for sustainable transport in Almaty.</u> The successful demonstration project will provide confidence to the municipality and its financing partners that other SUT initiatives can be successfully implemented after the completion of CAST. GEF support is required for this output.

65. With the GEF supported alternative to the baseline scenario, there will be a strengthened institutional arrangement and coordination for the development of sustainable urban transport in Almaty city. In addition, the completion of the institutional arrangements and the strategic plan will enable the municipal government of Almaty to strengthen their current urban transport policies that will provide confidence to investors and other stakeholders in the coordinated development of urban transport solutions.

66. The proposed GEF supported alternative will also increase the knowledge of civil society on sustainable transport issues through targeted public awareness programs and a demonstration project on a SUT project in Almaty City. This will provide domestic grassroots growth in the awareness of important sustainable transport issues and climate change in Almaty City as well as Kazakhstan.

Key Indicators, Risks and Assumptions

67. The project success indicators are shown in the Project Results Framework of this document. These indicators have annual target values, which will be monitored during the course of the CAST project implementation.

68. The overall project risk is moderate. CAST has been designed to complement and strengthen ongoing efforts in Almaty by the EBRD and the IFC to develop sustainable transport initiatives and to continue to facilitate close coordination and consultation between the relevant stakeholders in each of the proposed activities. Project activities will enhance local technical capacity to implement sustainable transport projects, clarify institutional responsibilities and strategic sustainable transport development; build effective awareness programs and training curriculum targeted to optimize knowledge diffusion on sustainable transport concepts; and build the confidence of private investors and financing institutions to reduce risks of loans to finance urban transport projects. A major assumption for the success of CAST is the commitment of all stakeholders involved to work towards the intended outcomes.

69. While all possible efforts have been made in the CAST design to mitigate perceived project risks, there are inevitably some unavoidable residual risks that will have to be carefully monitored and managed to ensure project success. The most significant risk identified during the project formulation was the possible unfavourable investment climates for the purchase of energy efficient BRT buses. Recommended mitigation measures are provided in detail in the "Offline Risk Log" in Annex 1.

<u>Financial Modality</u>

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70. GEF resources will be used as technical assistance to remove barriers to sustainable urban transport initiatives in Almaty City, and to support activities that will sustain the development of sustainable transport initiatives. As such, GEF resources will be used to:

   - mobilize stakeholders (mainly the municipal government of Almaty) for activities where there have been no prior funding commitments; and
   - add to resources committed from project partners to strengthen an activity.

71. As CAST will be a NIM implemented project, financial modality will be direct agency implementation (i.e. not cash being transferred to the implementing agency). Under this modality, DPTAR under the Municipal Government of Almaty will still maintain full programmatic control of CAST.

Cost Effectiveness: Global Benefits

72. The efforts to reduce transport-related energy consumption in Almaty City will have long term impacts on GHG emissions. The demonstrations initiated from this project will result in direct annual emission reductions of 31 ktonnes of CO_{2eq} or 615 ktonnes over technology life cycle (20 years for BRT). If these demonstrations were replicated 2.3-fold over a 10-year period after the GEF project is completed (2016 to 2025), cumulative indirect emission reductions will be 1.43 ktonnes CO_{2eq} from the LRT/BRT systems. At the GEF incremental cost of US$4,995,000, the cost of avoided CO2 emissions from the project (totaling 2 mln tCO2, including 615 ktonnes of direct and 1.43 mln tonnes of indirect CO2 reductions) will be about US$2.5 per tonne CO2 reduced.

Cost Effectiveness: National Benefits

73. The project will also provide a number of national benefits including:

   - reduction of transport-related local air pollution. In particular, SO_x, NO_x and particulate matter will improve urban air quality and provide significant health benefits to the urban population of Almaty City; and
   - improved urban liveability. Urban mobility will improve and provide social and economic benefits to Almaty City.

Sustainability

74. The components of CAST are designed to facilitate sustained modal switches from private cars to public transport. With traffic congestion being severe in Almaty, any successful measure that can demonstrate improved efficiency and quality of urban mobility and reduce air pollution would be most welcome and likely sustained; these measures would prove to be socially and politically popular with all levels of society.

75. Private sector involvement in public transport would contribute towards reducing dependence on the public budget and increase financial sustainability of any public transport initiative. The government would maintain investments in infrastructure that would support improved urban mobility such as dedicated bus lanes, synchronized traffic lighting, safe areas for pedestrian and bicycle transport and parking places. Other sources of revenue to reduce urban congestion such as congestion taxes, oil-petrol levies and other taxes can be assessed during CAST for its impact on sustainability.

76. The capacity building efforts of the GEF project would identify capacity building needs based on international best practices involving delivery of capacity building that fully

engages the beneficiaries with international and national practitioners in urban transport. This would contribute to the sustainability of the GEF interventions.

Replicability

77. The entire objective of conducting a demonstration is to provide useful lessons for replication, recognizing that the initiatives would be replicable as the needs in most cities of similar type are more or less the same. As such, the project will be setup to provide well designed, tightly managed and highly visible demonstrations. These demonstrations seek to build the potential for replication in Almaty as well as other large cities in Kazakhstan and in Central Asia. A good demonstration would provide important lessons for replicated projects for other congested corridors in Almaty as well as other cities in Kazakhstan and possibly in neighbouring countries.

3. PROJECT RESULTS FRAMEWORK

This project will contribute to achieving the following Country Programme Outcome as defined in 2010-15 CPAP:
- Expected UNDAF Outcome #2: By 2015, communities, national and local authorities use more effective mechanisms and partnerships that promote environmental sustainability and enable them to prepare, respond and recover from natural and man-made disasters   - The Government, industries and civil society take steps to adapt to climate change and mitigate its impact through energy efficiency measures and climate change adaptation policies   - Improved regulations and practices developed for public transport in the city of Almaty
Country Programme Outcome Indicators: **One sustainable urban transport demonstration project implemented to support implementation of policy and regulatory framework**   **Technical and institutional capacity development of participating agencies within the Municipal Government of Almaty**   **Public awareness on sustainable urban transport and strategic plans**   **Policies. planning and implementation improves the living conditions of population in the demonstration region**   **<u>Number of local and federal stakeholders involved and actively participating on the project</u>**   **94,000 people benefiting from improved conditions as a result of better urban mobility**   **1 demonstration project implemented along 1 or 2 congested corridors to demonstrate improved public transit and integrated traffic management**   **One community-based organization engaged in participatory monitoring of projects**
Primary applicable Key Environment and Sustainable Development Key Result Area (same as that on the cover page, circle one):
2. Catalyzing environmental finance
Applicable GEF Strategic Objective and Program: GEF-4 CC Strategic Program SP5: Promoting Sustainable Innovative Systems for Urban Transport (OP11)
Applicable GEF Expected Outcomes: Replication of sustainable transport measure that is operational and commercially viable
Applicable GEF Outcome Indicators: Ridership on new transport measures.

	Indicator	Baseline	Targets End of Project	Source of verification	Risks and Assumptions
Project Objective[21] To reduce the growth of GHG emissions from the transport sector in the City of Almaty, Kazakhstan.	• Tonnes of CO_2 emissions reductions resulting from transport modal switches to public transport services • Number of firm commitments from stakeholders for the implementation of improved public transport services in the City of Almaty	• 0 ktonnes CO_2[22] • No commitments for improving public transport services	• 31 ktonnes CO_2 (direct reduction) • 308 ktonnes CO_{2eq} (10-year reduction after completion of CAST) • 2 plans for replicating demonstration of improved public transport services in Almaty City	• Reports of improved public transport demonstration including surveys of ridership making transport modal switches from car to public transport • Reports from surveys of decreased trip times along corridors where	• Monitoring and evaluation activities planned under the project are fully supported and implemented • Continued Municipality support for the modernization of the bus fleet to reduce air pollution and GHG emissions • Reliable data from surveys on modal transport switches • Firm commitments from all stakeholders for the implementation of integrated BRT projects including financing of project

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[21] *Objective (Atlas output) monitored quarterly ERBM and annually in APR/PIR*

[22] No decline in GHG emissions due to lack of institutional coordination within the Municipalityto plan and implement sustainable transport initiatives. No commitments for any BRT initiatives.

	• Number of financing institutions committed to financing SUT	• No financing institutions committed to financing demo SUT	• 1 financing institutions committed to financing demo SUT by Year 2	integrated traffic measures have been implemented	
	• Percent increase in public transit ridership	• 21% passenger trips on public transit	• 33% passenger trips on public transit ridership by Year 5		
Outcome 1 **Improved management of public transport and air quality in Almaty City**	• Number of streamlined institutional arrangements for developing and regulating urban transport services, and monitoring transport-related GHG emissions and other air pollutants for Almaty	• Current institutions unable to advance projects to improve the state of urban transport in Almaty	• One institutional management plan that streamlines arrangements for developing and regulating urban transport services and monitoring transport-related GHG emissions and other air pollutants in Year 1	• Management plans for institutional streamlining related to urban transport • Standard public service contract developed following best international standards • Revised tender and contract documentation • City administration M&E plan to track performance of private urban transit operators • City monitoring system documentation for GHG and air pollutant monitoring	• Proposed institutional and regulatory changes are supported by the Municipality • Willingness of designated Municipality personnel to effectively manage and monitor public service contracts to deliver improved public urban transport services • Legal instruments are promulgated by the government in a timely manner • Willingness of Municipality to implement air quality and GHG monitoring system
	• Number of standard public service contracts of international standard to be used for private operators delivering public transport services to Almaty	• No effective standard public service contracts for delivery of public urban transport	• One standard public service contract template for developing improvements in public transit in Almaty is available by Year 1		
	• Number of trained Municipality personnel in monitoring and managing public service contracts for improved urban transport delivery and GEBs	• Lack of trained personnel in effective management of public service contracts for public transport services	• 5 trained personnel in effective management and monitoring of public service contracts for public transport services and GEBs		
	• Number of M&E systems developed for monitoring performance of public service contracts	• No M&E system for monitoring performance of public service contracts	• 1 M&E system for monitoring performance of public service contracts		
	• Number of studies on the true costs and benefits and expected subsidies to sustain public transport quality.	• No understanding of the cost implications to sustain public transport quality	• One study and expected subsidies to sustain public transport quality in Almaty City		

	• Number of monitoring systems for tracking reduction of transport-related GHG and air pollutant emissions	• No monitoring system for tracking GHG or air pollutant emissions from transport in Almaty	• 1 GHG/air pollutant monitoring system (software, data collection protocols and surveys) to measure and report on CAST direct and indirect GHG emission impact		
Outcome 2 **Improved efficiency and quality of public transport services**	• An optimized public transit route network developed by a transport-demand model • A public transport development strategy and plans for urban transport regulatory reform • Number of feasibility studies for the development of public transport improvements that include LRT, BRT and feeder routes • Number of new rolling stock procured and operated in the public transit system through old bus exchanges • Number of trainees on the operation and maintenance of new public transit rolling stock • Number of feasibility studies on true costs and benefits of sustainable transport projects	• City public transit network that has poor connections and routings • Lack of public transport development strategy and plans for urban transport regulatory reform • Piecemeal initiatives for the development of sustainable transport in Almaty • No program or plans for modernization of public transit rolling stock (except for new trolley buses financed through an EBRD loan) • No trained drivers and mechanics on the operation and maintenance of public transit rolling stock • No studies on true cost and benefits of developing sustainable transport projects in Almaty	• An optimized public transit route network that has been developed by a new transport-demand model • 1 public transport development strategy and plans for urban transport regulatory reform by Year 1 • 1 feasibility study on developing public transport improvements in Almaty by Year 2 • 200 old buses exchanged for new buses by Year 3 • 50 trainees on the operation and maintenance of new buses and re-fuelling infrastructure by Year 4 • 1 study on true cost and benefits of developing sustainable transport projects in Almaty by Year 2	• Public transport development strategy and plans for urban transport regulatory reform for Almaty City • Bankable feasibility implementation plans for SUT development in Almaty • Bus modernization plans • Study on public transport improvements, real costs and benefits and required subsidies	• Municipality government is willing to support sustainable urban transport development including subsidizing the project • Full stakeholder support including existing bus operators • Sufficient capital is available to finance bus program and related infrastructure projects • Availability of land for bus operations (i.e. maintenance and fuelling depots, bus stops and transfer areas)
Outcome 3 **Integrated traffic management**	• Number of paid parking schemes for Almaty planned	• No paid parking schemes being planned	• 2 plans for paid parking schemes in downtown core of Almaty and enforcement of parking restrictions	• Plans for private parking concessions and	• Municipality government is willing to support paid parking schemes that will generate more revenue for the

	• Number of synchronized lighting schemes planned • Number of plans for restricting motor vehicle movements along certain corridors to encourage pedestrian and non-motorized vehicle traffic and retail economic development	• Ad hoc measures taken to improve traffic flows in Almaty • No plans for pedestrian or NMV corridors	in selected areas of Almaty by Year 2 • 2 synchronized lighting schemes by Year 3 • 1 plan for restricting motor vehicle movement along a selected corridor to encourage pedestrian and non-motorized vehicle corridors and enhance retail economic development by Year 3	enforcement of parking restrictions • Integrated transport plans that include synchronized lighting • Plans for urban land use changes with a goal to enhance retail economic development	Municipality • Full stakeholder support improving efficiency of motor vehicle movement through synchronized lighting and paid parking spaces • Sufficient capital is available to finance integrated traffic measures and associated infrastructure projects • Availability of land for multi-level parking lots
Outcome 4 **Demonstration projects on sustainable transport**	• Bankable engineering plans for demonstration SUT project in Almaty City • Number of financing institutions that commit financing assistance to demonstration SUT • Number of kilometers of BRT and LRT in operation • Number of kilometers of improved trolley bus routes in operation • Percent increase in public transit ridership • TOE of cumulative energy savings generated by modal switches to demonstration on improved public transport	• No demonstration projects on sustainable transport • No financing institutions committed to financing demonstration SUT • 0 km of operational BRT and LRT • 0 km of improved trolley bus routes in operation • 0% increase on public transit ridership • 0 TOE saved	• 1 demonstration on sustainable transport in Almaty • 1 financing institutions committed to financing demo SUT by Year 2 • 14 km of BRT and 13 km of LRT in operation by Year 5 • 14 km of improved trolley service by Year 5 • 20% increase in public transit ridership by Year 5 • 7,075 TOE annual energy savings generated by modal switches to demonstration on improved public transport by Year 5	• Workshops and papers documenting performance of demonstration projects • Awareness campaign for demonstration projects	• Municipality government is willing to support sustainable transport development including subsidizing the project • Full stakeholder support including existing bus operators • Sufficient capital is available to fully finance the demonstrations • Availability of land for LRT, trolley and bus operations (i.e. maintenance and CNG fuelling depots, bus stops and transfer areas) • Relevant stakeholders and target groups are interested in participating and cooperating in the design, development and implementation of the demonstration projects

	• Number of tonnes CO$_{2e}$ reduced annually from the sustainable urban transport demo	• 0 tonnes CO$_{2e}$ reduced annually	• 30 ktonnes CO$_{2e}$ reduced annually from sustainable urban transport demo by Year 5	
	• Number of urban transport information centers established	• 0 information centers established	• 1 information center on SUT demo project established in Year 5	
	• Number of websites related to improved urban transport in Almaty	• 0 websites on public transit	• 1 website related to improved urban transport in Almaty by Year 3	
	• Number of workshops where experience of demonstration projects is shared	• 0 workshops conducted	• 3 workshops where experience of demonstration projects is shared completed by Year 5 by Year 5	
	• Number of papers documenting performance of demonstration projects at reducing transport-related GHG emissions	• 0 papers that document demo project performance	• 5 papers documenting performance of demonstration projects at reducing transport-related GHG emissions by Year 5	
	• Number of plans for replicating demonstration projects	• 0 plans for replicating demo projects	• 2 plans for replicating demonstration projects by Year 5	
	• Adoption of sustainable transport policies and regulations	• No policies or regulations for sustainable transport adopted	• City-formulated policy on sustainable transport adopted	
	• Investment mobilized in less GHG intensive urban transport	• No investments mobilized for less GHG intensive urban transport	• One investment for less GHG intensive urban transport mobilized for another main corridor in Almaty	

5. MANAGEMENT ARRANGEMENTS

78. Management arrangements have been structured to enable effective oversight and coordination while ensuring that individual components are implemented in an autonomous and efficient manner with coordinated reporting. NIM is the preferred execution with other execution arrangements to be considered exceptionally to accommodate the requirements of the specific components.

UNDP Support Services

79. UNDP will provide Project support services including project administration, management and technical support to the Project Manager as required by the needs of the individual project or Project Manager.

Collaborative Arrangements with Related Projects

80. The Ministry of Environmental Protection (MoEP) of the Republic of Kazakhstan, being in charge of implementation of environmental protection and climate change mitigation policies at the national level and coordination of GEF-funded technical assistance, will ensure close alignment of the project's activities with other on-going relevant initiatives. In particular, MoEP developed and now implements the "Sectoral program Zhasyl Damu for 2010-2014", an action plan on environmental protection in Kazakhstan that, *inter alia*, includes (i) strengthening regulatory control of municipalities on permissible automobile emissions vehicles and the quality of retail automobile fuels; (ii) reducing the environmental impacts of automobile transport through synchronized traffic signals along selected corridors, and encouraging the use biofuels and fuel additives; and (iii) implementing automated real-time emissions monitoring at the source notably for major industrial enterprises. The project will build on results and achievements of the program and incorporate them into the project design during the preparation stage.

81. The Municipality of Almaty, the project's main executing partner, has developed and approved several strategic documents to tackle persisting problems in urban transport and infrastructure development. The Urban Passenger Services Program for 2009-10 aimed at improved efficiency of the public passenger services in Almaty will be augmented by the proposed CAST activities under Outcome 2.

82. The Municipality has also funded the development of a model for traffic flows in Almaty City and vicinity with the Research Institute of Transport and Communications, Kazakhstan's largest company specializing in the design of road and rail transport infrastructure. The model has served as planning tool for justification of the construction of the eastern bypass road, a high-speed ring road around Almaty and the construction of flyovers in the city of Almaty at various intersections. The model requires additional development for its use in modeling passenger volumes for an improved public transit system in Almaty. Proposed activities of Outcome 2.1 are directly linked to model improvements.

83. The EU-funded Almaty Air Quality Pilot Project has the objective of formulating and implementing specific instruments for air quality management that is mainly related to urban transportation. The project is identifying relevant measures that reduce air pollution from mobile sources including the use of cleaner fuels such as natural gas, transferring knowledge to the Municipality on EU-procured equipment designed to reduce transport-related emissions, facilitating the involvement of NGOs and the public in air quality management. This project is scheduled for completion in late-2010. Proposed activities of Outcome 1 and 4 in CAST are closely related to the activities of this project.

84. The EBRD are considering two loans to the DPTAR-managed company, *Almatyelectrotrans* for the financing of modernization of the municipal tram and trolleybuses of Almaty as well as for the procurement of up to 200 buses (both trolleys and low-floor Euro IV-VI compliant buses). This loan would include improvements to the power substation modernization of the electric transport network, the upgrade of the electric transport information and dispatcher center (including GPS control), the installation of e-case validators to collect fares on trolleybuses and trams as well as institutional strengthening, improvements to service-based contracts to delivery of public transport services, commercialization of *Almatyelectrotrans*. The EBRD has thus far provided €300,000 of technical assistance (from the Government of Singapore through EBRD) for the feasibility study of improvements to the electric transport services network in Almaty, €300,000 for the PPP structuring of AET, €130,000 for the corporate development programme, and €180,000 for procurement and implementation support. This investment result will be integrated into the CAST design of Outcomes 2, 3 and 4, related mainly to the integration of all public transport modes through the creation of a unified fare system and public transport information center.

85. A Joint World Bank/IFC study for developing organized parking in Almaty City. In February 2009, the IFC completed a mission to Almaty City to assess its traffic problems and the impact of organized paid parking on the traffic flows. The IFC made recommendations to the Municipality develop the installation of an on-street paid parking system, and the construction of strategically placed multi-storied parking facilities (e.g. at a terminus station of the Metro). In addition, they submitted a proposal in September 2009 to provide expert advisory services for a detailed study of a scheme for on-street paid parking and the facilitation of private sector participation in compliance with international norms for transparency that will attract credible investors. CAST will assist the Municipality in partial financing of the IFC proposal that is linked to Outcome 3.

Prior Obligations and Prerequisites
86. There are no prior obligations and prerequisites.

Audit Arrangements
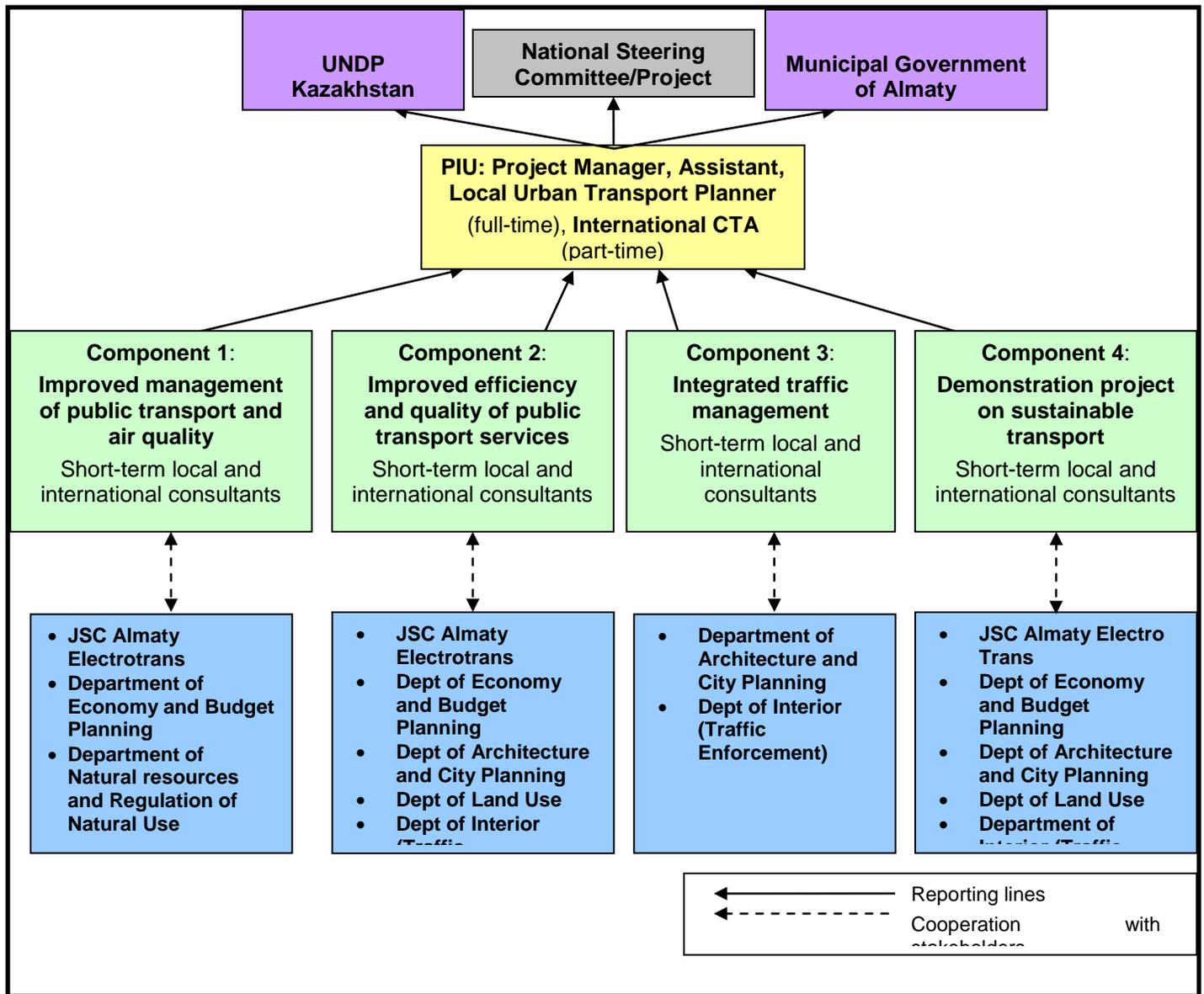*87.* Audits will be conducted following UNDP Financial Regulations and Rules and related audit policies.

Inputs To Be Provided by Partners
88. **National Steering Comittee** is responsible for making management decisions for CAST, in particular when guidance is required by the Project Manager. The NSC will play a critical role in project monitoring and evaluations by quality assuring these processes and products, and using evaluations for performance improvement, accountability and learning. It ensures that required resources are committed and arbitrates on any conflicts within the project or negotiates a solution to any problems with external bodies. In addition, it approves the appointment and responsibilities of the Project Manager and any delegation of its Project Assurance responsibilities. Based on the approved Annual Work Plan, the NSC will also consider and approve the quarterly plans and any essential deviations from the original plans.

89. To ensure UNDP's ultimate accountability for the project results, NSC decisions will be made in accordance to standards that shall ensure management for development results, best value money, fairness, integrity, transparency and effective international competition. The NSC will also provide a formal forum for key stakeholders to discuss the progress of CAST. The NSC will review the project "outcomes" in relationship with CPAP outcomes and country priorities and provide

policy guidance on implementation of the various project components. The NSC will review the results of this project vis-a-vis other relevant projects in the Climate Change & Sustainable Energy sectors. The PMU will provide it necessary support for arranging the meetings. The Project Manager will be an ex-officio member of the NSC. The PMU will serve as the Secretariat of the NSC and provide all necessary support for conducting the meetings. The NSC will meet at least once every year or more depending on the need for policy guidance by the project.

90. The National Steering Committee will be chaired by the Municipal Government of Almaty with representatives from MoEP, UNDP, the EBRD and the IFC. Members of the NSC will also be from the various departments of the Municipal Government of Almaty including the head of the DPTAR, Dept of Economy and Planning, Department of Land Use, Department of Architecture and City Planning and the Ministry of Internal Affairs (Traffic Enforcement).

91. The **Project Management Unit** (PMU), working under supervision of UNDP, will assist DPTAR under the Municipal Government of Almaty in the coordination of different responsible parties, support the other municipal agencies and consultants in conducting feasibility studies for SUT and ITM, preparing implementation plans for the demonstration project, conducting communication and advocacy activities for the promotion of the demonstration SUT project.

92. The **Project Manager** will be based in Almaty and have the authority to run the project on a day-to-day basis on behalf of the Implementing Partner within the constraints laid down by the NSC. The Project Manager's prime responsibility will be to ensure that CAST produces the results specified in the project document, to the required standard of quality and within the specified constraints of time and cost.

93. The CAST organizational structure is shown on Figure 9.

94. The proposed project will be implemented for 5 years. The project will start in the second quarter of 2010 and will conclude at the end of the fourth quarter on 31 March 2015.

Figure 9: CAST Organization Structure

UNDP Kazakhstan	National Steering Committee/Project	Municipal Government of Almaty

PIU: Project Manager, Assistant, Local Urban Transport Planner (full-time), **International CTA** (part-time)

Component 1:	Component 2:	Component 3:	Component 4:
Improved management of public transport and air quality	**Improved efficiency and quality of public transport services**	**Integrated traffic management**	**Demonstration project on sustainable transport**
Short-term local and international consultants	Short-term local and international consultants	Short-term local and international consultants	Short-term local and international consultants

• JSC Almaty Electrotrans • Department of Economy and Budget Planning • Department of Natural resources and Regulation of Natural Use	• JSC Almaty Electrotrans • Dept of Economy and Budget Planning • Dept of Architecture and City Planning • Dept of Land Use • Dept of Interior /Traffic	• Department of Architecture and City Planning • Dept of Interior (Traffic Enforcement)	• JSC Almaty Electro Trans • Dept of Economy and Budget Planning • Dept of Architecture and City Planning • Dept of Land Use • Department of Interior /Traffic

Reporting lines

Cooperation with stakeholders

95. To accord proper acknowledgement to GEF for providing funding, a GEF logo will appear on all relevant GEF project publications. Any citation on publications regarding projects funded by GEF should also accord proper acknowledgment to GEF. The UNDP logo should also be present in all publications along with GEF logo. UNDP logo should be displayed very prominently on vehicles as UN visibility is important for security purposes on vehicles and other project hardware.

6. MONITORING FRAMEWORK AND EVALUATION

96. The project will be monitored through the following M&E activities as detailed in the following paragraphs. The M& E budget is provided on Table 4.

Project Start

97. A Project Inception Workshop will be held <u>within the first 2 months</u> of project start with those with assigned roles in the project organization structure, UNDP country office and where appropriate/feasible regional technical policy and programme advisors as well as other stakeholders. The Inception Workshop is crucial to building ownership for the project results and to plan the first year annual work plan.

98. The Inception Workshop should address a number of key issues including:
    - assisting all partners to fully understand and take ownership of the project. The workshop should detail the roles, support services and complementary responsibilities of UNDP CO vis à vis the project team. The roles, functions, and responsibilities within the project's decision-making structures will be discussed including reporting and communication lines, and conflict resolution mechanisms. Terms of Reference for project staff will be discussed again as needed;
    - finalizing the first annual work plan (AWP) based on the project results framework and the relevant GEF Tracking Tool if appropriate. The indicators, targets and their means of verification will be reviewed and agreed upon, as well as assumptions and risks being re-checked;
    - providing a detailed overview of reporting, monitoring and evaluation (M&E) requirements. There should be agreement on the M&E work plan, budget and schedule;
    - discussing financial reporting procedures and obligations, and arrangements for annual audit;
    - planning and scheduling NSC meetings. Roles and responsibilities of all project organisation structures should be clarified and meetings planned. The first NSC meeting should be held <u>within the first 12 months</u> following the inception workshop.

Table 4: M&E Work Plan and Budget

Type of M&E activity	Responsible Parties	Budget US$ *Excluding project team staff time*	Timeframe
Inception Workshop and Report	▪ Project Manager ▪ UNDP CO, UNDP GEF	Indicative cost: 10,000	Within first two months of project start up
Measurement of Means of Verification of project results.	▪ UNDP GEF RTA/Project Manager will oversee the hiring of specific studies and institutions, and delegate responsibilities to relevant team members.	To be finalized in Inception Phase and Workshop.	Start, mid and end of project (during evaluation cycle) and annually when required.
Measurement of Means of Verification for Project Progress on *output and implementation*	▪ Oversight by Project Manager ▪ Project M&E Officer	To be determined as part of the Annual Work Plan's preparation.	Annually prior to ARR/PIR and to the definition of annual work plans
ARR/PIR	▪ Project manager and CIU teams ▪ UNDP CO ▪ UNDP RTA ▪ UNDP EEG	None	Annually
Periodic status/ progress reports	▪ Project manager and CIU teams	None	Quarterly
Mid-term Evaluation	▪ Project manager and CIU teams ▪ UNDP CO	Indicative cost: 40,000	At the mid-point of project

Type of M&E activity	Responsible Parties	Budget US$ *Excluding project team staff time*	Timeframe
	▪ UNDP RCU ▪ External Consultants (i.e. evaluation team)		implementation.
Final Evaluation	▪ Project manager and team, ▪ UNDP CO ▪ UNDP RCU ▪ External Consultants (i.e. evaluation team)	Indicative cost: 40,000	At least three months before the end of project implementation
Project Terminal Report	▪ Project manager with inputs from various team members ▪ UNDP CO ▪ local consultant	0	At least three months before the end of the project
Audit	▪ UNDP CO ▪ Project manager and team	Indicative cost per year: 3,000	Yearly
Visits to field sites	▪ UNDP CO ▪ UNDP RCU (as appropriate) ▪ Municipality and Government representatives	For GEF supported projects, paid from IA fees and operational budget	Yearly
TOTAL COST Excluding project team staff time and UNDP staff and travel expenses		US$ 125,000 (2.5% of total budget)	

An <u>Inception Workshop</u> report is a key reference document and must be prepared and shared with participants to formalize various agreements and plans decided during the meeting.

Quarterly

99. Progress made shall be monitored in the UNDP Enhanced Results Based Management Platform. Based on the initial risk analysis submitted, the **risk log** shall be regularly updated in ATLAS. Based on the information recorded in ATLAS, Project Progress Reports (PPR) can be generated in the Executive Snapshot. Other ATLAS logs can be used to monitor other issues such as lessons learned. The use of these functions is a key indicator in the UNDP Executive Balanced Scorecard. The initial risk log can be found in Annex I.

Annually

100. The **Annual Project Review/Project Implementation Reports (APR/PIR)** will be prepared to monitor progress made since project start and in particular for the previous reporting period (30 June to 1 July). The APR/PIR combines both UNDP and GEF reporting requirements.

101. The APR/PIR includes, but is not limited to, reporting on:
    - progress made toward project objective and project outcomes, each with indicators, baseline data and end-of-project targets (cumulative);
    - project outputs delivered per project outcome (annual);
    - lessons learned and good practices;
    - AWP and other expenditure reports;
    - risk and adaptive management;
    - ATLAS QPR;
    - portfolio level indicators (most focal areas on an annual basis).

Periodic Monitoring through Site Visits

102. UNDP CO and the UNDP RCU will conduct visits to project sites based on the agreed schedule in the project's Inception Report/Annual Work Plan to assess first hand project progress. Other members of the National Steering Committee may also join these visits. A Field Visit Report/BTOR will be prepared by the CO and UNDP RCU and will be circulated no less than one month after the visit to the project team and National Steering Committee members.

Mid-Term of Project Cycle

103. The project will undergo an independent **Mid-Term Evaluation (MTE)** at the mid-point of project implementation, November 2012. The MTE will determine progress being made toward the achievement of outcomes and will identify course correction if needed. It will focus on the effectiveness, efficiency and timeliness of project implementation; will highlight issues requiring decisions and actions; and will present initial lessons learned about project design, implementation and management. Findings of this review will be incorporated as recommendations for enhanced implementation during the final half of CAST. The organization, terms of reference and timing of the MTE will be decided after consultation between the parties to the project document. The Terms of Reference for the MTE will be prepared by the UNDP CO based on guidance from the Regional Coordinating Unit and UNDP-GEF. The management response and the evaluation will be uploaded to UNDP corporate systems, in particular the <u>UNDP Evaluation Office Evaluation Resource Center (ERC)</u>.

104. The relevant GEF Focal Area Tracking Tools will also be completed during the mid-term evaluation cycle.

End of Project

105. An independent **Final Evaluation** will take place three months prior to the final National Steering Committee meeting and will be undertaken in accordance with UNDP and GEF guidance. The final evaluation will focus on the delivery of CAST results as initially planned (and as corrected after the MTE, if any such correction took place). The final evaluation will look at impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental benefits/goals. The Terms of Reference for this evaluation will be prepared by the UNDP CO based on guidance from the Regional Coordinating Unit and UNDP-GEF.

106. The Terminal Evaluation should also provide recommendations for follow-up activities and requires a management response which should be uploaded to PIMS and to the UNDP Evaluation Office Evaluation Resource Center (ERC). The relevant GEF Focal Area Tracking Tools will also be completed during the final evaluation.

107. During the last three months, the project team will prepare the Project Terminal Report. This comprehensive report will summarize the results achieved (objectives, outcomes, outputs), lessons learned, problems met and areas where results may not have been achieved. It will also lay out recommendations for any further steps that may need to be taken to ensure sustainability and replicability of the project's results.

Learning and Knowledge Sharing

108. Results from CAST will be disseminated within and beyond the project intervention zone through existing information sharing networks and forums. The project will identify and participate, as relevant and appropriate, in scientific, policy-based and/or any other networks, which may be of benefit to project implementation though lessons learned. The project will identify, analyze, and share lessons learned that might be beneficial in the design and implementation of similar future projects. There will also be a two-way flow of information between this project and other projects of a similar focus.

Legal Context

109. This document together with the CPAP signed by the Government of Kazakhstan and UNDP which is incorporated by reference, constitute together a Project Document as referred to in the Standard Basic Assistance Agreement (SBAA) and all CPAP provisions apply to this document.

110. Consistent with the Article III of the SBAA, the responsibility for the safety and security of the implementing partner and its personnel and property, and of UNDP's property in the implementing partner's custody, rests with the implementing partner. The implementing partner shall:
- put in place an appropriate security plan and maintain the security plan, taking into account the security situation in the country where the project is being carried;
- assume all risks and liabilities related to the implementing partner's security, and the full implementation of the security plan.

UNDP reserves the right to verify whether such a plan is in place, and to suggest modifications to the plan when necessary. Failure to maintain and implement an appropriate security plan as required hereunder shall be deemed a breach of this agreement.

111. The implementing partner agrees to undertake all reasonable efforts to ensure that none of the UNDP funds received pursuant to the Project Document are used to provide support to individuals or entities associated with terrorism and that the recipients of any amounts provided by UNDP

hereunder do not appear on the list maintained by the Security Council Committee established pursuant to resolution 1267 (1999). The list can be accessed via:

http://www.un.org/Docs/sc/committees/1267/1267ListEng.htm.

This provision must be included in all sub-contracts or sub-agreements entered into under this Project Document.

Annex II: Detailed CO₂ Calculations and Assumptions

Direct Emission Reductions
Direct GHG emission reductions that are attributable to CAST stem from the successful completion of the SUT demonstrations along selected corridors that will be completed with project technical assistance by Year 5. Direct GHG benefits will be derived from Components 2, 3 and 4, specifically from modal switches from cars to trolley buses and the LRT (Output 4.1.) and increased vehicle energy efficiency and integrated traffic management measures , e.g. under Output 3.1. (parking scheme).

For estimating GHG reductions from CAST, the demonstration corridors are assumed to be:

- 13 km of LRT corridor (Momyshuly - Tole-Bi – Baitursynov – Makatayev - Žetysuskaya);
- 14 km of BRT trolley corridor (Sairan Bus Terminal - Abai Ave. – Ablai Khan Auezov Str to Ablai Khan Ave up to the Almaty 2 Railway Station);
- Both corridors will have been developed with integrated traffic management measures to move traffic more efficiently.

Key assumptions used in the GHG emission reduction calculations include:

Baseline Emissions:
- Average number of passengers per car is 1.8 passengers;
- Average car fuel consumption in Almaty along demonstration SUT corridors is 13 liters/100 km;
- Average number of passengers along Tole-Bi LRT corridor and Abai Avenue BRT corridor is 71,100 persons and 115,250 persons respectively based on 2007 data[23];
- Based on 2007 data, 2007 traffic volumes along Tole-Bi LRT corridor and Abai Avenue BRT corridor estimated to be 40,000 and 64,000 cars respectively;
- Estimated LRT corridor traffic volume in 2011 is:
    o 54,000 cars for 16 hours in two directions (assume 9% growth annually until 2011 after which car volumes level off due to road network capacity constraints); fuel consumption is 91,260 liters of petrol (13 km * 54,000 cars * 13 l/100 km);
    o Six bus routes with 120 large buses traveling a total of 25,000 km annually. Bus fuel consumption is 10,000 litres of diesel fuel (25,000 km x 40 litres/100 km);
- Estimated BRT corridor traffic volume in 2011 is:
    o 63,000 cars for 16 hours in two directions (assume no growth from 2007 data); fuel consumption is 114,660 litres of petrol (14 km * 63 000 cars * 13 l/100 km);
    o Five bus routes with 105 large buses travelling a total of 23,500 km annually. Bus fuel consumption is 9,400 litres of diesel fuel (23,500 km x 40 litres/100 km).
- Total petrol consumed daily is 205,920 liters petrol equivalent to 482 tonnes CO_2 daily or <u>127,000 tonnes CO_2 per year</u> (2.34 kg CO_2/liter gasoline or 0.63 kg carbon/liter gasoline over 22x12 days per year);
- Total diesel consumed daily is 19,400 liters diesel equivalent to 52 tonnes CO_2 daily or <u>14,000 tonnes CO_2 per year</u> (2.68 kg CO_2/liter diesel or 0.73 kg carbon/liter diesel over 22x12 days per year);
- Total <u>baseline emissions is 141,000 tonnes CO_2 annually</u>.

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[23] Worley Parsons Draft Transit System Recommendations for Almaty LRT Feasibility Study 2010, page 47

Project Emissions:

- LRT and BRT capacity is 44,000 and 94,000 passengers per 16-hr day;
- Capacity of each LRT car is 134 passengers of which 25% of passengers switch modes from private cars to LRT;
- Capacity of each trolley bus is 67 passengers of which 25% of passengers switch modes from private car to BRT;
- Transport modal switch means 19,000 cars are parked daily to use the LRT/BRT systems (138,000 passengers x 25% / 1.8 passengers per car). This will avoid 31,750 tonnes of CO_2 emissions from (0.25 x 127,000 tonnes CO_2 or 10,123 from LRT and 21,626 from BRT);
- Project will create emissions from power required from the grid for the trams and trolleys;
- Kazakhstan grid emission factor for energy supplied to the LRT and trolley BRT is 1.355 tonnes/MWh;
- LRT emission from grid power is 1,414 kg CO_2 daily or 373 tonnes CO_2 annually. This is based LRT trams requiring 3.4 kwh/km with each tram-trip requiring 44.2 kwh of power per trip. The daily power requirement is 44.2 kwh x 2 trips x 16 hrs (assuming the number of trams in operation simultaneously is 14, spaced 2 km apart along the route with each round trip taking 1 hour);
- BRT emissions from grid power is 2,330 kg CO_2 daily or 615 tonnes CO_2 annually. This is BRT trolleys requiring 2.6 kwh/km with each tram-trip requiring 36.4 kwh of power. The daily power requirement is 36.4 kwh x 2 trips x 16 hrs (assuming the number of BRT trolleys in operation simultaneously is 28, spaced 1 km apart along the route with each round trip taking 1 hour);
- Avoided emissions by the project is 30,762 tonnes CO_2 annually (31,750 – 373 – 615 tonnes CO_2 or 9,750 tonnes CO_2 (10,123-373) from LRT and 21,011 tonnes CO_2 (21,626-615) from BRT);
- GHG benefits from integrated traffic measures (ITMs) are already counted by the modal switches. If there were no ITMs along these demo corridors, LRT and BRT trolley transport would not provide efficient transport and thus would not compete with the private car;
- GHG benefits from integrated traffic measures (ITMs) are already counted by the modal switches. If there were no ITMs along these demo corridors, LRT and BRT trolley transport would not provide efficient transport and thus would not compete with the private car;
- *Average useful life of the LRT and BRT systems is 20 years*

Annual Reduction: 30,761 tonnes CO_2/year

Therefore, the total direct GHG emission reductions from the SUT demonstration attributable to CAST is 615,220 of CO_2 over 20 years.

Indirect Emission Reductions

Through the lessons learnt from the demonstration SUT, and the creation of the enabling institutional and regulatory environment created under CAST (specifically under Outputs 1.1-1.4, Outputs 2.1-2.2, Output 3.2), it is expected that the design, development and implementation of the SUT systems along other corridors will be facilitated. CAST is expected to raise the confidence of the municipality and city authorities to consider and implement other

SUT systems and measures. In this respect, any CO_2 emission reductions from these efforts by Almaty authorities in the future can be considered as indirect CO_2 emission reductions. Other corridors that could be developed over the next 10 years after the completion of CAST include:

- Raiymbek Avenue for BRT (15 km);
- Gogol – Aurezov Corridor for trolleys (12 km);
- Seifullin – Timiriyazev corridor for trolleys (20 km);
- Kunaev - Shevchenko – Zharokov – Toraigyrov corridor for LRT (16 km)

Therefore, the indirect emission reductions from successful SUT projects with CAST involvement can be calculated as follows: CO_2 indirect = 615,220 x (63/27) = 1.43 million tonnes of CO_2.

Energy Savings

Energy savings were calculated by fuel saved through 19,000 parked cars per day that have switched to public transport. Each parked car avoids consumption of 1.7 litres of petrol each day. If the fuel efficiency of each car is 13 liters/100 km, then 32,110 litres of petrol are saved each day. Assuming 35 MJ/litre of petrol, 1.124 million MJ or 26.8 TOE is saved each day or 7,075 TOE is saved each year (over 12 x 22 days).