

H.3.2 Development of Free Economic Zone (FEZ)

A free economic zone (FEZ) has previously been established in Karakol for the promotion of export-oriented industries. Unfortunately, enterprises established in this FEZ were not successfully operated due mainly to a lack of incentives and other privileges provided to those enterprises for promotion of exports. The Oblast Administration has recently announced that newly created FEZs will be established in Balykchy and Tamchy with stricter regulations on incentives and privileges.

Development of FEZs in the Issyk-Kul zone is considered to be one of the strategies to promote FDIs for accelerated development of industries in the region. They should, however, be developed based on strategies formulated specifically for that purpose. For example, the potential and promising sub-sectors of industry for the Balykchy FEZ and Tamchy FEZ appears to include the following.

Table H.25 Potential Sub-Sector for Location in FEZs

Balykchy FEZ	Tamchy FEZ
Logistics service industry, e.g., Packaging (bottling, packing, etc.) Labelling, printing Truck terminal and distribution Industry, including storages Pharmaceutical industry Herb and essential oil distilling Processing of medical materials Biological industry	IT-software industry Pharmaceutical industry Hotel/sanatorium industry Specific cultural facilities like Petroglyphes, gardens/parks Leisure industry and parks Goldsmiths and precious stones Storage and distribution industry Export-related service industry

It should be recalled that the industries to be located in these FEZs should be pollution-free in view of the need to protect the environment along the Lake. It is also noted that hotels and other tourism industries to be located in Tamchy FEZ should be differentiated from investments in other areas, defining, for example, that the FEZ enterprises should involve some public services such as adjoining petroglyphes or stone parks, which are open to the public.

For planning of the Balykchy FEZ, four alternative locations have been selected after discussions with SCAC and RIATB and a comparison of the technical, economic and environmental viewpoints of each. Their selected locations are shown in the following map.

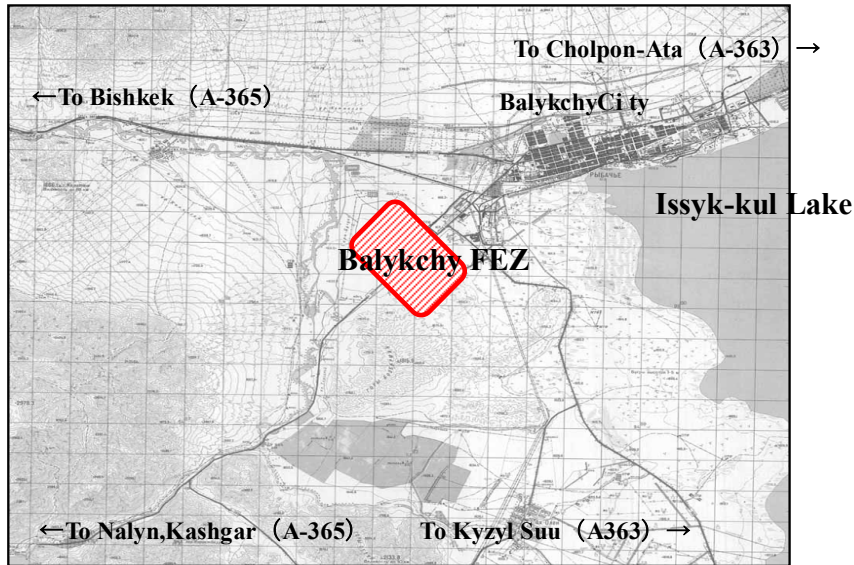


Figure H.2 Location of Balykchy FEZ

Based on the preliminary evaluation of potential sub-sectors of industries and their locations, a layout of the Balykchy FEZ has been determined as illustrated in the following.

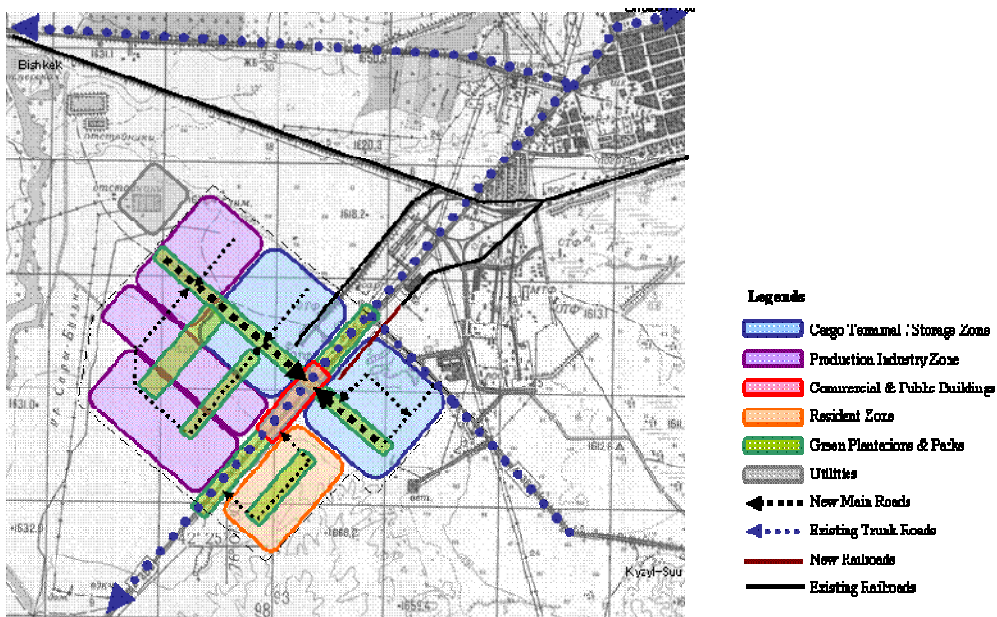


Figure H.3 Preliminary Layout of Balykchy FEZ
(Full Stage)

A preliminary layout of the Tamchy FEZ has also been elaborated as shown on the following figure. As seen from the layout, it is desirable that the Tamchy FEZ be implemented in line with the expansion and improvement of the Issyk-Kul international airport at Tamchy and the water transport terminal.

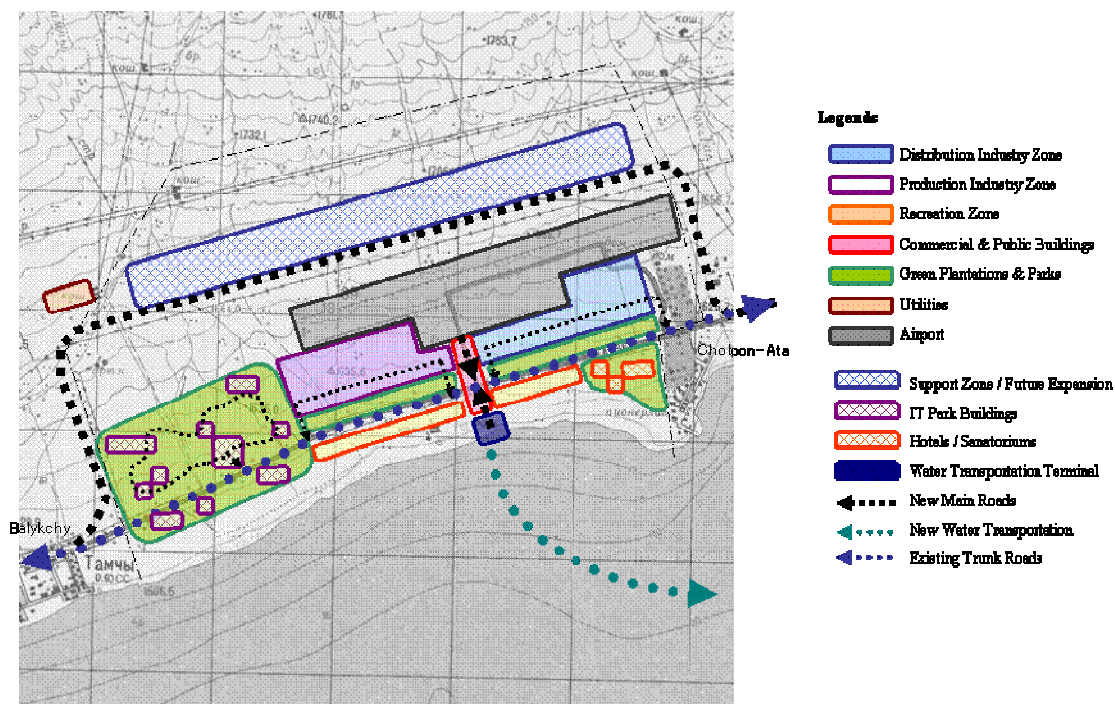


Figure H.4 Preliminary Layout of Tamchy FEZ (Full Stage)

For the implementation of FEZs in the Issyk-Kul zone, it is planned that FDIs would be promoted with some financial incentives (refer to FDIs as discussed later in Chapter 14). It should also be noted that development of FEZs in a single stage is impractical. They should be implemented in a staged development in line with the increasing number of tourist arrivals and development of local industries, as outlined under this master plan.

SECTOR I

INFRASTRUCTURE DEVELOPMENT PLAN

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I. INFRASTRUCTURE DEVELOPMENT PLAN

I.1 Water Supply and Waste Water Treatment

I.1.1 Current Conditions

(1) Water Supply

1) Overview

Seven urban centers in the Issyk-Kul Oblast have water supply systems, while the rural water supply systems are working in small towns and remote areas. Water is served to each household by direct connection or public water stand. Those systems were constructed in former Soviet times and have already become superannuated due to insufficient maintenance.

These systems are facing several serious problems. Rising electricity tariffs are the cause of high operation costs and unorganized fee collection, superannuated facilities, and unqualified water needs to be solved.

2) System and conditions

Centralized water supply system

Groundwater is the main water resource in the Oblast and surface water resources are explored where groundwater yield is insufficient to meet the demand. Even though the simple purification methods like chlorination, filtering or sedimentation were utilized for the water supply system in the Issyk-Kul Oblast, some facilities or equipment are in poor condition.

Superannuated facilities sometimes cause shortage of water supply. In the summer peak season, shortage of water in hilltop areas or high-rise buildings is seen. In the winter season, there is also the problem of water quality deterioration, which is caused due to the decrease of surface water volume.

The water supply system was designed and constructed in former Soviet times and the economic aspects were not taken into account in the planning and design stage. Wells located 100m lower than the service area need high electricity costs for water conveyance. This is the reason why the price of water is relatively high in Balykchy and Cholpon-Ata. Moreover, the price of electricity has tripled in the past several years and the economic problems of the water supply sector are worsening. Thus, some towns have plans to explore surface water availability, which will not cost much in operation and maintenance work.

Rural Area

It is said that only half the villages are equipped with a water supply system in the Republic. The rate of access to safe water in rural areas is decreasing due to lack of enough funds or subsidies for the maintenance of existing facilities.

3) Operation Organization

Currently VodaCanal of each Rayon or municipality operates water supply systems, but it is facing many economic and physical problems. Due to lack of technology and management knowledge, water charge collection is insufficient for sound management.

Table I.1 Water Supply Systems in 3 cities

City	Karakol	Cholpon- Ata	Balykchy
Main Water Resources	Surface Water	Surface Water (Aral River) Groundwater	Groundwater(15 wells)
Facilities	Intake, Sedimentation Pond	Intake, Well (70m-100m depth)	Well (70m-200m Depth)
Total Length of Distribution Pipeline	176km	84km	165km
Number of user	41,700 users	6,930 House holds (77% of population)	13,971 (21Entities)
Price (per m3)	1.07 som (Personal) 10.4 som (Entities)	(Personal) 1.0-2.3 Som (Entities) 9.0-20.58 Som	3.88 Som
Daily Consumption	Maximum Capacity, 30,000 m ³ /day	5,000 m ³ /day (Off-peak)	15,000 - 20,000m ³ /day
Number of staff	150 Staff	70 Staff	80 Staff

Source JICA Study Team, Profile of Karakol City

(2)Waste Water Treatment System

1) Overview

Centralized waste water treatment systems operate in three cities, Karakol Balykchy and Cholpon-Ata, while the septic tank system is common in the rural areas of the Issyk-Kul zone.

VodaCanal of each town is the main operating body of the sewerage system, while each public company at the Rayon level is in charge of collection of solid waste and sludge of septic tanks. After independence, those facilities have not been well maintained and operated.

2) System and conditions

The centralized sewerage system consists of the sewer and treatment plant. Treated water of the treatment plant is sprayed to farm gardens and discharged into the Issyk-Kul Lake watershed in Karakol and Cholpon- Ata, while treated water flows into Chui River in Balykchy.

The design concept for these sewerage systems lacks any economic viability. For example, Cholpon-Ata treatment plant is located approximately 100m above the elevation of the city

and is consuming a lot of electricity for pumping. This concept makes low cost operation difficult.

Almost all facilities are deteriorated because of lack of re-investment and poor maintenance. Only some parts of treatment facilities are working because of lack of spare parts, and inadequate construction works. In 1995, BOD water quality of treated water discharged from the treatment plant was about 150 ppm, which was five times larger than the design quality.

Furthermore, the pumping station in Cholpon-Ata installed to send wastewater to the sewage treatment plant is under emergency conditions. Three out of five installed pumps are already out of use due to inadequate maintenance and two remaining pumps are insufficient in case of emergency increases in waste water volume during the peak season. Once a pump is damaged and stopped by some reason, raw waste water will spill out into Issyk-Kul Lake.

Table I.2 Summary of Sewerage System in 3Cities

	Karakol	Cholpon-Ata	Balykchy
Treatment Plant Type	Mechanical Biological	Mechanical Biological (not working)	Mechanical Treatment Biological (not working)
Capacity of Treatment Plant	22,000m3/day	35,000m3 /day	36,000m3/day
Discharge	River (Issyk-Kul Water shed)	Farm Garden (Issyk-Kul Water shed)	Farm Garden (Chuy River Basin)
Length of Trunk Sewer	110km	47km	122km
Record of Treatment	--	12,000m3/day (Summer) 5,500 m3/day (Winter)	20,000m3/day
No of Client	13,362	3,309	10,000
Tariff Rate (KGS/m3)	1.07(Domestic)	2.3 (Domestic) 19.12 (Entities)	2.61(Domestic) 15.80(Entities)

Source JST and Profile of Karakol City

The treatment plant in Karakol has operating secondary treatment facilities, while those at Cholpon-Ata and Balykchy are not operating. Thus, it is estimated that effluent of the plant is 120 to 200 ppm of BOD. Discharging effluent to Issyk-kul Lake may affect water pollution of both lake and groundwater. Rehabilitation of Cholpon-Ata waste water treatment facilities is highly recommended.

3) Operations Organization

VodaCanal is also operating and maintaining the waste water treatment system in a similar way to the water supply system. However, they cannot collect sufficient tariff charges for adequate maintenance. Revisions of tariff charging systems should be taken into account because people are not willing to pay for treatment costs.

(3) Operation Data of VodaCanal

According to the following table, which shows the balance of VodaCanal, waste water management may have a deficit, while the water supply business is profitable.

Table I-3 Balance of VodaCanal Operation as of 2002

		Som		
		Karakol	Cholpon-Ata	Balykchy*
Water Supply	Income	7,436,299	2,105,696	4,238,531
	Expenditure	3,207,228	1,698,148	4,012,080
	Balance	4,229,071	407,548	226,451
Waste Water Treatment	Income	3,507,242	1,395,626	2,448,369
	Expenditure	7,717,232	2,352,316	2,674,720
	Balance	-4,209,990	-956,690	-226,451
Total	Income	10,943,541	3,501,322	6,686,800
	Expenditure	10,924,460	4,050,464	6,686,800
	Balance	19,081	-549,142	0

*Subsidy is included

Reasons for unsatisfactory operation of the waste water treatment business follow:

- Sewerage operation is much more expensive than that of water supply due to huge costs of materials including electricity.
- Revenue of sewerage business is not as large compared with water supply due to smaller numbers of customers.
- Separate fee collection system of water supply and waste water treatment may influence this lower revenue of the sewerage business.

(4) Donor's Assistance in This Sector

The following table shows donor assistance in the water supply and sewerage sector. The Small Town Infrastructure Project, Karakol Water Supply Project, and Efficient Water Supply Operations are related to the capacity building of VodaCanal. Rural Water Supply and Sanitation Project managed by World Bank is important in providing safe water in the rural area.

Table I.4 Donor's Assistance in Water Supply and Sewerage Sector

Donor	Project/ Program	Period	Target Area	Activity	Remarks
Swiss Development Cooperation	Karakol Water Supply Project	2005 -	Karakol Town	Rehabilitation of Water Supply Facilities and Capacity Building	10 mil. USD Grant
World Bank (ARIS)	Small Town Infrastructure Development Project	2005 -	Cholpon-Ata Town	Capacity Building for Town Hall, Improvement of Water Supply Facilities	25 thousand USD Loan, Cooperated with Urban Institute
World Bank	Rural Water Supply and Sanitation Project	2001-2008	Rural area of Naryn oblast, Talas oblast and Issyk-kul oblast	Community Based Construction and Management of Small Scale Water Supply	15 mil. USD Loan
DFID	Rural Water Supply and Sanitation Project	2001-2008	Ditto	Ditto, Technical Assistance for Hygiene Education	Cooperated with WB Project
USAID, (Urban Institute)	Efficient Water Supply Operations	2004-	Balykchy Town	Capacity Building for VodaCanal	-

I.1.2 Future Demand Projection

Future water demand is projected as shown below.

Table I.5 Water Demand of 3 Cities in Issyk-Kul Oblast

	Current Capacity (m3/day)	2003	2010	2025
Karakol	30,000	15,000	23,000	37,000
Balykchy	20,000	4,000	7,000	12,000
Cholpon-Ata	-	12,000	16,000	33,000

Source: JST

Table I.6 Sewerage Demand of 3 Cities in Issyk-Kul Oblast

	Current Capacity (m3/day)	2003	2010	2025
Karakol	22,000	7,500	13,800	25,900
Balykchy	36,000	3,600	6,300	10,800
Cholpon-Ata	35,000	11,000	14,000	30,000

Source: JST

Table I.7 Unit rate of Water Consumption per Capita

Unit Rate	Unit: Lit/day		
	2003	2010	2025
Unit Rate for Resident	65	90	120
Unit Rate for Tourist	250	275	300

Source: JST

Table I.8 Water Consumption Ratio by Sector

Average Consumption by Sector	Unit: Lit/day		
	Balykchy	Cholpon-ata	Karakol
Agriculture	20	10	10
Population	60	30	30
Industry	20	60	60

Source: JST

Table I.9 Recovery Ratio for Sewerage

	2003	2010	2025
Karakol	50%	60%	70%
Balukchy	90%	90%	90%
Cholpon-ata	10%	60%	60%

Source: JST

I.1.3 Issues to be addressed in the Master Plan

(1) Water Supply

1) Access to Safe Water

As described before, the rate of access to safe water in Issyk-Kul Oblast is very low, especially in the rural area. Recently, rural water supply projects funded by the World Bank

have succeeded in improving the situation. To continue these efforts by involving local government will effectively increase the rate of access to safe water.

2) Surface Water Development in Urban Area

In the Soviet times, water resources were dependent on groundwater, which has now become inefficient because of the high electricity cost. This has resulted in high water service prices. Therefore, shifting to low-cost water resources is urgently needed for sound management of the water supply business. It is also needed to solve the insufficient water supply capacity.

3) Promotion of Stable Operation

Collection ratio of charge is low not only because of the expensive tariff but also the ineffective collecting system. Due to insufficient collection of charges, it is difficult to implement related activities such as technical skill renovation and capacity building necessary to maintain proper maintenance.

(2) Waste Water Treatment

1) Rehabilitation of the Existing System

Since independence, the sewage disposal system has been weakened without proper maintenance due to shortages of funds and technical skills. As a result, quality of treatment has deteriorated and the system is currently under danger of collapse. Although the future sewage volume is not estimated to reach the capacity of treatment plants at Cholpon-Ata and Balykchy, as shown Table I.6, superannuated facilities of the system should be renovated urgently.

2) Promotion of Stable Operation

The situation of the operating body for waste water treatment is similar to the water supply system. They are facing the same type of problem such as a weak tariff collection system and lack of technical skills and insufficient funding.

I.1.4 Strategy for Development

(1) Water Supply

Surface water resources have being developed in Issyk-Kul Oblast to substitute the ground water resources through the cooperation of the World Bank (WB) and UNDP. However, development of pre-treatment facilities of water intakes has been delayed and further cooperation is necessary. Integrated development with the cooperation of new WB schemes of Community Development and Investment Agency (ARIS) should be promoted to provide hygienic water to all communities.

VodaCanal, the operating body for three cities in Issyk-Kul zone, which is in charge of water supply and waste water treatment businesses, should be empowered to soundly manage and

operate the water supply business. An appropriate collection system for the water charge, viable financial management, and retraining of technical staff will be necessary for VodaCanal.

(2) Waste water treatment

Rehabilitation of Cholpon-Ata sewage treatment plant is urgently required as described in the environment sector. Balykchy sewage treatment plant, which requires rehabilitation due to improper operation and yet to be completed facilities, is less urgent considering it is located outside Issyk-Kul Lake catchment area. Karakol sewage treatment rehabilitation is a less urgent issue as long as the activated sludge treatment facility continues to work appropriately, although capacity expansion might be necessary in future.

VodaCanal should be empowered as described above but it is also necessary to install small scale treatment systems in rural areas.

I.2 Solid Waste Management

I.2.1 Current Conditions

Facilities and equipment of solid waste disposal were poorly developed for both domestic waste and industrial waste. The collecting system was developed but waste category separation is not done and the final dumping sites where the collected waste is sent are inadequately developed. The final dumping sites of three cities have not been equipped with leachate treatment and the dumped waste is not covered by soil. The industrial and hazardous wastes are dumped in the same sites as general garbage.

A public company, called Tazalyk at Rayon level, is in charge of both collection of solid waste and cleaning roads as well as collection of sludge from septic tanks. Tazalyk is basically operated on the basis of self-contained management, however it is reported that the financial status of the solid waste companies are not unsatisfactory. The number of households, factories and public organizations covered by collection services of Tazalyk are limited due to insufficient numbers of trucks and collecting boxes. Significant improvement is necessary in the solid waste disposal sector.

I.2.2 Future Demand Projection

The following table shows future demand projection of generation volume and collection volume.

Table I.10 Projection of Solid Waste Generation Volume in Issyk-Kul Zone

Collection Volume (m ³ /y)				Generaton Volume (m ³ /y)			
	2003	2010	2025		2003	2010	2025
Karakol	26,800	32,400	34,200	Karakol	38,300	36,000	36,000
Balykchy	16,600	19,900	22,800	Balykchy	23,700	22,100	24,000
Cholpon-Ata	3,500	4,300	8,400	Cholpon-Ata	5,000	4,800	8,800
Others	121,400	143,000	134,500	Others	173,400	158,900	141,600
Total	168,300	199,600	199,900	Total	240,400	221,800	210,400

Collection Unit Rate per household per year (2004)

Detached house=2.0m³

Apartment=1.2 m³

Average=1.6m³

Increase rate; 1.2 to 2010, 1.6 to 2025

Source: JST

Collection rate (Assumption)

2003=70%, 2010=90%, 2025=95%

I.2.3 Issues to be addressed in Master Plan

(1) Establishment of Consolidated Structure

A publicly-owned company is in charge of solid waste disposal, road maintenance etc in local cities. To strengthen viability of these organizations, less financial support from the local government is critical. During the past decade, due to the decreases in subsidies from the former Soviet Union, the level of technical skills has gradually deteriorated. It is essential to establish a proper management structure with proper income generation system.

(2) Improvement of Waste Collection and Treatment Technology

The separated waste collection system has been phased out since the collapse of the Soviet Union. As a result, hazardous waste, hospital waste and industrial waste are treated improperly and final disposal sites are not managed correctly. To protect the environment, separation treatment of hazardous waste is needed. In addition, it is essential to build a sustainable recycling system by introducing especially the bio-mass system.

(3) Raising Public Awareness

To attract more tourists into Issyk-Kul region, the landscape particularly around Issyk-Kul Lake must be kept clean and safe. To preserve the high quality lake water and to create the beautiful scenery for tourism destinations, an organized effort to control solid waste treatment is essential. For instance, promoting a cleanup campaign involving local residents is proposed as a trial.

I.2.4 Strategy for Development

Strategy for development of solid waste management is proposed below.

- Public companies handling solid waste disposal are facing difficulty due to the insufficient charge collection and budgetary reductions. Methods to make the solid waste disposal business financially viable should be urgently found to ensure an efficient charge collection.
- Introduction of separate disposal of hazardous waste and recycling of waste should be

discussed.

- Scattered rubbish is damaging the image of the international nature-oriented tourism destination of Issyk-Kul. A series of clean campaigns is recommended with participation of residents and tourists for efficient and immediate results.

I.3 Power Supply and Heating System

I.3.1 Current Conditions

Electrical power is used for domestic and industrial energy as well as for heating in the Issyk-Kul zone. It is distributed by 4 companies in Kyrgyzstan, and Vostokelectro is in charge of Issyk-Kul Oblast power supply.

(1) National Grid and Transmission Network

The Kyrgyz electricity systems form part of the Central Asian electricity system, which was developed in the Soviet era.

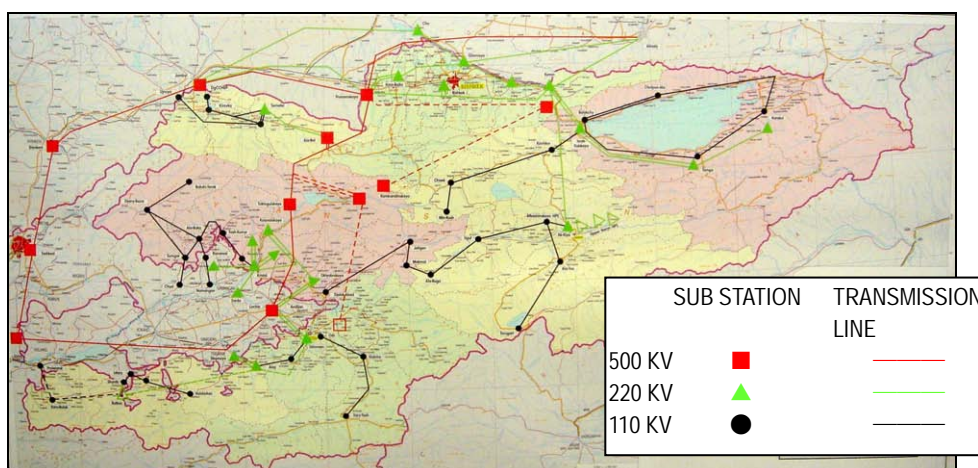
The Toktogul hydropower system is generating more than half of the energy output in the Kyrgyz Republic, and partly exporting the surplus energy. However, the power supply in the Issyk-Kul zone is unstable due mainly to the power distribution system.

Table I.11 List of Major Power Generation Plant in Issyk - Kul Area

Name of Power Plant	Type	Capacity (MW)	Production Volume 2003(GWh)
Toktogul	Hydro	1200	5665.1
Krup Sai	Hydro	800	3218.2
Shamaldai Sai	Hydro	240	995.3
Tash Kumyr	Hydro	450	1904.9
Uch Kurgan	Hydro	180	956.9
Bishkek	Thermal (Coal, Mazut and Gas)	600	946.6
Osh	Thermal (Coal, Mazut and Gas)	60	31.9

Source: Vostokelectro

In total, 18 large generation plants are operating in Kyrgyz Republic. The following table shows a summary of outstanding generation plants. Toktogul power plant has the largest capacity. As shown in the figure below, the power transmission network consists of 500KV, 220KV, 110KV lines to CIS standards. Power transmission to Issyk-Kul Oblast is linked from Bishkek to Balykchy via Kemin by 220 KV transmission lines. Balykchy substation, reconstructed in 1997 by EBRD funding, has adequate capacity for stable power transmission.

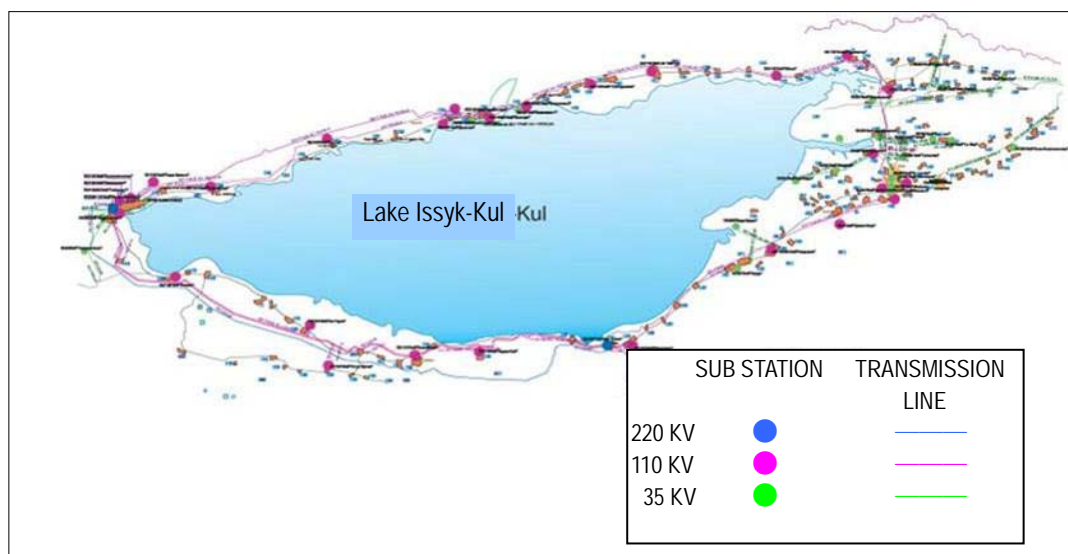


Source: RITAB

Figure I.1 Transmission Network in Kyrgyz republic

(2) Distribution Network

Power distribution through 35 kV lines is networked along the lake shore in the Issyk-Kul zone, as shown in the figure below. The capacity of substations is generally adequate to meet the present demand, but some substations are to be improved by expanding their capacity.



Source: RITAB

Figure I.2 Present Distribution Network in Issyk-Kul Oblast

Table I.12 Summary of Present Distribution Network and Facilities

Item	Unit	35 KV	110KV	Total
Extension of Lines	Single Circuit	398.66	912.81	1,311.47
	Double Circuit	75.03	21.17	96.20
	Total	473.69	933.98	1,407.67
Number and Capacity of Substations	Number/ MW	29/ 191	30/ 507.9	59/698.9

Source: RIATB

Transmission lines and substations have enough capacity, but often black outs occur due to lack of enough load distribution management, superannuated distribution facilities and

insufficient maintenance of facilities. The rehabilitation of facilities and improvement of load distribution management are necessary for stable operations.

In the longer term, power supply through the power grid would be combined with the fuel cell or alternative source to supply electric power effectively.

(3) Operation and Collecting System

The number of customers is shown in the following tables.

Table I.13 Number of Electricity Customers of Issyk-Kul Oblast

Category	Number	Remarks
Household	161,947	2002
Entities	3,312	2003, increasing in 2 or 3 % /year

Source: JST

Collection rate of power supply remains at 46.5%. It may be attributable to the lack of a suitable collecting system, as well as to the technical loss due to the superannuated facilities.

Table I.14 Rate of Technical Loss and Non Technical Loss (Kyrgyz Republic)

Electricity Losses(2002)	Rate
Power Generated	100.00
Transmitted Electricity	88.69
Distributed Electricity	75.72
Billed Electricity	56.16
Paid Electricity	46.50

Source: DfID

Table I.15 Current Tariff Structure

Households		
	Consumption KWh/month	Tiyin /kWh
Single Phase	0-149	43
	150	80
Industrial and Agricultural Consumer		
Power Rating	Som per kW	Tiyin per kWh
<150kW	0	80
>150kW	45	70
Other types of Consumer		
Category	Som per kW	Tiyin per kWh
Pumping Station		60
State and local		80
Restaurant and café		
<6kW	0	80
>=6 kW	45	80
Sauna etc	60	80

Source DFID Project Homepage, Interviews

(4) Fee Collection Status

Approximately only 70 to 80% of invoiced charges are collected. This is due not only to customer's low income levels but also the veiled financial status of the company. Customers

are suspicious about expenditure and financial accounts of the company, and they plan to disagree to any tariff increases in the near future.

Furthermore, it is said that about 6,500 customers don't have meters and almost 40,000 customers have out of dated meters, which can be easily falsified.

(5) Donor's Assistance

The following tables show assistance from donors in this sector. The World Bank and several donors are cooperating in the reform of this sector. After Kyrgyzenergo spinning off into 7 companies, privatization of distribution companies was discussed to enhance viabilities. The World Bank and several donors are starting a pilot project for reduction of commercial loss and technical loss.

Table I.16 Donor's Assistance in Power Supply Sector


Donor	Project/ Program	Period	Target Area	Activity	Remarks
World Bank	Power and District heating Rehabilitation Project (Tariff Reform)	-2005	Energy Sector	Rehabilitation of the Bishkek combined -heat-and-power plant; rehabilitation and upgrading of power transmission and distribution facilities Technical support and training;	20 mil USD Loan
DFID	Power and District heating Rehabilitation Project (Tariff Reform)	2000 -	Energy Sector	Developing a tariff policy and monitoring financial status	Cooperated with World Bank
World Bank	Power and District heating Rehabilitation Project Supplemental (Improvement of Commercial Loss)	2004 -	4 Distribution Companies	Installation of Meters for transformers Re-metering at the retail level Billing System Improvement , Technical assistance	5 mil USD Loan
World Bank	Power and District heating Rehabilitation Project Supplemental (Heating Components)	2004 -	Heating Company in Osh and Bishkek	Study for Improvement of Heating facilities Boiler improvement	Small Scale facilities might be studied in future 10 mil USD Loan
KfW	Power and District heating Rehabilitation Project (Improvement of Technical Loss)	2004 -	Severelectro	Rehabilitation of Facilities,	5 – 10mil USD Loan Cooperated with World Bank
Swiss Development Cooperation,	Power and District heating Rehabilitation Project (Improvement of Technical Loss)	2004 -	Vosoktelectro	Rehabilitation of Facilities,	10mil USD Grant Cooperated with World Bank

Source: JST

(6) Heating System

More than 100 heating systems are running in Issyk-Kul Oblast. The largest centralized one is located in Karakol city. Its supply volume, however, has been decreasing due to superannuated facilities. It is predicted that the heating system would be shifted from coal-fired energy to electric heating in line with the improvement of income levels. Furthermore, within a decade or so, co-generation by fuel cells would be disseminated at a lower price. It is, therefore, recommended that a new energy supply system in the Issyk-Kul zone based on introduction of fuel cells in a collective or independent manner be implemented.

Table I.17 Central District Heating Systems in Karakol City

Type of Thermal Plant	Coal Fired	
Capacity	60MW	
Total Length of Trunk line	24km	
Number of Customer	51 apartments and 10 organizations	
Constructed	1956	
Source	Coal	
Electrical Power Supply	Not Working	
Operation	Communal Service (State Property)	

Source: JST

I.3.2 Future Demand Projection

Peak demand of Balykchy Substation is 240 MW, which occurs in the evening during the winter season, while a peak of only 50MW occurs during summer. The following table shows peak demand projection forecast based on economic growth. This projection shows an additional substation is needed at Balykchy by 2025.

Table I.18 Projection of Electric Peak Demand in Issyk-Kul Zone

(Unit: MW)

	2003	2010	2025
Karakol	38.2	59.9	71.9
Balykchy	23.6	36.7	47.9
Cholpon-Ata	5.0	8.0	17.6
Others	173.2	264.4	282.8
Total	240.0	369.1	420.2

Source: JST

I.3.3 Issue to be addressed in the Master Plan

(1) Strengthen Viability of the Operating Structure

Reduction of both technical and financial loss, which totals 40%, is important for improving the viability of the operating system. In particular, tariff collection systems needs to be improved. The worsening financial status adversely affects every effort to empower technical capability and to upgrade facilities. Thus, the enhancement of financial status is an urgent matter.

(2) Reformation of Facilities

Some distribution facilities, such as 110kv/35kv substations and distribution lines, are old and need to be rehabilitated. Proper maintenance is also needed to improve technical loss.

(3) Introduction of Alternative Energy

Many hot water supply systems operated by coal fuel are now superannuated. The existing coal fired plants are causing damage to the environment, thus their substitution in future is recommended. There are several alternative power sources such as solar heating, electricity, hydrogen fuel cell, micro hydro power, etc.

(4) Improvement of Fee Collection System (Heating System)

As mentioned above, coal-fired plants shall be substituted although in the short run there is still a need to keep the system. The current system is heavily dependent on subsidies from the government in addition to fees collected from users. A subsidy system will possibly fade out at some future point as in other sectors, thus it is crucial to consider strategies to survive and find a way to become financially independent.

I.3.4 Strategy for Development

(1) Electric Supply

Some 40% of generated electricity was lost due to unpaid electric utilization (25%) and technical loss in the distribution network (15%). Vostokelectro, Energy Distribution Corporation, should improve the financial management viability and carry out technical upgrading and rehabilitation of distribution facilities, which cause frequent black outs in three cities of Issyk-Kul zone.

(2) Heating System

A large scale central heating system in Karakol and more than 100 heating systems are presently operating using coal fuel in Issyk-Kul zone. However, due to environmental awareness as well as necessary replacement of superannuated facilities, new energy resources will be necessary in future. Conventional electric heating for independent houses as well as new technology resources such as solar power, fuel cell, biogas, etc. could be examined as an earlier substitution.

However, social demands for the heating system are too high to terminate by sudden notice and operation should be kept for the medium term. Necessary maintenance and repair work should be done together with appropriate management and operation of the system through the establishment of a proper charging system at the same times as the gradual decrease of governmental subsidies.

I.4 Telecommunications

I.4.1 Current Conditions

In line with the progress of privatization in the telecommunication sector, Kyrgyz Telecom, the main telecommunication operating body in Kyrgyzstan, became a joint stock company. Kyrgyz Telecom started some investment and renewal works on superannuated facilities with the cooperation of foreign aid and FDI. Kyrgyz Telecom has provided several services as listed.

- a) Fixed Phone,
- b) Telegraph,
- c) Radio Broadcasting; and
- d) TV Broadcasting.

Mobile phone and Internet service are provided by subsidiary companies of Kyrgyz Telecom.

Present telecommunication service levels in the Issyk-Kul Oblast are 5.4 connections per 100 people in rural areas, and 17.8 connections per 100 people in urban areas.

(1) National Grid Network Scheme

A trunk line was connected from Bishkek, the gateway to international connections, to Karakol through Cholpon-Ata and Kadji-sai by microwave digital circuit. A high capacity STM-4 (622Mbps) fiber optics is being planned for installation from Bishkek- Kemin - Karakol.

To make it effective, replacement of the superannuated analog switching stations is also necessary. Kyrgyz Telecom gives the first priority to Cholpon-Ata area in consideration of its attractiveness as a tourism area, and secondly to Balykchy as a gateway of the Issyk-Kul Oblast, and thirdly to Karakol. Though Cholpon-Ata has a higher service level at 39 lines per 100 persons, utmost priority was given in the tourism center and the following development projects are scheduled.

- a) Introduction of Digital Switching Station
- b) Expansion of network to remote village (two villages)
- c) Capacity enlargement of stations at Tup

(2) Mobile Phone and Internet

Mobile phones services are provided by two companies, Kotel and Bitel, in the Issyk-Kul zone. The northern shore area of the lake is covered by 7 base transceiver stations, and the company plans to construct stations in the southern shore area. Internet services are available by dial-up in the Issyk-Kul zone.

(3) Operation Structure of Kyrgyz Telecom

Telecom Oblast Center in Karakol and branch offices in the central town of Rayon or municipality are in charge of daily maintenance and customer service. Kyrgyz Telecom has improved its services through an annual business plan, which was planned by oblast center through discussion with branch offices.

I.4.2 Future Demand Projection

The forecast demand is estimated to be three times the current capacity in 2025 in the Issyk-Kul zone, as shown below.

Table I.19 Demand Projection of Telephone Line (fixed telephone)

Area	Current Capacity	2003	2010	2025
Karakol	15,620	13,380	22,500	36,000
Balykchy	7,100	8,280	13,800	24,000
Cholpon-Ata	3,432	1,740	3,000	8,800
Others	48,082	60,720	99,300	141,600
Total	74,234	84,120	138,600	210,400

Rate for Access 2003: 20lines/100 pup. 32 lines/100 pop. 40 lines/100 pop.
Source: JST

I.4.3 Issue to be addressed in the Master Plan

(1) Improvement of Access to High Speed Network

In 1997, a trunk high speed network to Bishkek was constructed, however due to the growing demand for internet access, further investment for the improvement of both trunk lines and switching facilities will be necessary.

(2) Extension of Network to End users

The present service rate of 5.39 lines in the rural area is much lower than the required national standard level and the expansion of the network to rural areas needs to be improved continuously.

I.4.4 Strategy for Development

A telecommunication ring with high quality telecommunication services should be installed around Issyk-Kul zone to upgrade various information services, especially in the tourism sector, in which IT accommodation reservation and IT advertisement are the basic requirement for recent promotion of demand. Moreover, installment of optical fiber cable and rehabilitation of telephone exchanges will be necessary for promoting the investment of an IT software industry in Issyk-Kul zone.

I.5 Transportation

I.5.1 Introduction

There are some imposing ideas about transport development in Issyk-Kul Zone: upgrading Cholpon-Ata – Almaty Road, construction of Bedel Pass international motor road, construction of Sary Jaz international motor road, construction of Almaty-Kemin international motor road, extension of railway from Balykchy up to Cholpon-Ata, construction of a by-pass road of Issyk-Kul Ring Road, and so on. These attractive ideas seem to come from an eagerness to improve international accessibility to this region.

However, most of these projects are not included in the Master Plan – in particular any construction project of a new international motor road has not been adopted. The Study has concluded that the Issyk-Kul Zone should be developed in such a manner that the number of tourist arrivals never cause a heavy burden to the ecosystem of Issyk-Kul Lake, which means that the existing network is sufficient for tourism development. Therefore, instead of expanding the network system, the Master Plan proposed to rehabilitate and maintain the existing infrastructure.

During the study period, the runway extension of Issyk-Kul International Airport has been a topic in which many people are interested. The JST evaluated the project in view of conformity with the Master Plan, economic validity, and financial stability.

The JICA Study Team (JST) applied the “Strategic Environmental Assessment” approach to formulate the Master Plan. JST prepared a “Discussion Paper” and “Transport Sector Report”

for discussion purposes and distributed these materials to stockholders (the counterpart and related Departments of Ministry of Transport and Communication).

Many participants of Seminars and Workshops of the JST expressed fruitful opinions regarding transport development. In addition, the Study heard many viewpoints from responsible persons of transport administrations, engineers of the private sector, and specialists of international donors, and so on.

The followings outlines the responses:

- Issyk-Kul International Airport should be expanded to accept larger aircraft from various cities.
- Accepting large aircraft will cause noise pollution, which is improper for a resort area.
- Water transport is important in view of environmental protection and road maintenance or water transport should be suspended to avoid contamination;
- Cholpon-Ata – Almaty Road should be upgraded to attract Kazakhstan tourists, or the road should not be developed in view of environmental and economic feasibility;
- Bypass road should be constructed soon to ensure traffic safety in Cholpon-Ata;
- To protect the environment from vehicles, a suitable transport system should be introduced such as: trolleybus between Balykchy and Cholpon-Ata, electrified railway between Bishkek and Balykchy, and water transport; and
- Transport network should be developed not only to support tourism, but also agricultural export.

I.5.2 Present situation

(1) Roads

1) Road network

Total lengths of roads in the Kyrgyz Republic are more than 34,000km, of which 19,000km are public roads. The basic road network of the Kyrgyz Republic is formulated by several international motor roads¹, as illustrated in the figure below.

¹ Motor roads are classified into international motor road, national motor road, and regional motor road based on their function according to the Law of the Kyrgyz Republic “On motor roads”.

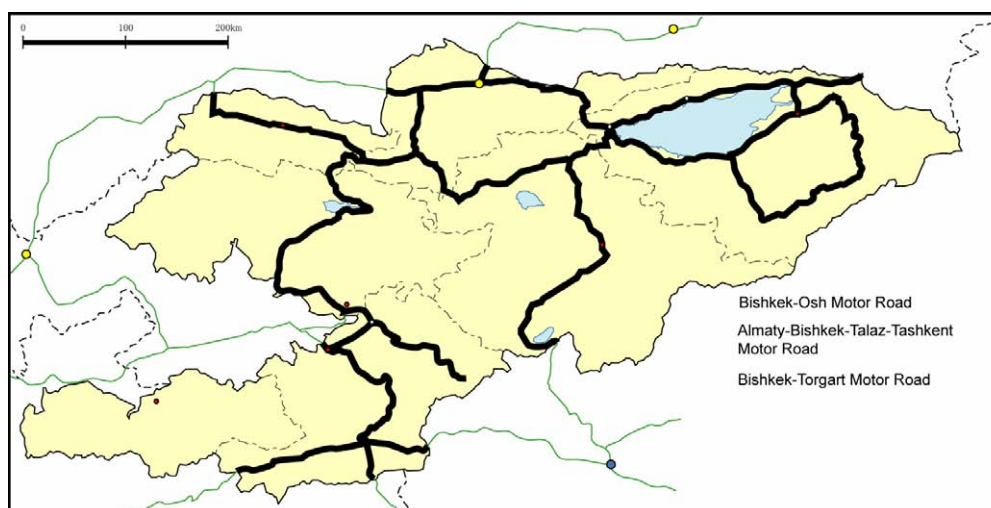


Figure I.3 International Motor Road in the Kyrgyz Republic

In Issyk-Kul Zone, the following three international motor roads form the basic structure of the transport network:

Bishkek – Balykchy -Torugart motor road (539km): This motor road functions not only as an international road between Bishkek and Kashgar (PRC) but also as an inter-oblast road connecting the east part of the Kyrgyz Republic (Chui, Issyk-Kul, and Narin) north and south.

Issyk-Kul Ring road (438km): This ring road circles around Issyk-Kul Lake along a length of 218km on the northern part from Balykchy to Karakol and 220km on the southern part. Approximately one third of the pavement of Issyk-Kul Ring Road is below an unsatisfactory condition². Part of the ring road needs reconstruction, and most sections require substantial routine and periodic maintenance to keep the road in a comfortable condition.

Tup – Kegen motor road (76km): This road is used for agricultural export from the east part of Issyk-Kul Oblast. A part of the road is closed during winter due to heavy snow. The road is deteriorated in many sections from Taldy-Suu to the border of Kazakhstan; there are some places where the surface asphalt layer is completely gone, and the average free speed by a sedan is approximately 30 - 40km/hr in this section.

(2) Road Condition in Issyk-Kul Oblast

The total length of motor road in Issyk-Kul Oblast is 3,022km, consisting of 1,037km of international motor roads, 766km of national motor roads, and 1,220km of regional motor roads (in round numbers) as shown in the table below. Unpaved roads account for 68.9% of the total length of motor roads. A grid system of streets and roads³ is common in towns and villages in Issyk-Kul Zone, although many streets and roads are severely deteriorated. Travel speed by a sedan on most motor roads in rural area is about 30 -40 km/hr.

² A visual observation conducted by Kyrgyzdortransproyekt in January 2004

³ Besides motor roads, streets and roads in towns and settlements belong to another classification system defined in SNiP 30-01- 2001 “Urban Planning, Planning and building of Cities and City Type Settlements”.

Table I.20 The Length of Road by Pavement Type (km)

	Total	Concrete	Bituminous	Blacktop	Gravel	Sand
International motor road	992*	-	490.6 (49.5%)	192.4 (19.4%)	309.0 (31.1%)	-
National motor road	766	4.7 (0.6%)	80.0 (10.4%)	42.0 (5.5%)	546.3 (71.3%)	93.0 (12.1%)
Regional motor road	1,219.9	-	77.0 (6.3%)	42.0 (3.4%)	939.7 (77.0%)	162.5 (13.3%)
Total	2,977.9	4.7 (0.2%)	647.6 (21.7%)	265.1 (9.3%)	1,805.0 (60.3%)	255.5 (8.6%)

Source: PLUAD N4

*: 45km of the international motor road is maintained by Kumtor.

(3) Traffic Volume

Traffic volume in Issyk-Kul Zone is very small at the moment, although accurate data are limited. The annual average daily traffic (AADT) of Issyk-Kul Ring Road is about 500 – 900 along the north shore, and 400 along the south shore. AADT of the road along Boom Valley is about 2,800. There is a strong peak in the summer season in terms of yearly fluctuation of transport. According to the statistics of the number of vehicles that paid an ecological tax at the toll gate at Balykchy, the peak month is August with a peak rate of 38.7% for cars and 33.2% for trucks.

The JST conducted 16-hours of traffic volume surveys at several points in Issyk-Kul Zone as shown in the table below.

Table I.21 Traffic Volume Data

	Car	Minibus	Bus	Truck	Total
May 27, 2004 (Wednesday)					
Boom Valley	1,536	41	33	246	1,856
July 16, 2004 (Friday)					
Boom Valley	3,467	538	130	296	4,476
Balykchy – Cholpon-Ata	2,810	520	136	223	3,689
Kajy-Say – Tamga	214	57	19	50	340

Source: JST

(4) Passenger transport

There are 65 public transport routes within Issyk-Kul Oblast, consisting of 19 intercity routes, 46 suburban routes, 16 inter-oblast routes (13 routes are from Bishkek), and three international routes, namely Karakol - Almaty, Karakol - Kegen, and Cholpon-Ata - Almaty⁴. Karakol - Kegen route is operated only in the summer season. The number of bus services on Cholpon-Ata - Almaty route increases to 25 in summer from one in other seasons. From Karakol to Bishkek, it takes approximately 6 hours by minibus and 8 hours by bus with the fares being 300 soms and 160 soms, respectively. Public transport is regularly operated on schedule, and frequency is relatively high considering the low density of the population. However, vehicles are old and unsatisfactory for trips, and the cost of the long-distance route is not cheap for local people.

⁴ Kyrgyz Transport Inspector, October 2003

(5) Institutional Aspect

International and national motor roads in Issyk-Kul Oblast are maintained by PLUAD N4⁵, except for the roads in Balykchy town, Cholpon-Ata town, and Karakol town. These towns maintain all their own public roads. Issyk-Kul Oblast is responsible for maintenance of regional motor roads, but these are usually deteriorated due to lack of budget. It appears that administrative classification does not coincide with functional hierarchy: some international and national motor roads do not function at national level anymore, while these motor roads are important at Oblast level.

For road maintenance of Issyk-Kul Ring Road, about 7 – 8 million soms per year (0.18 to 0.2 million USD) is allocated, which means only US\$430 per km is spent to maintain the important roads annually. This suggests only emergency repair works are done and there is minimal routine maintenance activity. It would be ideal if over US\$2,000 per km would be used for routine maintenance work.

Deterioration of roads is usually caused by lack of adequate routine maintenance, aging of pavement, and damage from heavy trucks. Usually, 1 truck with 15 tons loaded causes 7,700 times the damage of one passenger car. According to the Law of the Kyrgyz Republic “On motor roads”, it is possible to charge some kind of tax on heavy vehicles, but the collection system has not yet been adopted.

JST analysis revealed that traffic volume for the “average growth case” will not cause damage to the ecosystem in Issyk-Kul Zone; however, it is based on an assumption that vehicles are well inspected. There is no legal and institutional framework to regulate exhaust gas from vehicles at the moment.

I.5.3 Rail transport

Railway transport in the Kyrgyz accounts for only 3% of all freight transportation and 0.1% of all passenger transportation; however, it plays an important role for international transportation as a part of the railway network system of CIS countries.

The Kyrgyz Railway owns 423.9km of railway track of which 322.7km are located in the northern part and 101.2km in the southern part of the Kyrgyz Republic. Trains with diesel traction are operated on the single track with a broad gauge 1520mm between Bishkek and Balykchy. The railway is well maintained to meet the current transportation demand although the system is relatively old. Oil products are the major freight from Bishkek while coal and sand are the major freight from Rybachie.

A passenger train of 4 cars is operated daily at a fare of 45 soms in the summer season⁶. It takes 4 hours and 40 minutes from Bishkek to Rybachie, and the major passengers are Kyrgyz people; the number of international tourists is very small. The number of passengers between Bishkek and Balykchy (entire section) is about 2,000 per summer season.

⁵ PLUAD N4 is a division of Ministry of Transport and Communications.

⁶ The Kyrgyz Republic Distribution Network Research

I.5.4 Air transport

Manas International Airport is located 30km northwest of Bishkek, with a 4,600m runway. The first phase of a modernization project was completed in 2000 using a JBIC Yen loan; after that the number of passenger and freight has increased and reached 380,515 in 2003 (arrivals and departures). Domestic passengers account for 30.1% of the total passengers at Manas International Airport. As for international flights, passengers from/to Russia account for 26.1%, followed by passengers from/to Turkey at 11.8%, and German at 6.7%. Passenger volume between Bishkek and Urmchi is larger than that between Bishkek and Tashkent.

Osh International Airport came into operation in 1962 but no capital repairs have been carried out, and its runway is so deteriorated that aircraft limitations have been applied since 1990.

There are two airports in Issyk-Kul Zone; Issyk-Kul International Airport (former Tamchy Airport) and Karakol Airport. Issyk-Kul International Airport, having 2000×45m runway, is located 35km to the west of Cholpon-Ata and 5km to the east of Tamchy. Construction of Tamchy Airport was started in 1975 but the second phase of the project was suspended in 1982 due to lack of budget. The airport was reconstructed last year and came into operation on August 9, 2003 as Issyk-Kul International Airport. JSC Manas International Airport bears maintenance costs of Issyk-Kul International Airport and Karakol Airport. There was another small airport in Tamga village located on the southern shore of Issyk-Kul Lake, which was closed in 1986.

There are some concerns about the airspace of Issyk-Kul International Airport and Karakol Airport. The two airports do not satisfy the restriction of airspace; nevertheless exceptional permission was given to the construction because of the importance for military use in the Soviet era. The north side of the horizontal surface of Issyk-Kul International Airport cuts the mountain.

I.5.5 Water transport

A stock company “Issyk-Kul Liner” provides freight transportation services with two tug boats and seven barges, having jurisdiction over Rybachie port, Karakol port, and Kyrmenti wharf⁷. However, the facilities became too old to work efficiently and almost all freight ships are probably overage. Once water transport on Issyk-Kul Lake played an important role in freight transportation, but the demand has dropped rapidly in recent years. Coal is the major cargo from Rybachie to Karakol and Kyrmenti, while sand is conveyed in the opposite direction.

No passenger liner operates on the lake, but there are 15 passenger ships for excursions and many pleasure boats and yachts can be seen along the beach in summer.

⁷ Kyrmenti wharf is closed during winter due to freezing of the cove.

I.5.6 Transport Projects 1

There are few transport sector projects supported by international donors in Issyk-Kul Zone so far. Only EU-TACIS has set up a bus information system⁸ between Bishkek and Karakol under “Support to the Transport Sector in the Kyrgyz Republic” project.

There are some proposed projects that sometimes become topics of conversation regarding the development of Issyk-Kul Zone as illustrated below:

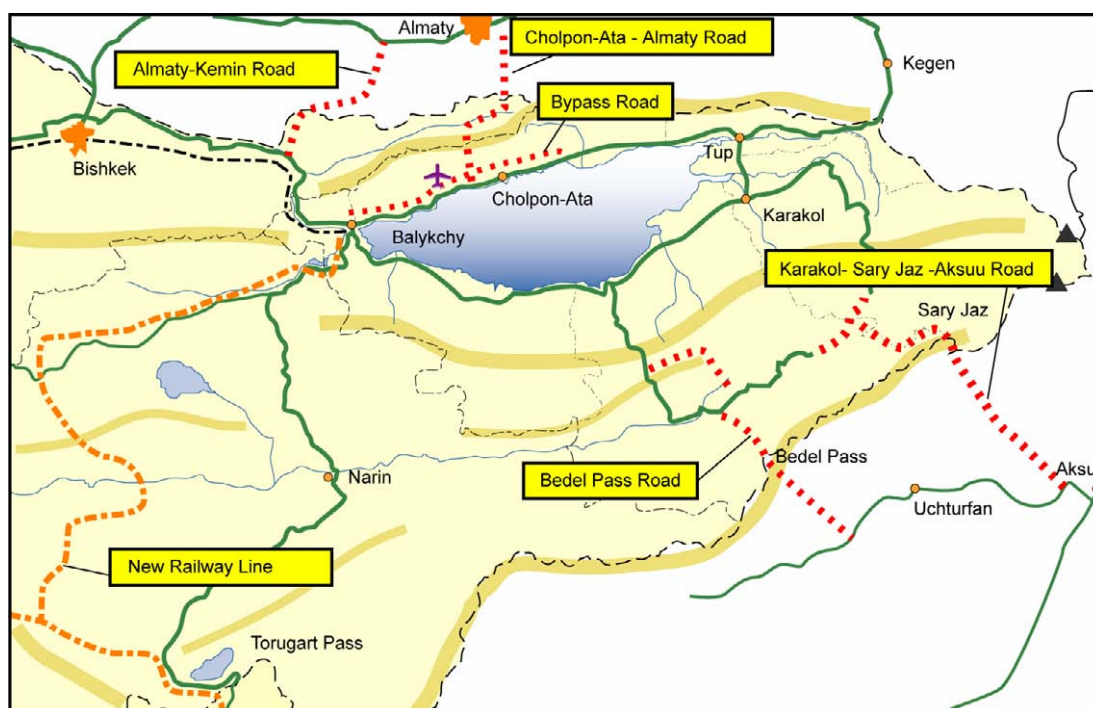


Figure I.4 Proposed Transport Projects

Among these, the following are excluded from the Master Plan in view of environmental consideration, economic viability and engineering aspects:

- Upgrade of Cholpon-Ata - Almaty road (101km);
- Construction of motor road via Bedel Pass; and
- Construction of Karakol – Sary Jaz – Aksu road.

(1) Road Project

There are many proposed projects for international motor roads in the Kyrgyz Republic. The important projects that relate to Issyk-Kul Zone are: 1) Bishkek – Balykchy – Narin - Torgurt Motor Road, and 2) Balykchy - Karakol - Balykchy - Tup - Kegen Motor Road. The second project is divided into two projects in the Master Plan as: 1) Tup- Kegen motor road and 2) Issyk-Kul Ring Road.

⁸ Passenger Information and Communication System (PICS)

(2) Railway Project

Construction of a new railway line between Rybachie and Karaketi is proposed to convey coal from the coal mine in Karaketi. There is a proposed project of a 500 km railway line linking Kashgar in PRC and Andizhan in Uzbekistan, which passes through the Kyrgyz Republic. Linking of the proposed Rybachie - Karaketi line to the Kashgar - Andizhan is also proposed. These projects are studied together under the TRACECA project as “Feasibility Study of New Rail Links between the Ferghana Valley, Bishkek and Kashgar”. The New Rail Links include 14.5km of Ferghana tunnel and 13.9km of Moldo-Too tunnel, and the study estimated the total project cost at 3,277 million EUR.

(3) Airport Project

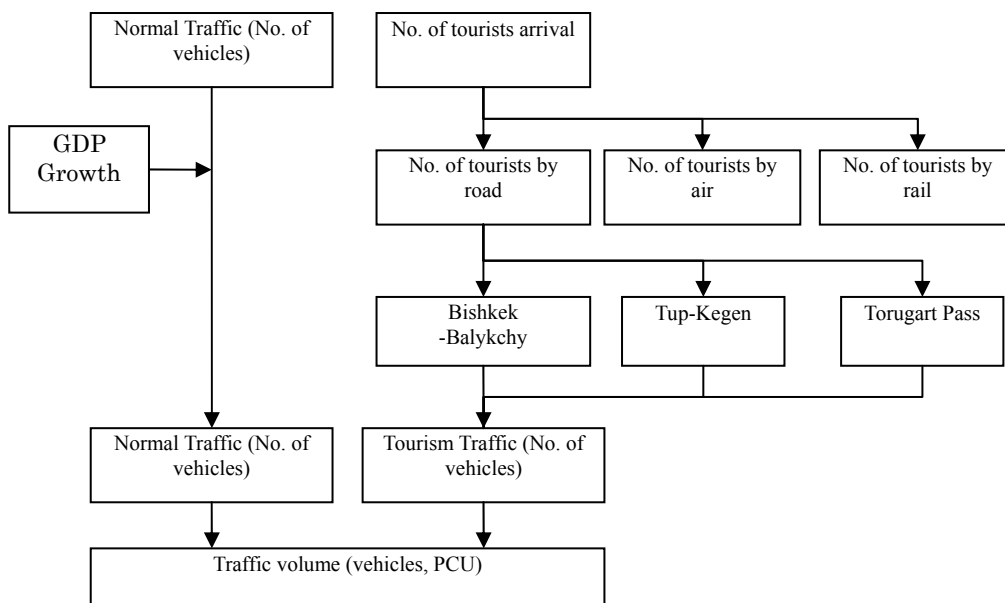
The second phase of rehabilitation of Manas International Airport has not been completed, yet there is a proposal to construct the second runway for cargo flights; the feasibility study is being conducted by a German company. Reconstruction of Osh International Airport is another important project and the project cost is estimated at 29 million USD.

Issyk-Kul International Airport is regarded as the third international airport in the Kyrgyz Republic, and its expansion is one of the most desired projects in Issyk-Kul Zone. It is proposed to extend the runway to 3,600m so that long-distance flights can use the airport. The necessary cost is estimated at 22.4 million USD.

I.5.7 Demand Analysis of Transport

(1) Methodology

With limited traffic data, traffic demand is estimated from various assumptions (Appendix) based on development targets, available traffic data, related reports, international experience, and observations by JST. Flow of the demand analysis is illustrated in the figure below.



(2) Demand Estimation

1) Without projects case

The annual average daily traffic along Boom Valley (Bishkek-Balykchy) will reach 4,500 and 9,700 PCU in 2015 and 2025, respectively, which means there is no need to upgrade the category of the existing road in view of SNiP requirement, and as with the other roads. However, hourly traffic volume of peak month along Boom Valley and within Cholpon-Ata city will slightly exceed the road capacity by 2025.

Table I.22 Average Daily Traffic in PCU (passenger car unit), without projects case

	Capacity PCU per hour	2010		2025	
		Annual PCU/day	Peak month PCU/day	Annual PCU/day	Peak month PCU/day
Bishkek – Balykchy	1600	4,500	7,700 (0.6)*1	9,700	15,000 (1.1)
Balykchy – Cholpon-Ata	2200	2,800	5,100 (0.3)	6,000	9,400 (0.5)
Cholpon-Ata – Karakol	2200	1,400	2,100 (0.1)	3,100	4,600 (0.3)
Within Cholpon-Ata*2	1500	4,800	8,400 (0.7)	10,300	16,000 (1.3)
Karakol – Balykchy (south)	1800	700	1,300 (0.1)	1,500	2,400 (0.2)

*1: Volume to Capacity Ratio of the peak hour of the peak month. Traffic volume in the peak hour is assumed to be 12% of the daily traffic volume.

*2: Inner transport is assumed to be 25% of pass-by traffic.

Source: JST Estimation

2) With project case

Congestion along Boom Valley

This case takes into account the following projects:

- Expansion of Issyk-Kul International Airport to accept long-distance flights
- Rehabilitation of Tup-Kegen Road as a diversion route from Almaty to Cholpon-Ata
- Rehabilitation of Bishkek – Balykchy railway to the extent of competing with motor car by road
- Construction of a freight terminal at Balykchy to transfer containers from truck to rail

The four projects will reduce traffic volume along Boom Valley (Kemin - Balykchy) to such an extent that continuous traffic congestion is not observed although travel speed is restrained during peak hours in peak months in 2025.

Table I.23 Average Daily Traffic in PCU (passenger car unit), with projects case

	2010		2025		VCR
	Annual	Peak Month	Annual	Peak Month	
Bishkek – Balykchy	4,300	7,100	9,300	13,200	1.0
Tup – Kegen	100	200	200	700	-

*JST Estimation

The airport project and Tup-Kegen Road project reduce larger traffic volume than the railway project and freight terminal project.

Table I.24 Project impact on reduction in traffic volume (Year 2025)

	Issyk-Kul International Airport	Tup-Kegen Road	Passenger Rail	Freight terminal
Reduction of average daily traffic of peak month (PCU)	670	650	420	120

*JST Estimation

Congestion in Cholpon-Ata

This case takes into account the following projects as alternatives:

- Route diversion of trucks from the northern part of Issyk-Kul Ring Road to the south
- Revival of water transport for freight transportation
- Construction of a bypass road
- Widening of road width (2-lane road to 4-lane road)

	Capacity PCU per hour	2010		2025	
		Annual	Peak Month	Annual	Peak Month
Route diversion* 1	1,500	4,600	8,000	9,800	15,300
Water transport* 2	1,500	4,600	8,000	9,800	15,300
Bypass road	1,500	3,200	6,000	6,600	10,600
4-lane road	4,100	4,800	8,400	10,300	16,000

*1: Transport between Balykchy-Karakol is assumed to be 75% of Cholpon-Ata - Karakol.

*2: water transport carries 3,000 tons per direction. 1 truck carries 15 tons.

I.5.8 Identified Problems of Transport Sector

The following summarize the existing condition:

- Maintenance works can not catch up with the deterioration of Issyk-Kul Ring Road because only emergency repairs have been possible to meet the minimum conditions of the most important road;
- Bishkek – Balykchy – Narin - Torugart Motor Road, which is the only route between Bishkek and Issyk-Kul Zone, has a bottleneck along a winding section in Boom Valley, where road safety is not guaranteed because of insufficient pavement, lack of traffic safety facilities and inadequate maintenance work for retaining walls;
- Besides the above-mentioned roads, most motor roads in Issyk-Kul Zone are deteriorated;
- Streets and roads in towns are also deteriorated;
- Rural areas far from Issyk-Kul Ring Road have poor accessibility to the most important roads due to bad conditions of local roads;
- Roadside facilities are insufficient for international tourists;
- Public budget to improve deteriorated motor roads and streets is seriously limited,
- As a result of economic difficulties, freight demand is too small to keep the transport chain between water transport, rail transport, road transport and intermodal facilities;
- All freight ships are overage and do not satisfy safety standards; nevertheless coal transport is still important for local people;
- Most trucks and buses are so old that most of the vehicle life will have expired in the near future;

These conditions immediately identify the following problems:

- Bad condition of transport system brings about high transport cost and long travel time, which cause negative impacts on regional economy and local communities;
- The existing transport system is insufficient to attract the expected number of international tourists, and the existing condition will not satisfy international tourists;
- Termination of water transport will bring about increases in transport cost of coal and construction materials, which will bring about another collapse of industry;
- Expiration of the existing trucks and buses will also bring about increases in transport costs.

In addition, demand analysis in the previous Chapter identifies the following problems:

- The existing transport network will not be able to accept the expected number of tourists in 2025 because of traffic congestion along Boom Valley and within Cholpon-Ata, although the exceeded number is relatively small;
- Modal choice will be limited for tourists because of the limited capacity of the existing railway and airport.

I.5.9 Development Concept

(1) Goals and Objectives

The major goal of transport sector development is to contribute to the goals of the Master Plan. Poverty reduction is the important goal to which the transport sector can contribute by reducing transport cost. In addition, transport sector development shall support tourism development and agricultural industries under careful consideration of environmental preservation.

The goals and the identified problems lead to the following objectives:

- To provide various and good accessibility for international tourists to Issyk-Kul Zone;
- To ensure high mobility with reliable transport system;
- To reduce travel cost for economic activity and local communities;
- To offer attractive and pleasant transport system for tourists; and
- To provide efficient transport system.

1) To provide various and good accessibility for international tourists to Issyk-Kul Zone

To attract international tourists, transport development shall provide various transport modes for good accessibility to Issyk-Kul Zone.

By Road

Bishkek – Balykchy – Narin – Torgart Motor Road is the only major access at the moment, and traffic safety of the road along Boom Valley should be guaranteed. Tup – Kegen Road should be an important alternative route from Almaty.

By Air

Manas International Airport should function as a hub airport in Central Asia, accepting various international flights from the other countries. Issyk-Kul International Airport should accept direct flights from Moscow and Beijing in the future.

By Rail

Passenger rail transport is a tourist attraction itself and the railway between Bishkek and Balykchy should provide convenient transport for not only domestic tourists but also international tourists.

2) To ensure high mobility with reliable transport system

To integrate various areas of tourism attraction in Issyk-Kul Zone, transport development shall ensure the mobility along Issyk-Kul Ring Road. Issyk-Kul Zone is not small. It takes five or six hours to go round the lake, which means one day is allocated for tourists to enjoy this drive. Maintaining travel speed around the lake is important for tourism attraction.

3) To reduce travel cost for economic activity and local communities

To strengthen economic activity and to contribute to poverty reduction, transport development shall reduce transport cost. Road networks in rural areas should provide convenient public transport routes and transportation routes for agricultural products at reasonable transport cost.

4) To offer attractive and pleasant transport system for tourists

To attract international tourists, transport development shall offer an attractive and pleasant transport system. Lakeside driving should be one of the important tourism attractions of Issyk-Kul Zone, and adequate rest areas should be provided. Access roads to the major resort areas such as Jeti-oguz, Altyn-Arsharn, and Dead Lake should offer high mobility and a pleasant journey.

5) To provide efficient transport system

To make up for the collapse of the freight transport system and passenger transport, transport development shall establish and provide an efficient transport system. Efficient alternative transport modes should be provided for modal shift to achieve adequate modal balance and congestion reduction. Railways should provide an alternative both for freight and passengers between Bishkek and Issyk-Kul Zone.

I.5.10 Transport Network Concept

The transport network concept in 2025 is illustrated in the figure of the next page.

(1) Road Network

Bishkek- Balykchy – Torugart International motor road is the major access route that connects Issyk-Kul Zone to Bishkek, other Oblasts, and the world.

Issyk-Kul Ring Road forms a basic network that roundly connects important regional centers like Karakol, Cholpon-Ata, Balykchy, Tup, Bakonbaeva and other resort areas. The ring road is not only an arterial road to support industry and people’s lives, but also a connection road for various tourism zones in Issyk-Kul Zone. The northern part of the ring road bears more traffic volume than the southern part.

Tup -Kegen international motor road connects Issyk-Kul Zone and Kazakhstan, and provides an important alternative route from Almaty for tourists and an important route for export of agricultural products.

Local and rural roads connect local communities, integrate scattered attraction points of tourism, and provide access routes for agricultural factories. Settlements in Aku-Su Rayon are linearly connected to Karakol by a part of Karakol – Bakonbaeva – Englichek international motor road, and other national roads.

(2) Airport

Manas International Airport will be an important hub airport accepting a lot of international flights, which contributes to provide good accessibility to Issyk-Kul Zone for tourists from outside the country. Issyk-Kul International Airport will directly accept international flight from not only Almaty and other cities in neighboring countries, but also Moscow and other large important cities in view of tourism in summer.

(3) Railway

The railway connects Bishkek and Issyk-Kul Zone for tourists in the summer season, although the major role of the railway is freight transportation. The modal share of the rail is smaller than transportation by road, but it will play an important role to reduce traffic volume along Boom Valley in the future.

(4) Water transport

Water transport will deal with passenger transport as a tourism attraction, yet freight transport will be revived in the future.

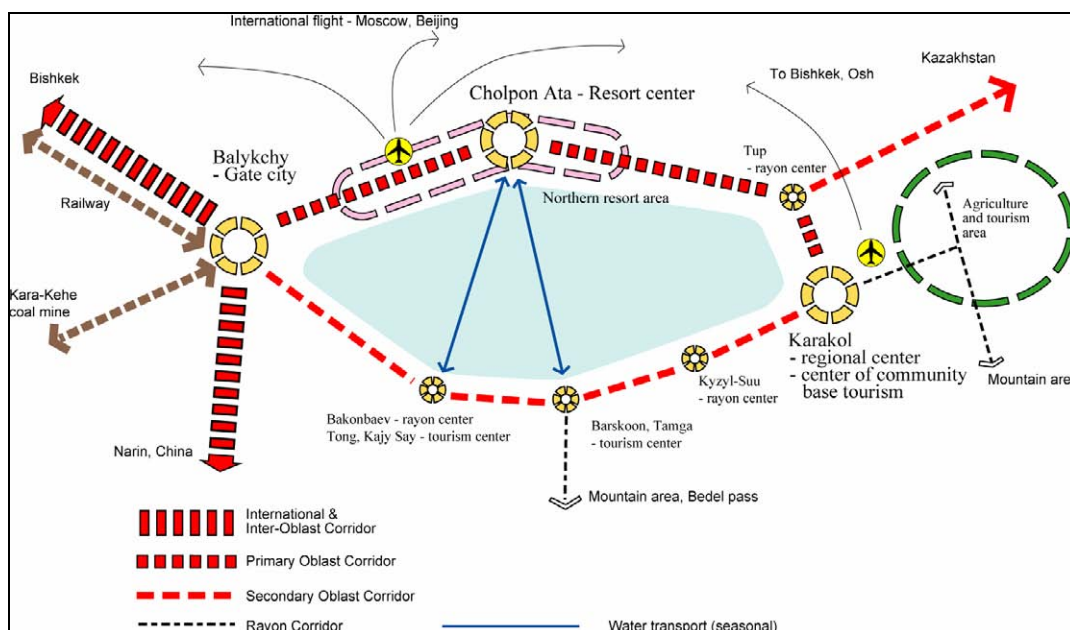


Figure I.5 Transport Network Concept in Issyk-Kul Zone

I.5.11 Development Strategy

The republic gives high priority to international/Oblast transport and city transport in Bishkek and Osh at the moment. The motor roads should be reclassified in terms of administrative responsibility so that Oblast can take care of the important motor roads that are less important at the national level.

Instead of expanding a new transport network, the existing transport system should be improved and maintained in accordance with development stages as follows:

Period	Issue of Transport Sector	Remarks
Short-term Initial preparation	To recover minimum service level	With extreme poor condition of hotels and other accommodations, transport development itself can not contribute to increase in tourist arrivals; instead, road network should be improved to meet the minimum requirement of service level for starting the Master Plan.
Mid-term Launching and boost	To trigger tourism development To support industrial development To support community development	If the priority projects in the Master Plan successfully lead the initial tourism development and attract tourist arrival as expected, transport sector should be developed in such a manner to induce further investment and tourism arrival to enhance the development. Efforts should be given to strengthen basic network in local area to support agricultural and community development.
Long-term Sustainable growth	To support various tourist activity	After the Master Plan bring about steady increase in tourist arrival, transport sector should contribute sustainable growth by providing attractive transport system. Transport capacity should be expanded by the period when tourist arrival reaches the maximum target.
2025- Control and management	To control over transport demand	Transport sector should turn its policy from development to control and management of transport demand to keep the ecosystem after the number of tourist arrival reaches allowable capacity.

Although protecting the ecosystem is one of the biggest issues in Issyk-Kul Zone, this is not such a stage to control transport; instead, this is the stage to attract international tourists to the

extent possible. If the Master Plan achieves its goals by the target year of 2025, traffic demand management will be an important issue taking into account environmental considerations.

I.5.12 Transport Projects 2

(1) Project Proposal

To achieve the objectives and desirable transport network system, the following projects are proposed in the Master Plan:

Objective	Period	Projects
To provide various and good accessibility for international tourists to Issyk-Kul Zone	<i>Short-term:</i>	- Road Safety along Boom Valley - Rehabilitation of Tup –Kegen Road
	<i>Mid-term:</i>	- Runway Expansion of Issyk-Kul International Airport
To ensure high mobility	<i>Short-term:</i>	- Rehabilitation of Issyk-Kul Ring Road
	<i>Mid-term:</i>	
	<i>Long-term:</i>	- Construction of a bypass road
To reduce travel cost for economic activity and local communities	<i>Mid-term:</i>	- Rehabilitation of Tup –Kegen Road - Improvement of local roads
To offer attractive and pleasant transport system for tourists	<i>Mid-term:</i>	- Construction of “roadside stations” - Improvement of local roads (for tourism resources)
	<i>Long-term:</i>	- Redevelopment of Balykchy Port Area
To provide efficient transport system	<i>Long-term:</i>	- Bishkek – Balykchy railway rehabilitation - Construction of a freight terminal

* Routine and periodic maintenance work is the important activity of transport sector but excluded from the “list” of the proposed project.

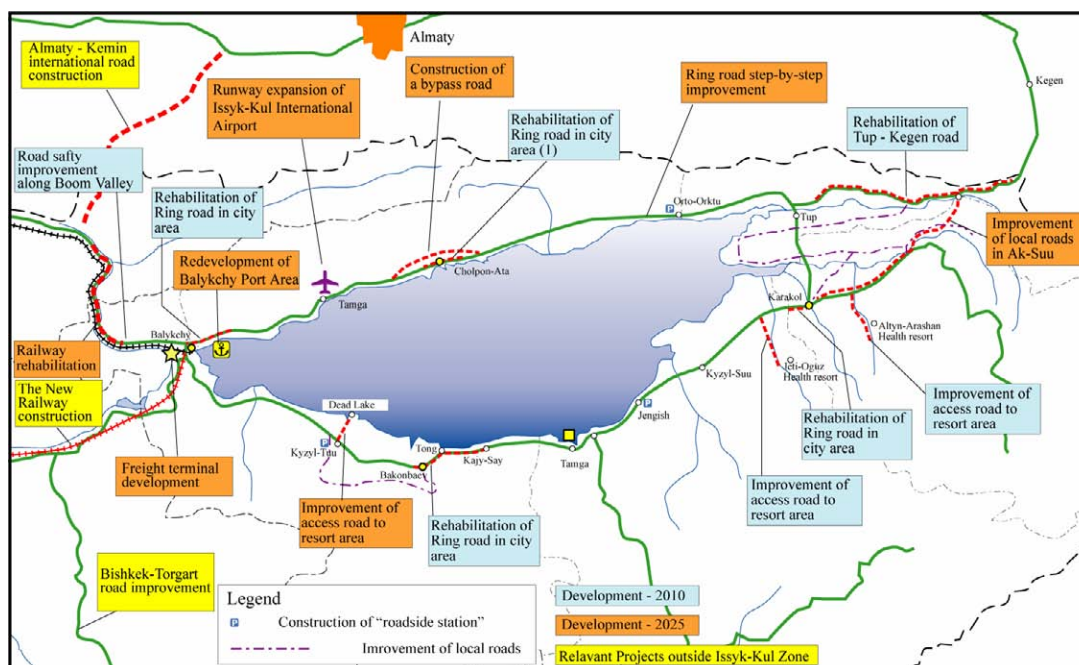


Figure 1.6 Project Location Map in Issyk-Kul Zone

(2) Project Profile Sheet

Short-term projects:

No	Project title	Description	Project item	Cost USD
1	Rehabilitation of Issyk-Kul Ring Road	The most important transport network should be rehabilitated in step-by-step manner	- Long-term action plan - Rehabilitation in city areas - Emergency maintenance work - Bridge rehabilitation	22M (short-term only)
2	Rehabilitation of Tup-Kegen Road	This road provide alternative route of tourism and export. Low cost bituminous pavement might be enough taking into account of low traffic volume.	- Tup – Taldy Suu (10km) - Taldy Suu - Sarytlogoy (26km) - Rehabilitation of Sarytlogoy – Karkara (30km)	18M
3	Road Safety along Boom Valley	Improvement of traffic safety along Boom Valley is important not only for tourism but also national economics.	- Rehabilitation of pavement (30km) - Installation of curve mirrors, guard rails, and stone fences - Construction of a rest area	15M

Mid-term projects:

No.	Project title	Description	Project item	Cost USD
4	Construction of “roadside stations”	Rest area for cars providing: - a parking area - summerhouses/ a small café - viewpoints/ toilets - small tourist information	- Kyzyl Tuu (Balykchy-Bakonbaev) - Jengish (Kyzyl Suu – Tamga) - Orto Orktu (Cholpon-Ata –Tup)	2M
5	Runway expansion of Issyk-Kul International Airport	This project enable the airport to accept long-distance direct flight	- Expansion of runway to 4000 - Installation of navigation equipments	30M
6	Rehabilitation of local roads	Local roads should be improved for access to arterial roads, public transport, freight transportation, and formulation of tourism network	- Teploklyuchenka - Novovoznesenovka (22km) - Novovoznesenovka – Jergalan coal mine (30km) - Mihailovka – Razdalnoe (37km) - Karakol – Orlineo (17km) - Mihailovka – Nikolaevka (45km) - Nikolaevka – Sary Togoy (37km) - Bakonbaev – Kara-Koo (60km) - Reconstruction of Santash Pass road (gravel road, 11km)	30M

Long-term projects:

No.	Project title	Description	Project item	Cost USD
7	Bishkek – Balykchy Railway Rehabilitation	The railway should be improved to increase speed and ensure safety to provide alternative routes for tourists.	- Replacement of wooden sleepers with concrete sleepers - Procurement of comfortable passenger cars	35M
8	Construction of a freight terminal	This project promotes a diversion of cargo traffic from the road along Boom Valley to rail.	- Procurement of special cars for container handling - Warehouse - Parking space for trucks	2.8M
9	Redevelopment of Balykchy Port Area	This project redevelops the port to a passenger port for tourists integrating railway and water transport.	- Reconstruction of the port - Rehabilitation of railway - Construction of a new station - Development of an amusement park, historical museum, seaside park and etc.	--
10	Construction of a bypass road	Congestion in Cholpon-Ata will be anticipated in the future.	- Construction of bypass road (70km)	35M

Appendix

1 Assumption of Traffic Demand Analysis

Base year traffic volume

- The average daily traffic volume in May 2004 along Boom Valley was assumed to be **2600 vehicles**, based on a traffic count survey along Boom Valley conducted on May 27, 2004.
- The average daily traffic volume in July 2004 along Boom Valley was assumed to be **5,400 vehicles**, in which normal traffic was 2700 and tourism traffic was 2700, based on traffic count surveys on May 27 and July 16, 2004.
- Seasonal fluctuation factor for normal traffic is taken from an existing study as follows:

Seasonal Fluctuation Factors (AADT to average daily traffic of each month)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1.67	1.61	1.43	1.22	0.98	0.79	0.69	0.68	0.72	0.87	1.16	1.56

Source: IDB Bishkek-Torugart Road Project

- Annual Average Daily Traffic (AADT) along Boom Valley in 2004 is estimated at **2,780 vehicles** based on these assumptions.
- Traffic growth rate of normal traffic corresponded with GDP growth. Considering contribution of tourism sector to GDP, 85% of GDP growth is applied for traffic growth rate. The traffic growth rate is calculated at 2.1% up to 2010, and 5.85% from 2010 to 2025.

Traffic Growth Ratio

	2004	2010	2025
GDP at 2002 price	7.15 billion soms	9.50 billion soms	22.3 billion soms
GDP growth ratio	1.0	1.33	3.12
Traffic growth ratio	1.0	1.13	2.65

Source: JST estimation

Tourist arrivals

Tourist arrivals are estimated in the Master Plan as follows:

Number of Tourist Arrivals and Potential Demand by Air

		2010		2025	
			By Air*		By Air
CIS	Kazakhstan	230,400	4,600	324,000	16,200
	Uzbekistan	67,200	3,400	108,000	8,600
	Russia	144,000	28,800	230,400	92,200
	Others	38,400	0	57,600	0
	Total	480,000	36,800	720,000	146,100
Non-CIS	Europe	50,000	9,000	70,000	19,600
	Americas	40,000	0	50,000	10,000
	West Asia	40,000	3,200	50,000	7,500
	North East	110,000	33,000	200,000	80,000
	South Asia	40,000	12,000	60,000	24,000
	Others	40,000	0	50,000	5,000
	Total	320,000	57,200	480,000	146,100
Foreign total		800,000	94,000	1,200,000	263,100
Domestic		300,000		600,000	
Issyk-Kul		1,100,000	94,000 (8.5%)	1,800,000	263,100 (14.6%)

Source: JST Estimation

* Potential demand if Issyk-Kul International Airport is developed.

- Based on traffic data of the ecological toll gate, the present seasonal fluctuation of tourism traffic is estimated, and the Master Plan assumes the seasonal fluctuation of tourism traffic in 2010 and 2025 as follows:

Monthly Tourist Arrival Ratio (%)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2004	1.5	2.5	2.5	2.5	3.4	8.2	24.6	32.8	16.4	2.5	1.6	1.5
2010	2.4	2.4	4.7	7.1	7.1	9.4	21.2	21.2	11.8	7.1	3.5	2.4
2025	3.5	3.5	5.3	7.0	8.8	10.5	15.8	15.8	10.5	8.8	7.0	3.5

Source: JST estimation

Modal share

- If Issyk-Kul International Airport is expanded, the share of tourist arrivals by air is estimated at 8.5% in 2010, and 14.6% in 2025. Without the airport project, tourist arrivals by air are estimated at 20,000 in 2010 and 25,000 in 2025, taking into account the capacity of the existing airport.
- The maximum capacity of a train is about 880 passengers (one direction, 11 passenger cars of 80 seats) at the moment. If railways are rehabilitated, it will be doubled.
- Modal share of tourist arrival by road is assumed to be 50% by car, 25% by minibus, and 25% by bus. For tourists relating to a kind of Silk Road tour, modal share is assumed to be 50% by minibus, and 50% by bus.
- Passenger occupancy of tourist arrival by road is assumed to be 3.5 passengers per car, 10 per minibus, and 40 per bus.
- Proportion of normal traffic by mode is assumed to be 71% of car, 11% of minibus, 2% of bus, and 13% of truck, based on traffic survey.

Modal Share and Passenger Occupancy of Tourists by Road

	Modal Share (percent of passengers)	Passenger Occupancy	Passenger Car Unit (PCU)	Average number of vehicle per tourist	Average number of PCU per tourist
Car	50%	3.5	1.0	0.174	0.193
Minibus	25%	10	1.5		
Bus	25%	40	2.0		

Source: JST Estimation

Route diversion

- Among the tourists by road via Bishkek – Balykchy Road, 80% will go to northern resort area, while 20% go to southern area.
- If Tup-Kegen Road is rehabilitated, 25% of tourists from Kazakhstan by road will use the road in 2010, and 50% in 2025. Among the tourists, 90% will go to northern resort area and 10 % to the south. The road is closed in winter from October to March.
- 10% of tourists from East Asia will use Torugart Pass.

2 Reference Tables for Transportation Plan

Category of motor road (SNiP^(*) 32-02-2004)

Category	Design Capacity		Vehicle	Number of lanes	Carriageway width (m)	Minimum Shoulder width (m)	Right-of-way (*2)
	PCU (passenger car unit)	Peak Hour					
I-A(*3)	>18,000	-	>9,000	4/ 6/ 8	2× 7.5/11.5/15	0.75	32m
I-B	>14,000	-	>7,000	4/ 6/ 8	2× 7.5/11.5/15	0.75	32m
II	6,000 -14,000	1,600 - 2,400	3,000 - 7,000	2	7.5	0.75	16m
III	2,000 - 6,000	800 – 1,600	1,000 - 3,000	2	7.0	0.5	13m
IV	200 - 2,000	-	100 - 1,000	2	6.0	0.5	12m
V	< 200	-	< 100	2	4.5	0.5	-

(*1) SNiP: Construction Standard and Regulations

(*2) Width from the center axis of a road

(*3) There is no category IA road in the Kyrgyz Republic

Project status of the international motor roads

Project	Status	Length	Cost Million USD
Bishkek - Osh motor road	Phase I (1996-98)	138km	92.98
	Phase II (on-going - 2005)	205km	90
	Phase III (1999-2001)	260km	62
	Total	603km	248
Bishkek -Torgurt motor road	F/S (1996), IDB grant	539km	189
Osh- Sary-Tash- Irkeshtam motor road	F/S (2001), TRACECA	262km	38
Jambyl- Talas- Suusamyр motor road	F/S (-2005), IDB grant	49km	14
Source: http://www.mtk.gov.kg			

Number of registered vehicles in the Kyrgyz Republic

Year	Cars	Trucks	Special Vehicles	Bus & Minibus	Motorcycle	Trailer & semi-trailer	Total
1997	178,052	57,253	9,253	12,502	28,259	17,179	302,498
2002	189,648	47,227	4,446	15,747	13,009	15,007	285,084

Source: TACIS programme "Support to the Transport Sector in Kyrgyzstan" - The Road Transport Sector in Kyrgyzstan

Annual Average Daily Traffic along major roads (1999)

Section	Total	Car	Minibus	Bus	Truck
Tokmak - Balykchy	2,885	2,190	50	70	565
Balykchy - Bosteri	886	580	80	50	176
Bosteri - Grigorievka	725	470	54	40	161
Grigorievka - Tup	577	358	40	29	150
Tup - Karakol	573	350	40	29	154
Karakol - Balykchy (south)	511	325	42	15	129
Balykchy - Kochkor	2,001	1,642	68	25	294
Source: TRACECA					

Pavement condition on Issyk-Kul Ring road

Balykchy – Karakol	Good	Satisfactory	Unsatisfactory	Bad
Northern part	20.9	34.5	34.5	10.1
Southern part	31.3	47.3	19.7	1.7
Total	26.2	41.1	26.9	5.8
Source: Kyrgyzdortransproyekt (modified)				
Note: Good – up to 10%, Satisfactory – 30%, Unsatisfactory – 50%, Bad – more than 50%				

Monthly traffic volume at gate of Balykchy (2003)

Month	Car			Truck			Total
	Domestic	Foreign	Total	Domestic	Foreign	Total	
1	1,877	43	1,920	777	90	867	2,787
2	2,008	465	2,473	798	67	865	3,338
3	2,645	115	2,760	832	80	912	3,672
4	2,524	118	2,642	763	59	822	3,464
5	3,361	165	3,526	897	57	954	4,480
6	6,006	407	6,413	1,418	146	1,564	7,977
7	20,185	2,556	22,741	4,366	676	5,042	27,783
8	30,946	3,453	34,399	6,255	817	7,072	41,471
9	5,334	225	5,559	1,166	127	1,293	6,852
10	2,528	47	2,575	727	70	797	3,372
11	2,234	23	2,257	659	43	702	2,959
12	1,600	16	1,616	372	16	388	2,004

Source: Biosphere territory "Issyk-Kul"

Transport volume (arrival and departure) at Manas International Airport

	2001	2002	2003
Passenger	305,767	313,554	380,515
Cargoes, paid luggage, and mails	8,361 tons	8,562 tons	N.A.

Source: <http://www.ariport.kg/>

Distance to major cities from Issyk-Kul International Airport

- 1,000km	1,000 – 2,000km	2,000-3,000km	3000-4000km	4000km-
Almaty 300	Urumqi 1,000	Baku 2,100	Moscow 3,200	Seoul 4,500
Tashkent 500	Delhi 1,500	Tehran 2,100	Beijing 3,500	Frankfurt 5,100
Dushanbe 600	Ashgabat 1,500	Dubai 2,500	Kiev 3,500	London 5,600
Islamabad 900		Tbilisi 2,500	Ankara 3,500	Tokyo 5,600
Kabul 900		Yerevan 2,600		New York 10,400
		Ulan Bator 2,600		

Source: JST

The construction project of the New Railway Lines

	Section 1	Section 2	Section 3	Total
	Karasu – Torugart	Balykchy – Ugolnaya	Ugolnaya – Arpa	
Length (km)	274	185	172	631
Project cost (mil. EUR)	1,622.76	308.37	1,345.60	3,276.73
Operation	2016-	2011-	2016-	

Source: Feasibility Study of New Rail Links between the Ferghana Valley, Bishkek and Kashgar

Freight volume at Rybachie station ('000tons)

	2000	2001
Departure from Rybachie	36.16	42.47
Arrival to Rybachie	114.62	103.57

Source: Kyrgyz Railway (February 26, 2002)

Passenger volume at Rybachie (Balykchy) station (persons)

	2000	2001
Suburban	180	N.A.
Local	5,826	3,487
Long distance	737	619

Source: Kyrgyz Railway (February 26, 2002)

Composition of passenger volume by direction (%)

Domestic	Russia	Turkey	German	China	Uzbekistan	Azerbaijan	Others
Osh Jalal Abad	Moscow Novosibirsk Others	Istanbul	Hanover Frankfurt Stuttgart	Urumchi	Tashkent	Via Baku to London	
30.1	26.1	11.8	6.7	6.3	5.8	5.0	8.1

Source: <http://www.ariport.kg/> (modified)

Transportation volume by water transport ('000)

	1980	1990	2000	2001
Passenger	100	100	-	-
Freight	483	647	35	36.2

Source: Ministry of Transport and Communication