

Country Name	<b>The project for Improvement of Capacity of Fire Fighting Techniques and Equipment in Ulaanbaatar</b>
Mongolia	

**I. Project Outline**

Background	Fire prevention measures were falling behind in Ulaanbaatar as urbanization and verticalization of buildings were happening in a midst of a construction boom caused by a significant population growth. The number of fire incidents had rapidly increased from approximately 1,100 cases in 2001 to approximately 2,100 cases in 2009. Although the Government of Mongolia was equipped with 47 fire vehicles including 17 Japanese-made fire vehicles provided under a grant aid project in the fiscal year 2001, these vehicles except for Japanese-made vehicles were severely deteriorated, so much so that more than 90 percent of fire fighting operations in the city were carried out by these 17 vehicles. The number of vehicles was utterly lacking, hindering firefighters' prompt arrival at the scenes of fire.			
Objectives of the Project	To strengthen the fire fighting system for effective fire suppression in Ulaanbaatar by renewing fire vehicles and equipment and providing technical assistance on operation and maintenance, thereby contributing to the protection of the lives and property of residents from fires.			
Contents of the Project	<ol style="list-style-type: none"> <li>1. Project Site: 13 fire stations in Ulaanbaatar</li> <li>2. Japanese side: (1) Provision of grant necessary for procuring eight pumpers with a 3,500-litter water tank, eight 8,000-litter water tankers, one chemical engine with an 8,000-litter water tank, two ladder engines (30 meters), three rescue engines with flood light (as well as a set of onboard equipment for each vehicle); (2) Technical Assistance (soft component of Grant Aid).</li> <li>3. Mongolian side: Securing of garages for fire vehicles; development of electricity, water, and wired/wireless communications systems at Fire Station No. 35 slated to be built; supply of fuel, water for fire fighting, and other consumables required for test operation, adjustment, training on operation, and soft component; transportation of equipment from the delivery site in Ulaanbaatar to individual fire stations and maintenance facilities; and securing of necessary personnel for operation and maintenance of procured equipment.</li> </ol>			
Project Period	E/N Date	March 12, 2012	Completion Date	July 9, 2013 (soft component completed)
	G/A Date	March 12, 2012		
Project Cost	E/N Grant Limit / G/A Grant Limit: 840 million yen, Actual Grant Amount: 838 million yen			
Executing Agency	National Emergency Management Agency (NEMA)			
Contracted Agencies	Main Contractor: ITOCHU Corporation Main Consultant: Fire Equipment and Safety Center of Japan			

**II. Result of the Evaluation**

< Special Perspectives Considered in the Ex-Post Evaluation >

- [Supplementary information for verifying achievement level of impact] The ex-ante evaluation summary did not specify indicators for measuring the achievement rate of the impact of this project (contribution to the protection of the lives and property of residents from fires). This ex-post evaluation employs "the number of injured, number of deaths, and amount of damage from fires in Ulaanbaatar" as the supplementary information to verify whether this project contributed to the reduction of loss in lives and property from fires.
- [Verification method for qualitative effects] With respect to the qualitative effects mentioned in the ex-ante evaluation summary (improving the safety and security of the citizens of Ulaanbaatar by raising confidence toward fire fighting among residents), the causal relation concerning the effects of this project can be regarded as (Output: vehicles and equipment procurement and soft component) ⇒ (Outcome: strengthening of fire fighting system) ⇒ (Impact: protection of residents from fire ⇒ improvement in safety and security of citizens). Therefore, "improvement in safety and security of citizens" corresponds to the impact of this project, and the impact would be verified using "the number of injured, number of deaths, and amount of damage from fires in Ulaanbaatar."

**1 Relevance**

<Consistency with the Development Policy of Mongolia at the Time of Ex-Ante and Ex-Post Evaluation>

At the time of ex-ante and ex-post evaluation, this project was and is consistent with Mongolia's development policy to "develop emergency management systems for disaster prevention, rescue, and times of disaster" and "strengthen disaster prevention equipment and personnel" as stated in policy documents such as the "Government Action Plan (2008-2012)," the "Government Action Plan (2016-2020)," and the "National Policy and Strategy Plan on Disaster Prevention (2012-2020)" etc.

<Consistency with the Development Needs of Mongolia at the Time of Ex-Ante and Ex-Post Evaluation >

At the time of ex-ante evaluation (2011), most of the fire vehicles, except for the 17 Japanese-made fire vehicles provided through a

grant aid project in the fiscal year 2001, were former Soviet-made vehicles older than 20 years and were experiencing frequent breakdowns as it was difficult to perform maintenance due to lack of spare parts; it became also difficult to handle a growing number of fires at high-rise buildings as there was only one ladder engine with an extremely high deployment rate. In addition, fires would begin to spread to nearby buildings in about 10 minutes after the fire breaks out in Ger areas where many Gers and wooden houses were randomly built without following regulations, creating a need for improving fire vehicles and equipment for effective fire suppression. At the time of ex-post evaluation, compared with the situation at the time of ex-ante evaluation, population is further concentrating in Ulaanbaatar, and the area of the city is continuing to expand as new settlements have been established. Further, there are continuing needs for creating new fire stations and improving fire vehicles and equipment because of the construction of a large number of high-rise buildings.

<Consistency with Japan's ODA Policy at the Time of Ex-Ante Evaluation>

The project was consistent with Japan's ODA policy, as "development of infrastructure for promoting economic activities (strengthening of the urban functions of Ulaanbaatar)" is stated as one of the priority areas for assistance in the "Country Assistant Program for Mongolia (2004)".

<Evaluation Result>

In light of the above, the relevance of the project is high.

2 Effectiveness/Impact

<Effectiveness>

This project has mostly achieved its objective, "strengthening of the fire fighting system for effective fire suppression." At the time of ex-post evaluation, the fire vehicles and equipment procured through this project are used properly. Although the JICA Mongolia Office could not obtain the actual yearly values for "(reducing) mobilization preparation time (Indicator 1)," an anticipated effect of the elimination of engine troubles and reduced engine startup time through the introduction of new fire vehicles, NEMA claims that all fire stations covered in this project have generally achieved target values since project completion, being able to start engine now in one to two minutes. The project also achieved the target in terms of the "number of pumper tankers that can be mobilized within one minute (Indicator 2)." Although the JICA Mongolia Office could not obtain the actual yearly values for the "time it takes for a ladder engine before discharging water (Indicator 3)," an anticipated effect of the improved performance through the new procurement of a ladder vehicle, NEMA claims that the fire stations targeted in this project have managed to achieve target values since project completion. According to the Emergency Management Department of Capital City under NEMA, actual values for each year have not been tracked for the "(greater) number of Ger area residents who can receive fire fighting activities promptly (within 10 minutes of the start of the fire)," an anticipated effect of the new procurement of four-wheel-drive fire vehicles that would enable driving in Ger areas where many roads are steep, narrow, and in poor condition, and the values in the table below are, thus, theoretical values calculated from the city's statistical data (such as the growth rates of population and households); these values have exceeded target values by a large margin since project completion. According to the Department, the reason was that the migrant population moving to Ulaanbaatar from the provinces has increased every year and settlements in Ger areas have expanded<sup>1</sup>. Moreover, according to the Department, among Fire Stations No. 11, 18, 29, 30, 64, 65, and 80, which acquired pumper tankers with good traveling performance through this project, the jurisdictions of Fire Stations No. 18, 29, and 30 encompass Ger area households located at hilltops, valleys, and other areas where it is difficult for fire vehicles to navigate and are each larger than a five-kilometer radius. While fire vehicles from these three stations sometime take longer than 10 minutes to arrive at scenes of fire due to these conditions, the rest of the fire stations mostly manage to have firefighters arrive within 10 minutes.

With respect to qualitative effects, according the Department, the ease of operation and hook-up of pumper tankers and tankers enabled by effective implementation of the soft component and a high performance of the procured vehicles allowed firefighters at Fire Stations No 11, 18, 29, 30, 65, 80 and 35, which deployed pumper tankers and tankers through this project, to engage in prompt and efficient fire fighting activities by coordinating the operation between these vehicles.

<Impact>

A certain level of anticipated impact of this project, "contribution to the protection of the lives and property of residents from fires" seems to have materialized. As shown in the table below, across Ulaanbaatar as well as the jurisdictions of the fire stations targeted in this project, the number of injured and deaths from fires have been on a decreasing trend while the number of fire incidents has increased between pre- and post-implementation of the project. According to NEMA, the implementation of this project enabled prompt arrival at scenes of fire, contributing to the reduction in the number of injured and deaths. Therefore, the safety and security of the citizens of Ulaanbaatar have seemingly also improved.

This project did not cause any adverse impacts on the natural environment. Although land acquisition took place to build new facilities (garages) at Fire Stations No. 35 and 65 as part of project implementation, it did not involve resettlement of residents as they were public lands.

<Evaluation Result>

In light of the above, the effect of the project has been observed mostly as planned. Therefore, the effectiveness/impact of the project is high.

<sup>1</sup> The actual number of khoroo of Indicator 4 (Number of Ger area residents who can receive fire fighting activities promptly (within 10 minutes of the start of the fire) (in entire Ulaanbaatar)) and another indicator, "Of these, the number of Ger districts served by Fire Stations No. 11, 18, 29, 30, 64, 65, and 80 that deployed efficient pumper tankers in this project, and the numbers of households and residents in these districts", has increased each year by eight and three, respectively, since 2013. The Emergency Management Department of Capital City claims that the number of khoroo has been increasing following the population growth in the city, but the basis for these numbers or calculation methods are unknown.

**Quantitative Effects**

Indicators	Baseline 2011 Baseline Year	Target 2016 3 Years after Completion	Actual 2013 Completion Year	Actual 2014 1 Year after Completion	Actual 2015 2 Years after Completion	Actual 2016 3 Years after Completion
Indicator 1 Mobilization preparation time (minutes) (Fire Stations No. 10, 11, 18, 26, 28, 29, 30, 34, 35, 63, 64, 65, and 80)	2-8 <sup>(1)</sup>	1	1-2 <sup>(2)</sup>			
Indicator 2 Number of pumper tankers that can be mobilized within one minute (vehicles) (in entire Ulaanbaatar)	7/15	15/15	15/15	15/15	15/15	15/15
Indicator 3 Time it takes for a ladder engine before discharging water (seconds) (Fire Stations No. 18 and 26)	180 <sup>(3)</sup>	120	120 <sup>(4)</sup>			
Indicator 4 Number of Ger area residents who can receive fire fighting activities promptly (within 10 minutes of the start of the fire) (in entire Ulaanbaatar)	9 khoroo <sup>(5)</sup> 27,690 households 149,900 persons	24 khoroo 50,690 households 259,900 persons	55 khoroo 68,074 households 272,297 persons	63 khoroo 77,799 households 311,196 persons	71 khoroo 87,524 households 350,096 persons	79 khoroo 97,249 households 388,996 persons
Of these, the number of Ger districts served by Fire Stations No. 11, 18, 29, 30, 64, 65, and 80 that deployed efficient pumper tankers in this project, and the numbers of households and residents in these districts	N/A	15 khoroo 23,000 households 110,000 persons	19 khoroo 30,592 households 122,371 persons	22 khoroo 34,963 households 139,852 persons	25 khoroo 39,333 households 157,334 persons	28 khoroo 43,704 households 174,816 persons

Source : Ex-ante Evaluation Summary, Preparatory Survey Report, questionnaire survey with NEMA

Note: (1) The baseline values represent entire Ulaanbaatar. (2) According to NEMA, the actual values for the 2013-2016 period were 1-2 minutes at all of the fire stations targeted in this project. (3) The baseline values represent entire Ulaanbaatar. (4) According to NEMA, the actual value for both Fire Stations No. 18 and 26 in the 2013-2016 period was 120 seconds. (5) A khoroo is an administrative unit below the district level ("Ger area" means areas where Ger houses are concentrated. As an administrative unit, a khoroo is positioned below the district level. A district is divided into several khoroo according to the size of a district, and the number of khoroo is usually used when indicating the number of households and population in Mongolia).

**Expected Impacts**
**(a) Number of injured, number of deaths, and amount of damage from fires in Ulaanbaatar**

	Before the project (2008)	Before the project (2009)	Actual values 2013	Actual values 2014	Actual values 2015	Actual values 2016
Number of fire incidents	2,337	2,165	2,730	3,040	3,249	2,474
Number of injured	24	41	28	27	24	18
Number of deaths	52	55	42	39	31	21
Amount of damage (million MNT)	4,100	3,800	6,800	6,100	4,700	3,800
Population (10,000 persons)	107	111	137	136	140	144

(b) Of these data in (a), the number of injured, number of deaths, amount of damage in areas served by the fire stations targeted in this project (Fire Stations No. 10, 11, 18, 26, 28, 29, 30, 34, 35, 63, 64, 65, and 80)

	Before the project (2009)	Actual values 2013	Actual values 2014	Actual values 2015	Actual values 2016
Number of fire incidents	2,003	2,491	2,857	3,033	2,309
Number of injured	38	26	24	23	16
Number of deaths	54	40	37	30	19
Amount of damage (million MNT)	3,656	6,639	5,640	4,345	3,528
Population (10,000 persons)	102	117	128	131	134

Source: The National Statistical Office of Mongolia for Population in Tables (a) and (b); The Disaster Research Institute for all other data.

### 3 Efficiency

Both the project cost and project period stayed within the plan (100 percent and 81 percent against the plan, respectively), and the output was generated according to the plan. Therefore, the efficiency of the project is high.

### 4 Sustainability

#### <Institutional Aspect>

Each fire station is placed under the Emergency Management Department of Capital City. Although a total of 132 positions were needed to be recruited at the time of ex-ante evaluation to operate and maintain (O&M) the vehicles procured through this project—pumper tankers and tankers (one of each at Fire Station No. 35), two ladder engines (Fire Stations No. 18 and 26), and two rescue engines with flood light (Fire Stations No. 34 and 63), a chemical engine (Fire Station No. 10)—, a total of approximately 60 individuals have been hired by the time of ex-post evaluation. This was caused by the cut in the national budget in an economic slump and the inability to secure payroll expenses. As shown in the table on the right, a certain number of employees who engage in O&M are maintained but the number is insufficient, and, as a result, they are forced to work in a shift system (24-hour shifts followed by 72-hour rest) that leads to extra working hours and overtime, creating problems such as the loss of vacation time. Although the shortage of firefighters is not affecting O&M of fire vehicles and equipment, overtime work tends to reduce the efficiency of the work. In pursuant to the “Requests for Fire Stations and Rescue Crew (Mongolian National Standard),” which is currently being followed, measures will be taken in future to increase and reinforce the number of fire stations and firefighters.

Number of personnel at each fire station at the time of ex-ante and ex-post evaluation<sup>(1)</sup>

Fire station	Management level (captains, assistant captains)		Other management level (lieutenants)		Firefighters, dispatchers		Engineers (maintenance engineers)				Total	
							Drivers, maintenance personnel		Professional engineers <sup>(2)</sup>			
	Ex-ante	Ex-post	Ex-ante	Ex-post	Ex-ante	Ex-post	Ex-ante	Ex-post	Ex-ante	Ex-post	Ex-ante	Ex-post
10	2	2	9	1	79	80	3	28	N/A	1	93	112
18	1	1	8	1	36	31	0	10	N/A	0	45	43
26	2	1	8	1	39	40	0	15	N/A	1	49	58
11	1	1	2	1	39	20	0	8	N/A	0	42	30
29	1	1	3	1	41	28	0	9	N/A	0	45	39
63	1	1	10	1	38	32	1	12	N/A	1	50	47
28	1	1	8	1	47	31	0	11	N/A	1	56	45
34	1	1	9	1	39	32	0	13	N/A	0	49	47
30	1	1	3	1	46	28	0	8	N/A	1	50	39
65	1	1	2	1	20	20	0	9	N/A	0	23	31
64	1	1	7	1	45	32	0	12	N/A	1	53	47
80	1	1	6	1	24	20	0	7	N/A	1	31	30
35	0	1	0	1	0	27	0	9	0	0	0	38

Source: Preparatory survey report, questionnaire survey with NEMA

Note: (1) According to the Emergency Management Department of Capital City, the differences in the number of personnel between the time of ex-ante evaluation and the time of ex-post evaluation are caused by the differences in position classification methods (no further details). (2) A “professional engineer” is a person with a college degree in automotive engineering and has a certain length of professional experience; a professional engineer provides guidance on diagnosing and evaluating causes of failures and repair procedures.

#### <Technical Aspect>

The engineers who would be in charge of O&M of the fire vehicles and equipment procured in this project were found to have an adequate level of technical skills at the time of ex-ante evaluation, and the ex-post evaluation also finds that engineers and drivers at each fire station possess sufficient technical skills. According to NEMA, in the events of fire vehicle or equipment failures, fire personnel have been able to correctly identify the causes and repair the problems quickly. Each fire station has been conducting four technical drills and 12 fire fighting/disaster drills each year since 2015. In addition, firefighters from multiple fire stations (about 70-130 participants each year) have participated in large-scale fire fighting training using fire vehicles and tankers at office buildings, thermal power plants, schools, shopping centers, etc. Further, those employees who had participated in the seminars targeted for each station’s trainers, which were conducted as part of the soft component of this project, have been training other employees at their own fire stations through seminars and training on operation techniques for coordinating a ladder engine and a pumper tanker, and the operation and maintenance of fire vehicles and equipment. The technical manual for fire fighting activity that was developed in the soft component has been utilized in training and seminars.

#### <Financial Aspect>

Although a certain level of budget is allocated for NEMA and the Emergency Management Department of Capital City at the time of ex-post evaluation, it has become difficult to secure an adequate allocation of budget necessary for O&M of the fire vehicles and equipment procured in this project due to the cut in the national budget allotment caused by an economic slump. As a consequence, NEMA claims that the organization has to give up buying genuine spare parts and resort to cheap parts, creating problems such as frequent replacement and shorter service life.

#### <Current Status of Operation and Maintenance>

As mentioned above, the fire vehicles and equipment procured through this project are used properly. According to NEMA, there are maintenance plans for all the fire vehicles and equipment including those procured through this project, and daily inspection, periodic inspection, and repair works are carried out. Results of inspections are recorded by engineers. Although necessary consumables and spare parts are properly procured and maintained, the shortage in the budget and the regulation in the procurement law<sup>2</sup> have made it difficult to purchase genuine spare parts as mentioned above.

<sup>2</sup> The procurement law in Mongolia prohibits specifying brands and manufacturers etc., and thus procurement specifying genuine spare parts is not allowed.

<Evaluation Result>

In light of the above, slight problems have been observed in terms of the institutional and financial aspects. Therefore, the sustainability of the project effect is fair.

5 Summary of the Evaluation

This project has mostly achieved its objective. The project has mostly achieved the target value for the mobilization preparation time, and achieved the target values for the number of pumper tankers that can be mobilized within one minute, the time it takes for a ladder engine before discharging water, and the number of Ger area residents who can receive fire fighting activities promptly (within 10 minutes of the start of the fire). With respect to the achievement of the project impact, a certain level of effect has seemingly been produced given that the number of fire incidents has increased since project completion while the number of injured and deaths from fires has decreased, compared with the situation before project implementation. With respect to sustainability, while the cut in the national budget due to an economic slump has caused problems such as the shortage of personnel and difficulty in purchasing genuine spare parts, technical competency of the personnel at executing agencies have been maintained due to the implementation of various training and seminars after project completion.

Considering all of the above points, this project is evaluated to be highly satisfactory.

**III. Recommendations & Lessons Learned**

Lessons Learned for JICA: As mentioned above, this evaluation experienced difficulty in obtaining actual yearly values for several indicators. When executing similar projects in future, it becomes important to: define, at the time of ex-ante evaluation, the indicators that the executing agency can continuously monitor (and obtain) through the time of ex-post evaluation; require the executing agency to monitor and report such data; and, in order to conduct ex-post evaluation smoothly, share the ex-ante evaluation results and its report with the partner country to strengthen mutual understanding.



A ladder engine used at Fire Station No. 26



A scene of a coordination drill between a ladder engine and a pumper tanker