

Country Name	The Project for the Construction of New Kawasoti Substation
Nepal	

### I. Project Outline

Project Cost	E/N Grant Limit: 847 million yen	Contract Amount: 790 million yen
E/N Date	June, 2007	
Completion Date	March, 2009	
Implementing Agency	Nepal Electricity Authority (NEA)	
Related Studies	Basic Design Study: October 2005 – May 2006	
Contracted Agencies	Consultant(s)	Nippon Koei
	Contractor(s)	Mitsubishi Corporation
	Supplier(s)	-
Related Projects (if any)	[Other Donors' cooperation] Construction of Mukundapur Substation and 33kV transmission lines to connect to New Kawasoti Substation (ADB)	
Background	<p>In Nepal, while the problem of lack of generating capacity had been solved by construction of hydropower stations, weaknesses in power transmission and distribution system were being disclosed. Nawalpalasi District, where the Kawasoti area is located (120km west-southwest from Kathumandu), was rapidly developing as it was close to Indian border, but the power supply system could not afford the sudden increase in electricity demand.</p> <p>Electricity was transmitted from Bardhaghat Substation to Bharatpur Substation via 70km-long 132kV transmission lines, then to the existing Kawasoti substation via 35km-long 33kV sub-transmission lines, and transformed to 11kV to distribute to consumers. The transmission capacity of this system was very small, and the long distance 33kV transmission lines and 11kV distribution lines made supply unreliable. Transmission loss was also remarkable. Under such circumstances, the government of Nepal requested a grant aid from Japan for construction of New Kawasoti Substation.</p>	
Project Objectives	<p><b>Outcome</b></p> <p>To ensure stable power supply in the Kawasoti area, Nawalparasi District in the middle west of Nepal by construction of New Kawasoti Substation.</p>	
	<p><b>Outputs</b></p> <p>Japanese Side</p> <ul style="list-style-type: none"> <li>Construction of 132kV/33kV/11kV New Kawasoti Substation</li> </ul> <p>Nepal Side</p> <ul style="list-style-type: none"> <li>To secure land for the new substation and temporary yard, to provide related facilities to the substation, etc.</li> </ul>	

### II. Result of the Evaluation

Summary of the Evaluation
<p>The extension of the existing power transmission and distribution facilities could not fully keep up with the growing electrical demand in isolated industrial areas like Kawasoti. The poor condition of the transmission and distribution facilities caused power failures and resulted in an unreliable power supply. In addition, there were so many domestic consumers left without being connected to the distribution lines because the priority for connection was placed on industrial/commercial consumers.</p> <p>This project has partially achieved its objective of ensuring stable power supply because some of the indicators such as transmission losses and the power output showed low figures due to the slower growth of electricity demand than projected and delays in the construction of some transmission lines connected to this project. Nevertheless, the power outages were reduced significantly. As for sustainability, some problems have been observed in terms of financial aspect due to the continuing losses of NEA (implementing agency) and the insufficient allocation for the yearly operation and maintenance budget by NEA according to the demand from the Substation.</p> <p>For relevance, the project has been highly relevant with Nepal's development policy, development needs as well as Japan's ODA policies at the time of both ex-ante and ex-post evaluation. For efficiency, the project cost was within the budget but, the project period slightly exceeded the plan.</p> <p>In the light of the above, the project is evaluated to be partially satisfactory.</p>

1 Relevance
<p>This project has been highly relevant with Nepal's development policy ("promotion of rural electrification for stimulating economic growth in rural areas" as per the 10th Five-Year Development Plan (2002-2007) and "to provide reliable electricity services to the rural people" as per the Three Year Plan (2010-13)), development needs (the continuing demand for stable electricity supply and demand for electricity growth in Kawasoti area) as well as Japan's ODA policy for Nepal (2007), at the time of both ex-ante and ex-post evaluation. Therefore, it's relevance is high.</p>
2 Effectiveness/Impact

Since the project was completed in 2009, the year 2009 is regarded as the target year. This project has somehow achieved its objective of ensuring stable power supply in Kawasoti area as shown in the reduction of the power outage due to 33kV transmission lines ground fault, which is deemed to have been contributed to the increase in the socio-economic activities and realizing the basic human needs as the number of consumers including schools and hospitals/clinics has increased. There were no considerable negative impacts on the natural and social environment including land acquisition for this project.

The maximum output has been below the expected level from 2009 to 2011 as (i) the actual electricity demand growth (annual average: 9%) was slower than projected at the ex-ante evaluation (15%), and (ii) Mukundapur Substation and the connecting 33kV transmission lines to receive power from New Kawasoti Substation had not been constructed on schedule due to opposition from residents. The Mukundapur substation came into operation in February 2012 and increased some output from New Kawasoti Substation for 2012. Transmission loss data were not available in a comparable form to the planned value, but, according to NEA the transmission loss has not been reduced as desired. The noticeable improvement is reduction in the power outages from 25 hours/year in 2006 to 1.7 hours/year in 2012.

Therefore, the effectiveness/impact is fair.

#### Quantitative Effects

Indicator(unit)	baseline value (2006)	target value (target year) (2008)	Actual value			
			2009	2010	2011	2012 (ex- post evaluation)
indicator 1 Total transformer capacity of existing/new Kawasoti SS (MVA)	(actual value) 8MVA	(planned value after 2008) 38MVA	38 MVA	38 MVA	38 MVA	38MVA
indicator 2 Maximum output of New Kawasoti SS	-	(planned value) 2009: 15MVA 2012: 23MVA 2014: 30MVA	8.6 MVA	9.4 MVA	10 MVA	14.51MVA (9.37MVA from 132kV, 5.14MVA from 33kV)
indicator 3 Power outage due to 33kV transmission lines ground fault (hour/year) (Bharatpur SS – Existing/ New Kawasoti SS)	(actual value) 25 hours/year	(planned value after 2008) reduced	0.15 hours/year	3.47 hours/year	2.3 hours/year	1.7 hours/year

Note: (1) SS stands for substation. (2) Transmission loss data is not shown in this table as it is not available in a comparable form.

Source: NEA

#### 3 Efficiency

Although the project cost was within the plan (ratio against the plan: 94%), the project period slightly exceeded the plan (ratio against the plan: 114%) because of social unrest that delayed the detailed design and procurement. Outputs were produced mostly as planned. Therefore, efficiency of the project is fair.

#### 4 Sustainability

The facilities/ equipment provided by the project are maintained by New Kawasoti Substation under the Butwal Grid office, NEA.

The project has some problems in the financial aspect due to the severe financial loss of NEA with low tariff rate and high cost of purchase of electricity from abroad and independent power producers (IPPs). Although NEA has tried to secure budget to keep running New Kawasoti Substation and other transmission/ distribution facilities so far, the allocated amount is lower than requested. The average 20% hike in electricity tariff was implemented recently, but there still remains a concern on the securement of the future budget. Meanwhile, no problem has been observed in structural and technical aspects and current status of operation and maintenance of the implementing agency with the available budget: according to Butwal Grid office, sufficient number of staff is allocated and has properly practiced operation and maintenance so far, and the overall condition of the facility is good. A small concern on the structural aspect can be pointed out though it is not a problem for now: if complicated maintenance becomes necessary in the future, the office of Butwal Grid (around 85km away) will provide support, but it may be delayed during strikes and other similar problems. Also, through the data collection process for this ex-post evaluation, it was found that the NEA's data and information management system could be improved (e.g. not all data were readily available, and responsibility over particular data/ information was unclear).

Therefore, sustainability of the project effect is fair.

### III. Recommendations & Lessons Learned

#### Recommendations for Implementing agency

- NEA should do internal review for further enhancing its record keeping and data registration system for better grasp of effectiveness.
- The required full budget for the operation and maintenance of New Kawasoti Substation should be secured for the future despite NEA's bad financial health.
- Some mechanism for improvement to ensure prompt system should be developed for major maintenance as the supporting organization (Butwal Grid office) is quite far, especially in times of strikes and calamities, though this provision has not posed serious problem till now. The improvement measures could be,
  - Enhancing the existing staff capacity for major repair and maintenance for New Kawasoti SS Staff or Kawasoti SS

with equipment supplement, which the existing staff can respond to both the substation in case of emergency. Spares which should always be available are 1) Vacuum interrupters, 2) Closing coil, and 3) Trip coil)

- Depute repair and maintenance expert with necessary equipment for major maintenance from the Butwal Grid to either Kawasoti Substation or the New Kawasoti Substation, which are proximity to each other.

#### Lessons learned for JICA

- The data and information for evaluations should be clearly stated in the Basic Design in a consistent manner with the standard practice of data collection and analysis at the implementing agency. (In case of this project, the baseline and target of transmission loss should have been calculated in a consistent manner with the general data managing system of NEA so that it could be comparable before, during and after the project.)
- The BD study should also set up the data recording system suitable in the partner country's context, if it does not exist in their system, and assistance in capacity building (as a soft component) should also be considered.
- When planning a future substation project, progress of construction of connecting transmission facilities should be thoroughly examined; attention should be paid to social aspects of not only the concerned project but also other projects which has relation with this project and could affect its performance.



External View of New Kawasoti Substation



Relay panel



Preparing for survey to consumers (enumerators for ex-post evaluation being briefed by Chief of New Kawasoti Substation)