

Kingdom of Morocco

Ex-Post Evaluation of Japanese ODA Loan  
“Rural Electrification Project (II) (III)”

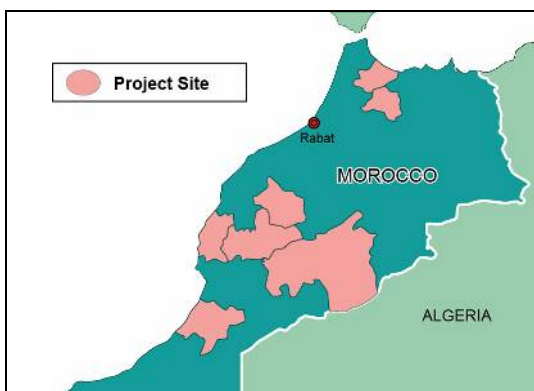
External Evaluator: Keishi Miyazaki / Keisuke Nishikawa, OPMAC Corporation

**0. Summary**

The Rural Electrification Projects (II) and (III) aimed at the electrification of rural villages through the construction of distribution lines in order to reduce poverty and rectify regional disparities in 10 provinces with high levels of poverty. The relevance of this project is high as it was consistent with the development plan and development needs of Morocco and was also consistent with the key areas of assistance in Japan’s ODA policy for Morocco. As for the effectiveness of the project, it was observed that the target figures of peak load and the rural electrification rate were achieved and that sales volume and sales revenue have been steadily increasing. Also, local residents have reported the indirect effects of rural electrification such as improvements in access to information and more hygienic conditions. With regard to the implementation of the project, while the project cost was within the planned amount thanks to efficient designing and competition among contractors, the project period substantially exceeded the plan due to delays in construction activities and the large amount of time required for coordination with the villages through which distribution lines would pass. Therefore, the efficiency of the project is fair. The sustainability of the project is high as there were generally no issues identified in terms of the institutional, technical and financial aspects of the executing agency, nor were there problems in the conditions of the operation and maintenance of the facilities.

In light of the above, this project is evaluated to be highly satisfactory.

**1. Project Description**



Project Location



Distribution lines constructed under the project (Essaouira Province)

## 1.1 Background

At the time of project planning, Morocco had a population of 28 million, of which 55% lived in urban and 45% lived in rural areas. The number of people living in poverty was 5.3 million (1998/99) and of these, those in rural areas accounted for 66% (3.5 million) of the total poor. It was often pointed out that the main problems of these people, both in urban and rural areas, were that they did not have basic infrastructural facilities such as a water and electricity supply, or roads, or sufficient access to public services such as education and medical services.

While the electrification rate in urban areas was almost 100%, the rate in rural areas was still at 63% in April 2004. Therefore, the entire country of Morocco faced the challenge of reducing regional disparities and poverty, and a specific challenge of rural development was to raise the electrification rate.

The 'Programme d'Electrification Rurale Globale' (PERG), launched by the Moroccan government in 1995, had as its target, an increase of the electrification rate to 90% in rural areas by 2010. Under this programme, several phases of distribution network development had been undertaken by the Office National de l'Electricité (ONE)<sup>1</sup> and the Rural Electrification Projects (II) (III) were to support some portions of PERG's Phase 3 and the second stage of its Phase 4.

## 1.2 Project Outline

The objective of the project is the electrification of rural villages in 10 provinces with high levels of poverty by expanding the electricity distribution networks, thereby contributing to the reduction of poverty and regional disparities through an improvement of living standards.

Loan Approved Amount / Disbursed Amount	Rural Electrification Project (II) : 7,350 million yen / 7,350 million yen Rural Electrification Project (III) : 5,257 million yen / 4,536 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	Rural Electrification Project (II) : May, 2002 / June, 2002 Rural Electrification Project (III) : November, 2005 / November, 2005
Terms and Conditions	Rural Electrification Project (II): Interest Rate: 2.2%, Repayment Period: 30 years (Grace Period: 10 years), Conditions for Procurement: General Untied Rural Electrification Project (III): Interest Rate: 0.9%, Repayment Period: 20 years (Grace Period: 6 years), Conditions for Procurement: General Untied
Borrower / Executing Agency	Office National de l'Electricite et de l'Eau Potable / Office National de l'Electricite et de l'Eau Potable (Guaranteed by the Government of the Kingdom of Morocco)

<sup>1</sup> ONE merged with the Office National de l'Eau Potable (ONEP) in April 2012 and became the Office National de l'Electricite et de l'Eau Potable (ONEE).

Final Disbursement Date	Rural Electrification Project (II) : December, 2007 Rural Electrification Project (III) : March, 2011
Main Contractor (Over 1 billion yen)	<u>Rural Electrification Project (II)</u> Isotron (Spain) / Ritmaf (Morocco) / Consenergy Consortile (Morocco) / Cegelec (Morocco) <u>Rural Electrification Project (III)</u> Elcotram (Morocco)
Main Consultant (Over 100 million yen)	-
Feasibility Studies, etc.	Government of the Kingdom of Morocco ‘Programme d’Electrification Rurale Globale’ (1995)
Related Projects	Japanese ODA Loan ‘Rural Electrification Project’ (Loan Agreement in 1998) In addition, Agence française de développement (AFD), KfW Bankengruppe (KfW), European Union (EU), Islamic Development Bank (IsDB), Arab Fund for Economic and Social Development (AFESD), Kuwait Fund for Arab Economic Development etc. supported promotion of the overall plan of the Government of Morocco ‘Programme d’Electrification Rurale Globale’.

## 2. Outline of the Evaluation Study

### 2.1 External Evaluator

Keishi Miyazaki (OPMAC Corporation)

Keisuke Nishikawa (OPMAC Corporation)<sup>2</sup>

### 2.2 Duration of Evaluation Study

This ex-post evaluation study was conducted with the following schedule:

Duration of the Study: October 2012 – October 2013

Duration of the Field Study: February 9 – March 3, 2013 and May 11 – May 19, 2013

### 2.3 Constraints during the Evaluation Study

While this project was implemented in a total of 10 provinces in rural areas of Morocco, only four provinces could be visited during the survey period. Also, the electricity loss rate and electrical power failure could not be analysed as it was difficult to collect data in the same format from all the provinces concerned.

<sup>2</sup> Joined the evaluation team of OPMAC as a team member from Japan Economic Research Institute Inc.

### 3. Results of the Evaluation (Overall Rating: A<sup>3</sup>)

#### 3.1 Relevance (Rating: ③<sup>4</sup>)

##### 3.1.1 Relevance to the Development Plan of Morocco

###### Consistency with the Overall Policy

At the time of the appraisal of the Rural Electrification Project (II)<sup>5</sup>, the Economic and Social Development Plan (2000-2004), as one of its key challenges, prioritised the enhancement of policies to reduce regional disparities through rural development. In Morocco, no long-term development plan has been formulated since the expiry of this five-year development plan, although development policy was stipulated in the Finance Bills / Finance Acts of the respective years. In the Finance Bill of 2013 (Economic and Financial Report), effective at the time of the ex-post evaluation, it is clearly stated that electrification and water supply services targeting the poor in rural and mountainous areas will be enhanced in accordance with the development objectives in these areas, as set forth in the ‘National Initiative on Human Development’, established in May 2005 by His Majesty King Mohamed VI. Thus, it can be observed that rural electrification has been an important policy challenge as reflected in the fact that rural development policies are maintained at a national level.

###### Consistency with Sector Policy

In order to redress regional disparities, the Moroccan government formulated the ‘Programme d’Electrification Rurale Globale’ (PERG) in 1995 with the aim of bringing the rural electrification rate up to 90% by 2010<sup>6</sup>. The government commenced the construction of distribution networks in rural areas from the following year. PERG was still positioned as an effective programme, even at the time of the ex-post evaluation, and the Executing Agency (ONEE) has continued the electrification of remaining areas by bearing a larger portion of the cost as PERG progresses<sup>7</sup>.

In this way, PERG was effective as a sector level programme both at the times of appraisal and ex-post evaluation. This project, supporting some parts of the programme, can be said to have been relevant to sector policy.

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<sup>3</sup> A: Highly satisfactory, B: High, C: Partially satisfactory, D: Unsatisfactory

<sup>4</sup> ③: High, ②: Fair, ①: Low

<sup>5</sup> As the ‘Rural Electrification Project’ was implemented three times as Japanese ODA projects, the Rural Electrification Project (II) will be referred to as ‘(II)’ and the Rural Electrification Project (III) as ‘(III)’ in this report.

<sup>6</sup> The target rate of rural electrification continued to be revised, becoming ‘98% by 2007’ including the contributions from independent power producers.

<sup>7</sup> The upper limit of the installation cost in the third phase of PERG ((II) is part of this phase) was 14,000 dirham (DH) per household, and that of the fourth phase - second stage ((III) is part of this phase) was 27,000DH per household. ONEE was spending more for each household (as the cost to be borne by each household was always the same) as PERG progressed. At the time of the ex-post evaluation, these were the areas where the installation cost per household was 27,000 – 80,000DH. (Note: 1DH was about 11.7 yen as of July 2013.)

### 3.1.2 Relevance to the Development Needs of Morocco

In 1999, 45% of the entire population of Morocco lived in rural areas, and the rural electrification rate remained at 49% in November 2001, although the rate in urban areas was almost 100%. It was also said that 66% (3.5 million people) of the 5.3 million poor lived in rural areas in 1998/99, and that there was a large rural-urban gap in terms of access to electricity. This was particularly bad among the poor (according to the appraisal report of (II)).

As a result of the implementation of PERG from the second half of the 1990s, the rural electrification rate substantially improved, as shown in Table 1, leading to the reduction of the rural-urban gap in access to electricity. This project also contributed to an increase in the electrification rate<sup>8</sup>.

Table 1: Rural Electrification Rate

Year	Rural Electrification Rate (%)	Consumption of Electricity (Million KWh)
Average 2000 – 06	64.7	15,538
2007	93.0	20,502
2008	95.4	21,638
2009	96.5	22,392
2010	96.8	23,749
2011	97.4	25,634

Source: Financial Act 2013 (Economic and Financial Report)

It was observed that the rural electrification rate reached 97.4% in 2011 and that electricity consumption increased as the electrification rate improved. As the supply of electricity is a basic infrastructural service for society, it is desirable that the areas remaining unelectrified areas be given electricity and that a stable supply is provided for electrified areas, amid the consistent increases in electricity consumption in the country.

Therefore, this project (both (II) and (III)) was relevant to the need for rural electrification and for a stable supply of electricity both at the times of project appraisal and ex-post evaluation.

### 3.1.3 Relevance to Japan's ODA Policy

The provision of assistance to rural development to narrow disparities between urban and rural areas was one of the key areas of Japan's ODA for Morocco at the time of the appraisal of (II) in 2002 and of (III) in 2005 (according to the 'Country data book'). In the Medium-Term Strategy for Overseas Economic Cooperation Operations of the former Japan Bank for International Cooperation (1999-2001 and 2002-2004 editions), regional development to narrow

<sup>8</sup> In detail, (II) was to cover part of PERG's Phase 3 (7 provinces, approximately 1,700 villages and 88,000 households (about 28% of PERG's Phase 3)), and (III) to cover part of PERG's Phase 4-2 (4 provinces, 1,191 villages and approximately 33,000 households (about 14% of PERG's Phase 4-2)).

the gap was considered a key assistance area and especially in the context of Morocco, the development of electrification, the water supply, roads, telecommunications, etc in rural areas was the focus of assistance.

Thus, this project, having as its target the reduction of poverty and the narrowing of regional gaps by the electrification of rural villages, was in conformity with the overall ODA policy and the overseas economic cooperation policy for Morocco at the time of project appraisal. The relevance of the project therefore can be concluded to be high.

This project has been highly relevant to Morocco's development plan and development needs, as well as to Japan's ODA policy; therefore its relevance is high.

### 3.2 Effectiveness<sup>9</sup> (Rating:③)

#### 3.2.1 Quantitative Effects (Operation and Effect Indicators)

##### 3.2.1.1 Peak Load, Rural Electrification Rate, Household Electrification Rate

At the time of project planning, peak load (maximum electricity at the sending end) and the rural electrification rate were expected to increase in (II), and the household electrification rate in the project area was expected to increase, in addition to these two indicators, in (III). The target year for measuring the level of achievement of each indicator was 2009 in (II), one year after completion of the project, and 2011 in (III), two years after completion of the project. The table below shows actual values and achievement levels, obtained at the time of the ex-post evaluation.

[Rural Electrification Project (II)]

Table 2: Peak Load (Maximum Electricity)

Unit: MW

Province	2001	2005	2008	2009		2010	2011	2012
	Base year	Actual value	Actual value	Target value	Actual value	Actual value	Actual value	Actual value
Chefchaouen	7.0	18.5	28.5	11.0	33.2	41.0	43.3	45.6
Taounate	9.0	9.2	17.4	14.0	19.8	22.5	26.7	27.8
Al Haouz	37.5	17.0	29.3	55.0	33.5	38.4	42.4	43.4
Azilal	9.5	19.2	25.4	13.8	29.8	28.4	32.5	34.6
Tiznit	16.0	17.1	23.8	25.0	26.2	28.5	33.1	33.6
Ouarzazate	26.0	18.4	30.0	39.0	39.2	43.8	48.6	48.8
Zagora	5.5	9.6	11.8	8.5	12.0	13.3	13.5	14.8

Source: Data provided by the Executing Agency

<sup>9</sup> Sub-rating for Effectiveness is to be put with consideration of Impact.

Table 3: Rural Electrification Rate

Unit: %

Province	2001	2005	2008	2009		2010	2011	2012
	Base year	Actual value	Actual value	Target value	Actual value	Actual value	Actual value	Actual value
Chefchaouen	29	78	96	87	97	97.3	97.4	97.7
Taounate	39	72	95	88	96	96.2	96.7	97.6
Al Haouz	40	75	93	86	94	94.7	95.8	98.6
Azilal	54	71	84	83	90	92.1	93.4	94.6
Tiznit	49	80	98	88	98.6	98.8	98.8	98.9
Ouarzazate	65	86	96	98	96	96.2	96.6	99.1
Zagora	78	93	96	95	96.6	96.7	96.7	98.3

Source: Data provided by the Executing Agency

The peak load (a total value of peak loads at 60/22 kV substations in each province) generally increased considerably during the 2000s, including during the period of this project. The number of provinces that achieved the target figures in 2009 was six out of seven provinces, and the achievement level was 116% on average<sup>10</sup>.

With regard to the rural electrification rate, PERG finally settled the target of raising the rate to 98% by 2007. The overall rural electrification rate of Morocco in 2007 was actually 93%, increasing at a slower pace compared to the original plan, but it reached over 97% in 2011. The rural electrification rates in each province covered by this project, as indicated in Table 3, reached their target levels in six provinces out of seven by 2009, and increased further to more than 94% in all of the provinces in 2012. This shows that this project has contributed to the overall improvement of electrification rates<sup>11</sup>.

[Rural Electrification Project (III)]

Table 4: Peak Load (Maximum Electricity)

Unit: MW

Province	2003	2005	2008	2009	2010	2011		2012
	Base year	Actual value	Actual value	Actual value	Actual value	Target value	Actual value	Actual value
Chefchaouen	12.5	18.5	28.5	33.2	41.0	18.9	43.3	45.6
El Kelaa des Sraghnas	28.3	33.2	39.4	43.6	45.8	47.4	48.0	48.6
Chichaoua	9.9	15.0	20.8	22.6	24.7	21.7	26.8	28.2
Essaouira	12.4	24.5	26.9	27.8	28.5	40.8	29.3	30.5

Source: Data provided by the Executing Agency

<sup>10</sup> The actual values of the base year (2001) obtained during the project planning were different from the values for 2001 provided by the Executing Agency. Some of the actual values were lower than their base values, but it was not possible to track down the evidence of the values obtained during the planning stage (e.g. The actual value in Al Haouz in 2001 was 11.5 MW, being substantially lower than the value of 37.5 MW shown in the planning report). However, Table 3 shows the base values obtained during the planning period as the basis for judgement.

<sup>11</sup> The proportion of the households electrified in (II) and (III) is 7% of the entire PERG programme.

Table 5: Rural Electrification Rate

Unit: %

Province	2003	2005	2008	2009	2010	2011		2012
	Base year	Actual value	Actual value	Actual value	Actual value	Target value	Actual value	Actual value
Chefchaouen	41	78	96	97	97.3	97	97.4	97.7
El Kelaa des Sraghnas	48	91	97	97	97.3	98	97.4	98.6
Chichaoua	48	73	89	90	91	96	91.4	97.0
Essaouira	30	61	87	88	88.8	94	88.9	92.3

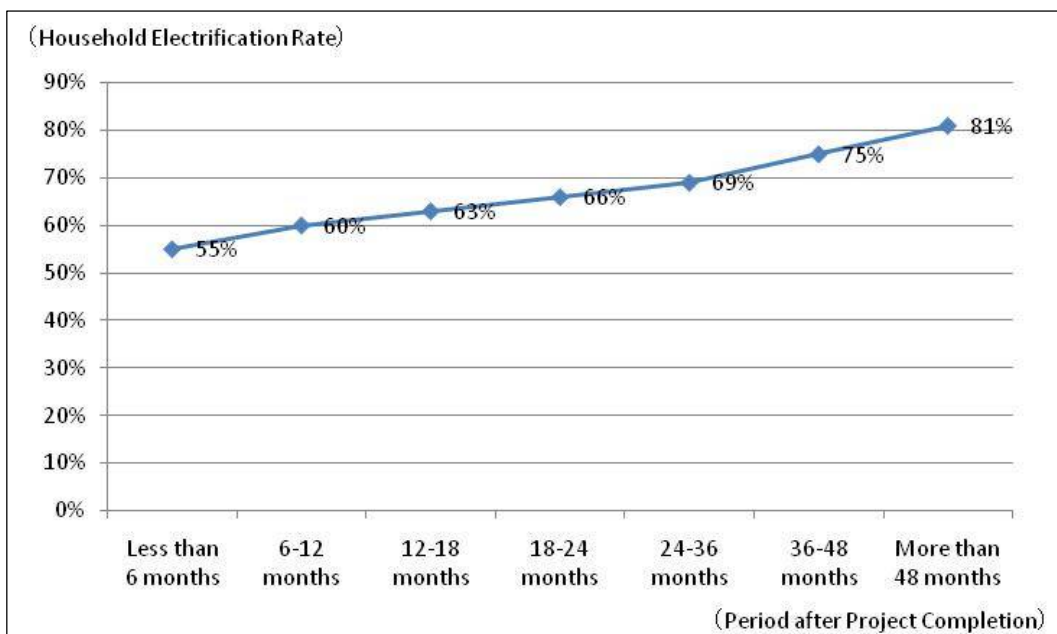
Source: Data provided by the Executing Agency

The peak load in 2011 in the provinces of (III) shows that while it substantially exceeded the target value in Chefchaouen, it remained at 72% in Essaouira. According to the Executing Agency, while the target value in Essaouira was planned based on the expectation that there would be new industrial facilities during the planning stage, no such projects were actually implemented and this led to lower-than-expected demand for electricity. The four provinces as a whole sufficiently achieved their target in 2011 and 2012 when the actual figures were 114% and 119% of the target value respectively.

With regard to the rural electrification rate, while only one out of four provinces achieved their targets by the target year, the achievement level of the three remaining provinces was high at 95 – 99%, and the number of provinces achieving the target increased to three in 2012. Overall, it can be observed that electrification has progressed well towards the target rates of the entire PERG programme.

No figure for the household electrification rate in the villages in the project area corresponding to the planned target figure could be obtained as the Executing Agency did not have the data either at provincial level or at project area level. However, national level data showing the household electrification rates categorised into several time periods after the electrification of the villages was available, as shown in the figure below. According to the data, the household electrification rate after the distribution lines were constructed was 75% three to four years after completion of the project, and 81% after more than four years. This implies that in the project areas, where more than three and a half years have passed in both projects, an average of over three out of four households is using electricity.





Source: Data provided by the Executing Agency

Figure 1: Rate of Household Electrification after Village Electrification (2012)

### 3.2.1.2 Other Quantitative Effects

In addition to the indicators above, data such as electricity sales volume, sales revenue and the electricity consumption of each household is shown below.

Table 6: Sales Volume and Revenue in Rural Areas in Each Province

Province	Sales Volume (Unit: MWh)					Sales Revenue (Unit: thousand DH)				
	2009	2010	2011	2012	Change 2009~12	2009	2010	2011	2012	Change 2009~12
Chefchaouen	73,182	79,061	102,742	105,548	144%	67,085	75,036	99,128	100,952	150%
Taounate	53,510	61,658	66,021	70,549	132%	49,844	58,115	62,164	66,441	133%
Al Haouz	66,490	80,408	89,460	99,245	149%	65,566	80,629	89,588	97,927	149%
Azilal	44,429	51,638	58,750	65,918	148%	41,821	49,256	56,155	63,238	151%
Tiznit	42,094	45,681	51,304	55,578	132%	38,432	42,967	48,635	53,025	138%
Ouarzazate	52,270	58,496	63,999	70,236	134%	48,846	54,968	60,022	66,206	136%
Zagora	24,142	30,332	33,823	36,588	152%	21,746	28,684	31,963	34,636	159%
El Kelaa des Sraghnas	69,744	79,796	88,173	99,117	142%	65,860	75,335	85,127	95,253	145%
Chichaoua	23,017	32,505	39,208	43,147	187%	19,845	31,628	38,552	42,491	214%
Essaouira	25,062	20,856	33,590	39,502	158%	25,667	18,945	34,232	40,212	157%
Total	473,940	540,431	627,070	685,428	145%	444,712	515,563	605,566	660,381	148%

Source: Data provided by the Executing Agency

As the rural electrification rate and household electrification rate improved, electricity sales volume and revenue also went up in all the provinces covered by this project, as shown in Table

6. The sales volume and revenue actually went up by 45% and 48% respectively from 2009 to 2012. These increases were not just due to an increase in the electrification rate but were also greatly influenced by the electricity consumption of each household in rural areas as more electric appliances were used for a longer time and more frequently. Specifically, electricity consumption increased by an average of 25% between 2009 and 2012, ranging from 12% to 53% in all the provinces covered under this project.

Table 7: Monthly Electricity Consumption per Household in Rural Areas

Unit: KWh

Province	2009	2010	2011	2012	Change 2009~12
Chefchaouen	60.8	62.7	78.8	78.3	129%
Taounate	52.7	55.2	57.3	58.9	112%
Al Haouz	63.5	72.3	75.9	80.2	126%
Azilal	66.6	69.1	72.1	76.9	115%
Tiznit	53.5	55.5	59.8	63.1	118%
Ouarzazate	73.5	78.7	83.4	87.9	120%
Zagora	74.0	89.6	97.0	100.7	136%
El Kelaa des Sraghnas	77.3	84.2	88.4	95.5	124%
Chichaoua	44.8	57.9	65.8	68.4	153%
Essaouira	49.9	37.8	55.2	63.4	127%
Average of 10 Provinces	61.66	66.3	73.37	77.33	125%

Source: Data provided by the Executing Agency

Although a rural electrification programme had been implemented before PERG, it was not fully functioning in connecting rural areas to the distribution network. Rural electrification progressed through the implementation of PERG and this formed a base for improving the living conditions of rural areas and for rectifying rural-urban disparities. PERG is characteristic in that it requests beneficiaries to bear part of the cost of developing distribution networks, and it can be said that this cost-sharing mechanism has contributed to the improvement of the rural electrification rate.

With regard to the defrayment of the construction costs of distribution networks, communes covered the burden of 2,085 DH per household, while each connecting household was to bear 2,500 DH. The remaining amount was covered by the Executing Agency (ONEE). This finance framework maintained the cost borne by communes and households at the same level throughout the country regardless of the locations of villages. It also enabled the Executing Agency to reduce their need to finance through the amount covered by the beneficiaries. In addition, in order to promote the electrification of households, a mechanism was introduced where it was possible for households to pay the cost of electrification in instalments<sup>12</sup>. During project implementation, the Executing Agency also collaborated with the communes in each

<sup>12</sup> In addition to this arrangement, individual connections from the distribution lines in villages needed to be separately financed by each household (2,000 – 6,000 DH, depending on the sizes of houses).

project area so that the parties concerned with the construction of medium and low voltage distribution lines would always be coordinated and involved in the scheduled implementation of the plan.

### 3.2.2 Qualitative Effects

At the time of project planning, the following qualitative effects were expected: an improvement in the living environment (increase in opportunities to access information, increase in night-time activities, improvement in hygienic conditions, reduction of labour, etc.); poverty reduction in rural areas; an elimination of rural-urban disparities. These effects will be analysed in the following ‘Impact’ section as they were regarded as impacts of the project in the ex-post evaluation survey.

Improved safety during the night as well as a higher level of satisfaction on the part of residents can be considered to be other qualitative effects of the project. A beneficiary survey (as described hereinafter) revealed that the following points were highly regarded by residents. As for the improvement in safety, 43% replied that safety had ‘improved’ while the rest of the respondents said that there was ‘no change’. A majority of women expressed the view that night-time safety had improved. This implies that the streetlights installed along with the project had played a certain role in improving safety. Regarding the level of satisfaction with electricity supply services, there were favourable responses on electrification and a stable electricity supply and 83% of the respondents were found to be ‘satisfied’.

## 3.3 Impact

### 3.3.1 Intended Impacts

In this section, the items described in ‘3.2.2 Qualitative Effects’ will be analysed as impacts of this project, both those expected and those unexpected at the time of planning. As no surveys on the social and economic impacts of PERG had been conducted since 2003, and no data on provincial poverty level rankings after 2007 was available, in this ex-post evaluation survey, these impacts were measured through a beneficiary survey in the villages where electrification through the project had taken place<sup>13</sup>.

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<sup>13</sup> The relatively large provinces of Tiznit and Ouarzazate from (II), and Essaouira Province from (III), and Chefchaouen Province where both (II) and (III) were implemented, were selected for the beneficiary survey. In these provinces, interviews were conducted with 103 rural residents.

Table 8: Key Results of the Beneficiary Survey (on the Living Environment)

Impact	Key Result	Main Comments / Remarks
Increase in opportunities to access information	Greatly Improved: 69% Improved: 28%	Many respondents said that they are now able to watch television and listen to the radio. A number of satellite dishes were observed during the site visit.
Increase in night-time activities	Increased: 45% No change: 52%	More can now be done inside the house with the availability of lights, but other than that, no particular community-related activities have been created. Therefore, mixed responses are thought to have been received.
Improvement in hygienic conditions	Improved: 63% No change: 37%	Beneficiaries who responded that hygienic conditions improved provided the examples that a water supply direct to each house had been made possible with electricity and that the hygienic conditions for food were now better using refrigerators.
Reduction of household work	Greatly reduced: 26% Reduced a little: 18% No change: 54%	While the positive factors are that there is no more need to draw water and that refrigerators can now be used, some respondents said that the overall amount labour had not decreased as it was now possible to work even after dark.

Source: Beneficiary Survey

Changes in the living environment were found to be highly appreciated. Improvements in access to information, and improvements in hygienic conditions tended to be regarded in a positive way. It can be said that a stable supply of electricity has led to a widespread use of televisions in each house, and women in particular, who normally have a lot of work inside the house, can now obtain a wealth of information. As for hygienic improvements, more food items are now hygienically kept thanks to the availability of refrigerators after

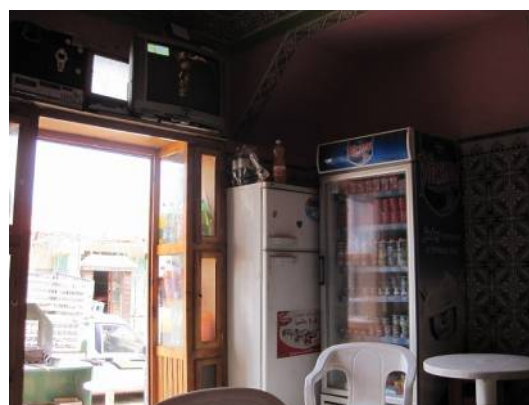


Photo 1: Refrigerator at a café in a village electrified in the project (Ouarzazate Province)

electrification. This was considered to be the main factor among the positive answers. While there were mixed answers on the increase in night-time activities and the reduction of household work, few stated that they had become worse. Therefore, it can be presumed that the project has generated some positive effects.

On the other hand, respondents were not as positive in their views on the improvement of their living environment when it came to broader questions on poverty reduction in rural areas and also on regional disparities. On the changes in income, only 21% responded that their income had increased after electrification. The remaining 79% reported no changes. Also, on the improvement of poverty levels, while 17% saw some improvements, 66% felt that there had been no change. The remaining 17% were unsure. Concerning the question of rural-urban disparities, only 13% answered that they were being redressed; 69% found no change and the remaining 18% were not sure. In the site surveys in these four provinces, an example of the

project effects was observed in that business hours could be extended, even after dark, in the centre of communes where there were some shops. However, although this project reached out to mountainous remote settlements, where some changes in the living environment were brought about, there were no examples of new commercial activities and no additional opportunities for increases in income and/or correction of regional disparities were found. One of the main sources of cash income for rural residents is the labour migration of men to urban areas, and this did not change, even after the implementation of the project. This project had the aspect of social infrastructure development which contributes to the improvement of villagers' living environment, rather than inducing more economic activities in rural areas.

### 3.3.2 Other Impacts

#### 3.3.2.1 Impacts on the Natural Environment

At the time of planning, no serious environmental impacts were expected. The project did not fall under the category of projects in a large sector, it had no characteristics that were likely to give a negative influence on the environment, nor was it in that kind of region. In accordance with the domestic legislation of Morocco, no environment impact assessment was required for the construction of distribution lines. Also, no negative impact on the natural environment was foreseen as this project did not involve any deforestation and the cutting of trees would be minimised.

No respondents pointed out any negative environmental effects in the beneficiary survey and, according to information from the ONEE officers in each province visited during the site survey, no problematic environmental impacts occurred either during or after construction. No such impacts were observed when the evaluator visited the project sites in person in some of the provinces. Therefore, it can be concluded that no negative impacts on the natural environment were caused during implementation nor have any been observed, even after completion of the project.

#### 3.3.2.2 Land Acquisition and Resettlement

At the time of planning of this project, no land acquisition or resettlement of residents were planned as, basically, government land was to be used for the installation of poles and other facilities.

In the beneficiary survey, 98% of the respondents replied that there were no cases of land acquisition. The remaining 2% provided the information that some of the residents in villages that were not to receive electrification under this project had asked for some compensation for their communes for the installation of transmission and distribution lines passing through their villages, as they were not the direct beneficiaries of the project. These villages eventually received electrification through other projects of PERG, and no land acquisition issues occurred after all. Also, no residents needed to be relocated due to this project.

Generally, some sections of land inside villages had to be used to install poles and transformers, but the installation was mostly welcomed by the beneficiaries. As the number of villages covered under the project was large, there were some cases, such as in several villages in Taounate, where more time was required for coordination among villagers regarding the location of village distribution lines. However, it was confirmed that no land acquisition related to this project was executed.

This project has largely achieved its objectives; therefore its effectiveness is high.

### 3.4 Efficiency (Rating:②)

#### 3.4.1 Project Outputs

In this project, distribution lines were developed in rural areas of Morocco with a higher level of poverty. A total of 10 provinces, seven in (II) and four in (III), were covered by the project (one province was included in both projects). The final outputs and the original plans are compared in the table below.

Table 9: Comparison of Original and Actual Outputs

Component	Original		Actual	
	(II)	(III)	(II)	(III)
Construction of medium-voltage (22 kV) distribution lines	Approx. 1,832 km	Approx. 1,300 km	1,684 km	1,118 km
Construction of low-voltage (220/380 kV) distribution lines	Approx. 3,675 km	Approx. 2,550 km	4,329 km	2,657 km
Installation of transformers	Approx. 840	Approx. 580	845	556
Number of villages covered	1,717	1,189	1,706	1,166
Number of households covered	87,103	33,380	86,428	32,803

Source: Project Completion Report

Note: (II): The seven provinces of Chefchaouen, Taounate, Al Haouz, Azilal, Tiznit, Ouarzazate and Zagora

(III): The four provinces of Chefchaouen, El Kelaa des Sraghnas, Chichaoua and Essaouira

\* While Chefchaouen is in both (II) and (III), different villages were covered in respective phases.

This project, taking into account lessons learned from similar projects in the past, had the possibility of changing project areas from the original plan. As a result of close work with communes in the detailed design of the provincial distribution networks, 11 villages and 675 households in (II) as well as an additional 23 villages and 577 households were excluded from the project scopes<sup>14</sup>. However, as these villages were eventually covered by other PERG projects and as electrification itself has been achieved in line with the plan, no problems have arisen overall.

<sup>14</sup> The three villages in Taounate Province, as described in '3.4.2.2 Project Period', that were initially against the installation of distribution lines are included here. It can be judged that there were no problems in producing the 'project outputs' as measures to avoid further delays in the project were taken while maintaining the initial design of the network.

### 3.4.2 Project Inputs

#### 3.4.2.1 Project Cost

In PERG, a basket system was employed to manage the both the fund of the Executing Agency itself and funds from other donors, including the Japanese ODA loan in one account. As a result, it was not possible to clarify the amount spent as the ‘foreign currency portion’ or the ‘local currency portion’ as had been planned during the design phase. The Japanese ODA loan was fully utilised as it had lower interest rates than other funding sources, leading to a lower level of financing directly from the executing agency through borrowings from commercial banks.

The planned and actual project costs are compared in the table below.

Table 10: Comparison of Original and Actual Project Cost

Unit: million yen

	(II)		(III)	
	Original	Actual	Original	Actual
Japanese ODA loan provided	7,350	7,350	5,257	4,536
Own funding by Morocco	3,606	1,590	1,768	600
Total	10,956	8,940	7,025	5,136

Source: Project Completion Report

The total costs were within the planned amount in both projects as efforts to reduce project cost were made with an efficient detailed design of the distribution lines and the creation of competition among contractors in the bidding process ((II) resulted in 82% of the planned amount, and 73% in (III)). As the Japanese ODA loan, with lower interest rates, was fully utilised, it can be observed that the proportion of the executing agency’s own funding turned out to be substantially smaller than the plan.

#### 3.4.2.2 Project Period

The project periods exceeded the plans in both projects. The planned and actual periods from the time of the loan agreement to project completion (excluding the one-year inspection periods) are shown below.

Table 11: Comparison of Original and Actual Project Periods

	Original	Actual	Comparison with the Original Plan
Rural Electrification Project (II)	June, 2002 – August, 2005 (39 months)	June, 2002 – September, 2008 (76 months)	195%
Rural Electrification Project (III)	November, 2005 – September, 2007 (23 months)	November, 2005 – November 2009 (49 months)	213%

Source: Appraisal Report, Project Completion Report and Interviews with the Executing Agency

The project period of (II) showed a substantial delay due to the slow progress of the contractor's construction and to the opposition of some villages to the installation of distribution lines that would pass through their villages (195% of the planned period). It took a long time to coordinate with the three villages in Taounate that were opposed to the installation of distribution lines. These villages were excluded from the scope of the Japanese ODA loan project and the Executing Agency dealt with the villages with their own funds. Therefore, the Japanese ODA loan project was completed in September 2008, while the actual coordination and construction with the Executing Agency's own funds continued until January 2012. The development of distribution lines in other project areas, apart from these villages, had been completed by 2007.

Major factors for the delay in (III) were the slow progress of construction activities by contractors, and longer-than-planned time for coordination with villages on the installation of distribution lines. As a result, the project took 49 months until November, 2009, which was 213% of the planned project period.

Although a number of villages needed to be covered, the periods of both projects were over 150% of the plan. Therefore, the efficiency of the project period is low.

### 3.4.3 Results of Calculations of Internal Rates of Return (IRR)

The Economic Internal Rate of Return (EIRR)<sup>15</sup> calculated by the Executing Agency at the time of planning of this project was 12.2% for (II) and 8.0% for (III). Recalculation of the rate was attempted in this ex-post evaluation survey, but a direct comparison was difficult as the detailed calculation methods used during the planning stage could not be obtained and the assumptions for calculation were different. ONEE calculated EIRR of PERG in December 2012, by using actual data for the entire PERG up to 2012 and projected figures for 2013 – 2016. The result was 7.6%. The assumptions used in this calculation were 'Project life: 30 years; Cost: project cost, household connection cost; Benefit: increased revenue, consumers' surplus and tax revenue'.

Although the project cost was within the plan, the project period exceeded the plan; therefore efficiency of the project is fair.

## 3.5 Sustainability (Rating:③)

### 3.5.1 Institutional Aspects of Operation and Maintenance

Operation and maintenance (hereinafter referred to as O&M) of the electricity distribution facilities constructed in this project is taken care of by the Distribution Offices of the Electricity

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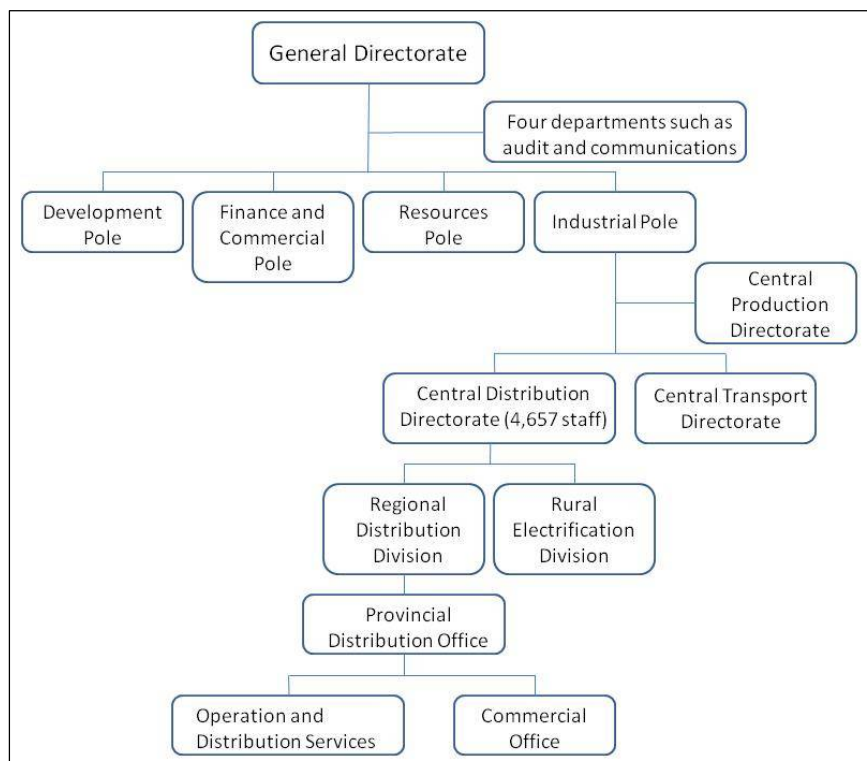
<sup>15</sup> Financial Internal Rate of Return (FIRR) was not available/calculated in PERG.



Branch of the Office National de l'Electricite et de l'Eau Potable (ONEE), located in each province.

ONEE Electricity Branch had about 8,680 staff members as of 2012. It has four poles and the Central Distribution Directorate with 4,657 members is positioned under the Industrial Pole. The Central Distribution Directorate has 10 Regional Distribution Divisions, which supervise provincial Distribution Offices. The distribution offices located in each province have a number of Commercial Offices and also Operation and Distribution Services which are in charge of the O&M of distribution lines. The provincial Distribution Offices formulate periodical inspection schedules and the condition of the lines is checked once every several months. If any problems are discovered at the time of inspection, it is the responsibility of provincial offices to deal with the problems.

As stated above, the Office National de l'Electricité (ONE) merged with the Office National de l'Eau Potable (ONEP) in April 2012 and became the Office National de l'Electricité et de l'Eau Potable (ONEE). However, the structure for the O&M of rural distribution networks has not been changed.



Source: Information supplied by ONEE

Figure 2: Organisation Chart of ONEE (simplified for this report)

With regard to the collection of electricity charges, a prepaid card payment system was introduced in the project area. No meter reading was required in remote areas and electricity

users (each household) recharged the amount they required at card centres located in each area. The introduction of this system did not increase the burden of meter reading on ONEE staff but it did guarantee the secure collection of electricity charges.

### 3.5.2 Technical Aspects of Operation and Maintenance

As it had been undertaking O&M activities on distribution lines in the country even before the project, ONEE was considered to have a high enough level of capacity and a sufficient number of well-experienced engineers to implement rural electrification. .



Photo 2: Pre-paid processing unit at a card centre (Tiznit Province)

At the time of the ex-post evaluation, the Operation and Distribution Service Offices under the Distribution Office located in each province were responsible for the O&M of distribution lines. Some of the repair work may be contracted out to the private sector, but ONEE itself also conducts regular inspections every several months by forming several teams (5 – 10 engineers in each team). According to the provincial ONEE offices visited, the technical level of the O&M staff was sufficient. There were no issues identified in terms of their O&M skills and electricity had been stably supplied almost all the time. The supply was maintained through the repair of lines when there were any troubles.

The Executing Agency also commented that training activities such as a two-month course on maintenance were regularly conducted at the training unit of the ONEE Electricity Branch main office, so that the maintenance skills of staff could be improved. ONEE has six kinds of O&M manuals, including one on the maintenance of the connecting units between high-voltage, medium-voltage and low-voltage lines and also one on the maintenance of medium-voltage and low-voltage networks. These are utilised in the training courses.

### 3.5.3 Financial Aspects of Operation and Maintenance

ONEE has operated on a stand-alone basis without any direct subsidies from the government, and it is required to be financially independent. As for the financial conditions of ONEE, it recorded a surplus in 1998 and 1999, but a surge in fuel prices, an increase in electricity purchases from independent power producers (IPP) and an increase in reserves for pensions all contributed to an overall deficit until 2002. 2003 saw a recovery to surplus thanks to an increased precipitation leading to an increase in the generation of hydropower and a decline in the purchasing prices from IPP. It was expected during the planning of (III) that the financial condition would be sound from 2005, after a small deficit in 2004.

According to the financial details for the 2000s (income statements, balance sheets and cash flow statements) analysed in the ex-post evaluation survey, it was found that the final balance had remained in deficit since 2004.

Table 12: Financial Conditions of ONEE Electricity Branch (Income Statement)

Unit: million DH

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Total sales	10,628	12,080	12,339	12,442	14,478	15,436	16,955	18,887	20,561	21,522
Total operating expenses	12,372	12,850	11,741	11,843	14,547	15,632	16,206	23,097	20,441	20,492
Gross margin	-1,744	-770	598	599	-68	-196	748	-4,210	120	1,030
Financial income	325	365	289	344	497	380	587	820	887	896
Financial expenses	980	902	915	1,042	823	1,039	1,380	1,550	1,832	1,894
Financial results	-655	-537	-626	-698	-326	-658	-793	-730	-945	-998
Current balance	-2,399	-1,307	-29	-98	-394	-855	-45	-4,940	-825	32
Non-current balance	151	368	131	94	196	-832	-88	-116	-280	-422
Net profit before tax	-2,248	-939	102	-5	-199	-1,686	-133	-5,056	-1,105	-391
Net profit after tax	-2,277	-970	69	-39	-241	-1,734	-182	-5,112	-1,164	-452

Source: Data provided by ONEE

The amount of loan interest, included in the financial expenses, has been increasing and it is expected that the payment of interest for loans, including the Japanese ODA loan, will increase further. This will act as a financially negative factor. However, no serious problems can be seen in their repayment ability as the major reason for losses has been depreciation and the cash flow has generally been positive. Depreciation has been increasing as capital investment continued, but sales revenue has also been increasing, backed by the growing number of electricity users and also with a rise in electricity charges in 2006, both of which are expected to continue. Also, while the capital adequacy ratio of ONEE cannot be said to be high, no serious financial problems are found as the 'fixed assets to fixed liability ratio', which measures long-term financial stability, has stayed at a stable level just below 100%.

The electricity tariff (Table 13) was raised by 7% in 2006, and since then it has been kept at the same level, even though the consumer price index recorded a 12.3% increase between 2006 and 2013 (Ministry of Economy and Finance), indicating that it was at a low level.

Table 13: Electricity Tariff for Households (at the time of the ex-post evaluation)

Monthly consumption	Tariff per kWh
0~100 kWh	0.9010 DH
101~200 kWh	0.9689 DH
201~500 kWh	1.0541 DH
More than 500 kWh	1.4407 DH

Source: Information provided by ONEE

Note: The most recent tariff increase was in 2006 (7% increase)

While the above shows the total financial condition of ONEE, financial data and provincial budgets for O&M at distribution offices were not available as the data could not be separated. Both the headquarters and provincial offices commented that the budget has been sustainable, and it is expected that an increased O&M budget will be necessary now that the distribution network has become extended and is wider. Therefore it will be increasingly important to continue to secure a sufficient budget for this purpose in a stable manner.

#### 3.5.4 Current Status of Operation and Maintenance

In the ex-post evaluation, site surveys were conducted in four provinces out of ten to see the O&M conditions of distribution lines. There were no distribution lines which were found to be broken or without a supply of electricity. In order to maintain a stable electricity supply, provincial offices formulate annual maintenance plans and management officials meet up once a month to check the status of the electricity supply and O&M conditions to see if there are any problems or issues of O&M activities.

However, in rural areas where accessibility is not so easy, storms, particularly in the winter season, sometimes cut electricity lines and stop the supply of electricity. Under such weather conditions, roads cannot be used and the blacked out villages, which do not have easy accessibility, cannot get electricity supplied until the road conditions improve. Delays in repairs due to bad physical access are not related to the appropriateness of ONEE responses, but, rather, this is related to the issue of road infrastructure. ONEE appears to be doing their best under such constraints.

Regarding the services performed by ONEE, including O&M activities, 83% of the respondents in the beneficiary survey said they were satisfied, as described in '3.2.2 Qualitative Effects'.

No major problems have been observed in the operation and maintenance system, therefore the sustainability of the project effect is high.

## **4. Conclusion, Lessons Learned and Recommendations**

### **4.1 Conclusion**

The Rural Electrification Project (II) and (III) were projects that aimed at the electrification of rural villages through the construction of distribution lines in order to reduce poverty and rectify regional disparities in 10 provinces with high levels of poverty. The relevance of this project is high as it has been consistent with the development plan and development needs of Morocco. It was also consistent with the key areas of assistance in Japan's ODA policy for

Morocco. As for the effectiveness of the project, it was observed that the target figures of peak load and the rural electrification rate were achieved and that the sales volume and the sales revenue have steadily increased. Also, local residents spoke of the indirect effects of improvements in access to information and more hygienic conditions through rural electrification. With regard to the implementation of the project, while the project cost was within the planned amount due to efficient design and competition among contractors, the project period substantially exceeded the plan due to delays in construction activities and a large amount of time required for coordination with the villages through which distribution lines would pass. Therefore, efficiency of the project is fair. The sustainability of the project is high as there were generally no issues identified in terms of the institutional, technical and financial aspects of the executing agency nor were there problems with the conditions of the operation and maintenance of the facilities.

In light of the above, this project is evaluated to be highly satisfactory.

## **4.2 Recommendations**

### **4.2.1 Recommendations to the Executing Agency**

When problems occur with distribution lines during bad weather, ONEE cannot always take remedial actions by responding immediately due to the poor condition of access roads in mountainous areas. This is not an issue that is faced only by ONEE and it is important to work with other government ministries, and also with local authorities, to find a way to conduct O&M activities in areas vulnerable to bad weather conditions. It is hoped that a stable electricity supply will be maintained in all villages by enhancing an optimal collaborative structure.

### **4.2.2 Recommendations to JICA**

No recommendations

## **4.3 Lessons Learned**

### **4.3.1 Cooperation with Local Authorities and the Setting of a Sufficient Project Period**

This project was implemented by the Executing Agency itself including the procurement of equipment and the supervision of the construction process as well as the work with local communes and villages and a number of contractors. As there were a lot of sub-projects to the project, it was necessary for the smooth implementation of the project that the Executing Agency collaborated with communes in coordinating the persons / parties concerned. However, there were some cases where contractors could not carry out construction activities in accordance with the plan and where more time was required for coordination with those residents opposed to the installation of electricity poles. Therefore, it may have been advisable to set a sufficient project period during the planning stage.

#### 4.3.2 Introduction of a Prepaid Card System

It is now always possible to collect electricity charges in the project area where a prepaid card system has been introduced, and this system has been effective as a means of reducing the burden on the Executing Agency of collecting charges. It has also improved the collection rate in rural areas. This system could be applied to similar projects.

#### 4.3.3 Introduction of Cost-sharing System for Electrification

In order to promote the electrification of each household, the cost borne by communes and households for the construction of distribution lines was maintained at the same level across the country. The remaining cost was entirely covered by the Executing Agency. This system has enabled both an equalisation of the contribution of each rural household and a reduction in the financial burden on the Executing Agency, while maintaining the public nature of the project. This cost-sharing method for electrification is effective in promoting rural electrification and it would be useful to examine the possibilities of introducing this method when similar projects are planned and implemented.

End

### Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
(1) Output		
[Rural Electrification Project (II)]		
• Construction of medium-voltage distribution lines (22 kV)	Approx. 1,832 km	1,684 km
• Construction of low-voltage distribution lines (220/380 V)	Approx. 3,675 km	4,329 km
• Installation of transformers	Approx. 840	845
[Rural Electrification Project (III)]		
• Construction of medium-voltage distribution lines (22 kV)	Approx. 1,300 km	1,118 km
• Construction of low-voltage distribution lines (220/380 V)	Approx. 2,550 km	2,657 km
• Installation of transformers	Approx. 580	556
(2) Project Period		
[Rural Electrification Project (II)]	June 2002 – August 2005 (39 months)	June 2002 -September 2008 (76 months)
[Rural Electrification Project (III)]	November 2005 – September 2007 (23 months)	November 2005 – November 2009 (49 months)
(3) Project Cost		
[Rural Electrification Project (II)]		
Amount paid in foreign currency	5,522 million yen	Not available
Amount paid in local currency	5,434 million yen (538 million DH)	Not available
Total	10,956 million yen	8,940 million yen
Japanese ODA loan portion	7,350 million yen	7,350 million yen
Exchange rate	1 DH = 10.1 yen (as of November 2001)	
[Rural Electrification Project (III)]		
Amount paid in foreign currency	2,997 million yen	Not available
Amount paid in local currency	4,028 million yen (333 million DH)	Not available
Total	7,025 million yen	5,136 million yen
Japanese ODA loan portion	5,257 million yen	4,536 million yen
Exchange rate	1 DH = 12.1 yen (as of September 2004)	