

JBIC Ex-post Monitoring Report

Project Name: India "Basin Bridge Gas Turbine Project"

[Outline of Loan Agreement]

Loan Amount/Loan Disbursed Amount : 11,450 million yen/10,779 million yen
 Signing of Loan Agreement : March 1990
 Final Disbursement Date : March 1998
 Ex-post evaluation : 1999
 Executing Agency : Tamil Nadu State Electricity Board

[Project Objective]

This project was to construct a gas-fire power plant and install gas turbine generators (30MWx4) in Chennai in order to meet the peak-time power demand in the morning and evening (including for irrigation pumps) and thereby contribute to the promotion of industries (including agriculture) through a stable power supply.

[Outline of Results] (Field Survey : January 2005)

Item	Ex-post Evaluation	Ex-post Monitoring																																				
<p>[Efficiency and Impact]</p> <p>(1) Power supply under the project (to meet the peak-time demand)</p> <p>(2) Interruption of the power supply during peak time hours in the morning and evening</p>	<p>(1) The installed turbines are operated only during the peak demand hours as planned. The total power generation in 1999 was 165GWh¹ and the power plant has been operated almost as planned. The planned annual power generation is 173GWh (assuming they are operated 6 hours a day, 240 days a year).</p> <p>(2) Construction of this power plant realized a stable power supply even during peak hours and eliminated interruption of the power supply in the morning and evening.</p>	<p>(1) Affected by the unexpected steep rise in the price of naphtha (fuel of this power plant), the annual power generation under this project started to decrease in 2003.</p> <p><Changes in Annual Power Generation and the Price of Naphtha></p> <table border="1"> <thead> <tr> <th>Evaluation Item</th> <th>Unit</th> <th>1998</th> <th>1999</th> <th>2000</th> <th>2001</th> <th>2002</th> <th>2003</th> <th>2004</th> </tr> </thead> <tbody> <tr> <td>Output Capacity</td> <td>MW</td> <td>120</td> <td>120</td> <td>120</td> <td>120</td> <td>120</td> <td>120</td> <td>120</td> </tr> <tr> <td>Annual Power Generation</td> <td>GWh/year</td> <td>77</td> <td>165</td> <td>186</td> <td>171</td> <td>312</td> <td>80</td> <td>44</td> </tr> <tr> <td>(Reference) Price of Imported Naphtha</td> <td>(JPY/kilo litter)</td> <td>14,419</td> <td>14,150</td> <td>20,612</td> <td>21,124</td> <td>20,155</td> <td>23,249</td> <td>28,808</td> </tr> </tbody> </table> <p>(2) This power plant with its operation characteristics (reaching the maximum output in 15 minutes after the start of operation) is indispensable for the power supply in the state during peak hours and in the event of emergency demand. The output capacity of this power plant (120MW) is almost equivalent to 1.7% of the peak-time power demand in the morning and evening in Tamil Nadu State, which is 7,253MW. Although the power supply under this project is decreasing as mentioned in (1) above, a stable power supply in the state is ensured even during peak hours by using an additional power supply from other states via the grid.</p>	Evaluation Item	Unit	1998	1999	2000	2001	2002	2003	2004	Output Capacity	MW	120	120	120	120	120	120	120	Annual Power Generation	GWh/year	77	165	186	171	312	80	44	(Reference) Price of Imported Naphtha	(JPY/kilo litter)	14,419	14,150	20,612	21,124	20,155	23,249	28,808
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<p>(3) Promotion of industries (including agriculture) through a stable power supply during peak demand hours</p>	<p>(3) The operation rate of irrigation pumps has increased as a result of a stable power supply.</p>	<p>(2) The electricity from this power plant is used for running of irrigation pumps in the morning and in the evening. It is difficult to measure the direct contribution of this project to agricultural production since other factors are involved, however, as shown in the table below, the agricultural production in the state has been stabilized.</p> <p><For information: Changes in Grain Production in Tamil Nadu State></p> <table border="1"> <thead> <tr> <th>Year</th> <th>1996</th> <th>1997</th> <th>1998</th> <th>1999</th> <th>2000</th> <th>2001</th> </tr> </thead> <tbody> <tr> <td>Grain Production (tons)</td> <td>6,930</td> <td>8,104</td> <td>9,413</td> <td>8,969</td> <td>8,903</td> <td>8,472</td> </tr> </tbody> </table>	Year	1996	1997	1998	1999	2000	2001	Grain Production (tons)	6,930	8,104	9,413	8,969	8,903	8,472																						
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<p>[Sustainability]</p> <p>(1) Technical Capacity / O&M System/Financial Status</p> <p>(2) O&M Status</p>	<p>(1) There is no problem. A sufficient number of skilled technical workers are assigned to operation and maintenance (approximately 80 persons as of 1999, the total number of employees is unknown).</p> <p>(2) There is no problem with the operation and maintenance status. Spare parts (for 5 years operation) are always in stock.</p>	<p>(1) Technical Capacity: The executing agency, TNEB (Tamil Nadu Electricity Bureau), has a sufficient number of employees and skilled technical workers (respectively about 130 persons and 70 persons as of 2004), and performs overhauls on a regular basis. O&M System: TNEB is under the jurisdiction of the Tamil Nadu State Government. The organization and operational structure have not changed since the time of ex-post evaluation. Financial Status: The budget for the operation and maintenance of the power plant has been gradually increasing. The annual budget allocated to the power plant is adequate to maintain the operation of the plant. However, TNEB as a whole reported a net loss of 10.3 billion Rp for the fiscal year of 2003-04.</p> <p>(2) There is no problem with the operation and maintenance status (spare parts are always in store).</p>																																				

¹ The ex-post evaluation of this project reports the total power generated in 1999 was 155.1 GWh. However, TNEB pointed out at the time of research for this monitoring that actual figure was 165GWh.

<p>[Lessons Learned, Recommendations, Data Information and Monitoring Method]</p> <p>(1) Follow-up of the lessons learned and recommendations made in the ex-post evaluation and SAPS conducted after the ex-post evaluation</p> <p>(2) Lessons learned in the ex-post monitoring and recommendations for maintaining sustainability</p>	<p>(1) None</p>	<p>(2) The cost of operating a power plant fueled by naphtha is larger than the average of other plants. If the fuel is changed from naphtha to natural gas, the operating cost would be reduced to less than 60% of the current cost. The Indian Government has a plan to construct gas pipelines between domestic gas fields and each region. If a gas supply is made available in Chennai or liquefied natural gas storage facilities are constructed in Ennore (in the suburbs of Chennai) in the future, it would be possible to convert the fuel of this power plant to natural gas and run it under combined cycle, operating it as a base-load station.</p>
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