Log-Frame Matrix

ISCC Mathania	2000 65 482	India	02.05.02
⇧Project	⇧Project No.	⇧Country	⇧Version

Objectives, Results, Activities	Indicators	Assumptions	Indicators
Overall Objective 1. Support to economic growth in Rajasthan by provision of additional electrical energy for productive energy uses. 2. Contribution to establishment of solar thermal steam generation in combination with fossil fuel based power generation as commercially acceptable CO_2-abatement technology worldwide. Simultaneously contribution to prevention of global warming by CO_2-abatement through operation of the Mathania plant	1.1 Regulator functions according to its rules and regulations and regularly issues tariff notifications which lead to a real increase in tariff revenue per kwh sold. 1.2 The share of productive electricity use in electricity demand growth in Rajasthan is higher than 60%. 2.1 ISCC or similar solar thermal technology is applied in India and / or other countries of the world's solar belt while the subsidy requirement decreases.	<…>	<…>
Project Purposes 1. Integrated Solar Combined Cycle plant at Mathania generates electricity by operating the solar thermal as well as the conventional part in a sustainable and efficient way and feeds the electricity to the northern grid. The plant operation has a smaller negative climatic effect than its conventional alternative.	1.1 Starting *two years* after commissioning, the plant feeds at least 65 Gwh annually from the solar field to the grid. Overall energy is about 800 Gwh/a. 1.2 Availability of fossil part of plant is 86% or higher 1.3 Fuel consumption of the combined cycle (night operation, no additional firing) is not exceeding 8000 kJ/kwh 1.4 Availability of solar field is 97% or higher 1.5 Net solar thermal efficiency of the solar field is 13% or higher 1.6 Annual CO_2 abatement as compared to a coal fired plant (Suratgarh II) is at least 520,000 tonnes/year.	**for achieving the Overall Objective** A. Power sector in other potential countries is conducive for ISCC plants B. Cost of ISCC or other solar thermal technology based electricity generation fall faster than cost of fossil fuel based electricity generation, and/ or carbon emission effects are priced in. C. Additional electricity is used for economically efficient, socially and environmentally acceptable purposes.	B.1 Dynamic unit cost for average fossil fuel plant in potential states for ISCC plants five years after commissioning of ISCC Mathania as compared to ISCC dynamic unit cost.
Results 1. ISCC is technically operational	1.1 Take-over test of ISCC successful.	**for achieving the Project Purposes** A. Fuel supply ensured	A.1 FSA signed and in force before

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Objectives, Results, Activities	Indicators	Assumptions	Indicators
2. Private operator is in place and appropriately equipped, staffed, organised. 3. Operating contract between RSPCL and private operator is signed and in force. 4. RSPCL is institutionally capable to monitor operation of the plant, to acquire operational capacity over time and to execute the operation contract successfully. 5. PPA between RVPN and RSPCL is effected, ensures full power take-off, cost covering price. 6. Revenue of RSPCL is appropriately secured by bank guarantee, letter of credit and/or escrow account etc. 7. Institutional capacity for promotion of the technology is created.	3.1 Contract available and agreed to by KfW 3.2 Remuneration for power according to operating contract covers generation cost including profit for the private operator fully. 4.1 Business Plan of RSPCL implemented 4.2 RSPCL staff successfully qualified 5.1 Power purchase price per kwh according to PPA covers RSPCL cost fully. 6.1 Securitisation package is bankable. 6.2 Liquidity and profit of RSPCL would be ensured (financial indicators) 7.1 Technology promotion institution executes concept as planned.	B. Financial and cash position of RSPCL always satisfactory C. Sufficient Solar radiation to operate solar field efficiently D. Trained RSPCL staff stays permanently with RSPCL and receives adequate remuneration and incentives E. ISCC plant problem free when operational responsibility transferred to RSPCL F. Power grid stable and reliable G. Reforms of power sector Rajasthan are leading to a commercially viable sector. H. T&D losses are reduced to significantly lower level	commissioning of the plant. A.2 Fuel Supply according to FSA B.1 Accounts receivables < 30 days B.2 RoI > 3% (Electricity Act) C.1 At least 2285 kwh/m2/a solar radiation E.1 Taking-over certificate issued by RSPCL F.1 Not more than one unplanned grid failure annually G.1 RVPN achieves cash break-even by 2004 G.2 Power sector reforms implemented according to Project Implementation Plan agreed between World Bank and GoR. H.1 T&D losses are reduced to 22% until 2006/07
Project Activities 1. RfP/RfQ consultant 2. EPC-cum-operation contract 3. Implementation consultant 4. Replication activities 5. Engineering, procurement and construction of additional installations like administrative facilities. 6. Engineering, procurement and construction of infrastructure like railway, water pipeline etc. 7. Elaboration of overall management	1.1 Consulting contract signed 2.1 EPC-cum-operation contract signed 3.1 Contract for implementation consultant signed Execution of project activities as planned with regard to quality, quantity, time and cost.	**for achieving the Results** A. Financing ensured B. Signing of appropriate PPA and securitisation package between RVPN and RSPCL (loan covenant) C. Signing of FSA between RSPCL and fuel supplier/ agent	A.1 Complete financing of equity of Rs 500m by GoR for implementation period by first year of construction A.2 GoI grant (Rs. 500m) available on time A.3 GoR loan stand-by facility available B.1 PPA signed before award of EPC contract (presumably by end of 2001) C.1 FSA signed before commencement of plant testing, i.e. presumably 01/2005

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Objectives, Results, Activities	Indicators	Assumptions	Indicators
and organisation concept for operation phase 8. Institutional strengthening of RSPCL 9. Elaboration of technology promotion concept	A. Cabinet Approval granted (achieved) B. Power Sector reforms initiated, i.e. reform bill enacted and tariff revenue sufficient for cash-break-even or tariff increase approved by Regulatory Commission (achieved)		

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Threshold values of overall economic efficiency Real increase in tariff revenue per kwh sold as a consequence of tariff notifications issued by the regulatory authority.			
Threshold values for undesired side-effects regarding environment Plant satisfies World Bank environment norms for thermal power plants in developing countries			
	Category of risk*		
	at project appraisal	according to prior project information	according to current project information
Overall risk The overall risk refers to the observance of the essential criteria of promotion for the type of project concerned and comprises the specific risks of major negative deviations in the implementation of the activities when the assumptions for • the achievement of Results • the achievement of the Project Purposes • the achievement of the Overall Objective are fulfilled and the threshold values of overall economic efficiency and for undesirable side-effects specified for the project in question are reached.	2		
Potential influence on risks**	2		

* Categories of risk: 1 = no/minor risk 2 = medium risk 3 = high risk 4 = very high risk or occurrence of hazard
Projects in category 3 are classed as problematic.
Projects in category 4 are considered as not meeting the criteria of promotion.

** Degrees of potential influence on risks: 1 = none/minor 2 = average 3 = high

Risk Rating (specific risks)

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	Specific risks				Potential influence	
	none/minor	medium	high	very high/ occurrence of hazard	none/minor	average high
I. Risk to the achievement of Results a) due to deviations from the Project Activities specified with regard to						
- design	X					X
- cost	X					X
- time schedule	X					X
b) due to deviations from the assumptions with regard to ...						
Financing ensured	X					X
Signing of appropriate PPA and securitisation package between RSEB and RSPCL (loan covenant)		X				X
Signing of FSA between RSPCL and fuel supplier/ agent	X					X
Overall risk rating for the achievement of Results	X					X
II. Risk to the achievement of Project Purposes due to deviations from the assumptions with regard to ...						
Fuel supply ensured		X				X
Sufficient Solar radiation to operate solar field efficiently	X				X	
Trained RSPCL staff stays permanently with RSPCL and receives adequate remuneration and incentives	X				X	
ISCC plant problem free when operational responsibility transferred to RSPCL		X				X
Power grid stable and reliable	X				X	
Reforms of power sector Rajasthan are leading to a commercially viable sector.		X				X
T&D losses are reduced to significantly lower level		X			X	
Financial and cash position of RSPCL always satisfactory			X			X
Overall risk rating for the achievement of the Project Purposes		X				X
III. Risk to the achievement of the Overall Objective due to deviations from the assumptions with regard to ...						
Power sector in other potential countries is conducive for ISCC plants		X			X	
Cost of ISCC or other solar thermal technology based electricity generation fall						

Risk Rating (specific risks)

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faster than cost of fossil fuel based electricity generation, and/ or carbon emission effects are priced in. Additional electricity is used for economically efficient, socially and environmentally acceptable purposes.		X X			X X	
Overall risk rating for the achievement of the Overall Objective due to deviations from the assumptions (see above) and due to the risk of deviations from Project Purposes		X			X	
IV. Risk of the threshold values of economic efficiency not being reached Real increase in tariff revenue per kwh sold as a consequence of tariff notifications issued by the regulatory authority.		X				
Risk of undesired side-effects beyond the limits rated as tolerable (environment)		X				X
VI. Overall risk rating		X				
VII. Overall rating of the potential influence on risks						X

Project Monitoring Plan

ISCC Mathania	2000 65 482	India	Hilliges	02.05.02
⇧Project	⇧Project No.	⇧Country	⇧Project Officer	⇧Version

Objectives, Results, Activities	Indicators	Sources	Type and frequency of reports
Overall Objective Support to economic growth in Rajasthan by provision of additional electrical energy for productive energy uses. Contribution to establishment of solar thermal steam generation in combination with fossil fuel based power generation as commercially acceptable CO2-abatement technology worldwide. Simultaneously contribution to prevention of global warming by CO2-abatement through operation of the Mathania plant	A. Regulator functions according to its rules and regulations and regularly issues tariff notifications which lead to a real increase in tariff revenue per kwh sold. B. The share of productive electricity use in electricity demand growth in Rajasthan is higher than 60% C. ISCC or similar solar thermal technology is applied in India and/ or other countries of the world's solar belt while the subsidy requirement decreases.	A. GoR, RSEB successor, Regulator, World Bank B. Transco, World Bank C. World Bank, GEF	A. Annual progress review B. Final evaluation C. Final evaluation
Assumptions for the achievement of the Overall Objective A. Power sector in other potential countries is conducive for ISCC plants B. Cost of ISCC or other solar thermal technology based electricity generation fall faster than cost of fossil fuel based electricity generation, and/ or carbon emission effects are priced in. C. Additional electricity is used for economically efficient, socially and environmentally acceptable purposes.	A. Sector commercially attractive, baseline plants not too cheap B.1 Dynamic unit cost for average fossil fuel plant in potential states for ISCC plants five years after commissioning of ISCC Mathania as compared to ISCC dynamic unit cost.	A. Power sector analysis B. Special study on trends in electricity generation cost C. Rajasthan Transco, Regulator	A. Final evaluation B. Final evaluation C. Final evaluation
Project Purposes Integrated Solar Combined Cycle plant at Mathania generates electricity by operating the solar thermal as well as the conventional part in a sustainable and efficient way and feeds the electricity to the northern grid. The plant operation has a smaller negative climatic effect than its conventional alternative.	A. Starting two years after commissioning, the plant feeds at least 65 Gwh annually from the solar field to the grid. Overall energy is about 800 Gwh/a. B. Availability of fossil part of plant is 86% or higher C. Fuel consumption of the combined cycle (night operation, no additional firing) is not exceeding 8000 kJ/kwh D. Availability of solar field is 97% or higher	A.- E. Operator, RSPCL F. Calculation by expert	A.-D. Quarterly Progress Reporting A.- F. Annual progress reports

	E. Net solar thermal efficiency of the solar field is 13% or higher F. Annual CO2 abatement as compared to a coal fired plant (Suratgarh II) is at least 520000 tonnes/ year.		
Assumptions for the achievement of the Project Purposes A. Fuel supply ensured B. Financial and cash position of RSPCL always satisfactory C. Sufficient Solar radiation to operate solar field efficiently D. Trained RSPCL staff stays permanently with RSPCL and receives adequate remuneration and incentives E. ISCC plant problem free when operational responsibility transferred to RSPCL F. Power grid stable and reliable G. Reforms of power sector Rajasthan are leading to a commercially viable sector. H. T&D losses are reduced to significantly lower level	A.1 FSA signed and in force before commissioning of the plant. A.2 Fuel Supply according to FSA B.1 Accounts receivables < 30 days B.2 RoI > 3% (Electricity Act) C.1 At least 2285 kwh/m2/a solar radiation E.1 Taking-over certificate issued by RSPCL F.1 Not more than one unplanned grid failure annually G.1 Transco achieves cash break-even by 2004 G.2 Power sector reforms implemented according to Project Implementation Plan agreed between World Bank and GoR. H.1 T&D losses are reduced to 22% until 2006/07	A.-E.: RSPCL F.-H.: RSEB/ Transco, World Bank	A.2, B.1: Quarterly progress Reports B.2, C.1: Annual Report F.1, G.1, G.2, H.1: Annual progress review
Results 1. ISCC is technically operational 2. Private operator is in place and appropriately equipped, staffed, organised. 3. Operating contract between RSPCL and private operator is signed and in force. 4. RSPCL is institutionally capable to monitor operation of the plant, to acquire operational capacity over time and to execute the operation contract successfully.	1. Take-over test of ISCC successful. 3.1 Contract available and agreed to by KfW 3.2 Remuneration for power according to operating contract covers generation cost including profit for the private operator fully. 4.1 Business Plan of RSPCL implemented 4.2 RSPCL staff successfully qualified	RSPCL, KfW	One time reporting as and when activity is accomplished

5. PPA between RSEB/Transco and RSPCL is effected, ensures full power take-off, cost covering price. 6. Revenue of RSPCL is appropriately secured by bank guarantee, letter of credit and/or escrow account etc. 7. Institutional capacity for promotion of the technology is created.	5.1 Power purchase price per kwh according to PPA covers RSPCL cost fully. 6.1 Securitisation package is bankable. 6.2 Liquidity and profit of RSPCL would be ensured (financial indicators) 7.1 Technology promotion institution executes concept as planned.		
Assumptions for the achievement of the Results A. Financing ensured B. Signing of appropriate PPA and securitisation package between RSEB and RSPCL (loan covenant) C. Signing of FSA between RSPCL and fuel supplier/ agent	 A.1 Complete financing of equity of Rs 500m by GoR for implementation period by first year of construction A.2 GoI grant (Rs. 500m) available on time (i.e. in 2001) A.3 GoR loan stand-by facility available B.1 PPA signed before award of EPC contract (presumably April 2001) C.1 FSA signed before commencement of plant testing, i.e. presumably September 2003	RSPCL, GoR, KfW	One time reporting as and when activity is accomplished
Project Activities A. RfP/RfQ consultant B. EPC-cum-operation contract C. Implementation consultant D. Replication activities E. Engineering, procurement and construction of additional installations like administrative facilities. F. Engineering, procurement and construction of infrastructure like railway, water pipeline etc. G. Elaboration of overall management and organisation concept for operation phase	 A. Consulting contract signed B. EPC-cum-operation contract signed C. Contract for implementation consultant signed Execution of project activities as planned with regard to quality, quantity, time and cost.	RSPCL, KfW	One time reporting as and when activity is accomplished

H. Institutional strengthening of RSPCL I. Elaboration of technology promotion concept			
Minimum criteria of overall economic efficiency	<…>	<…>	<…>
Occurrence of undesired side-effects	Plant satisfies World Bank environment norms for thermal power plants in developing countries	Operator, RSPCL	Annual progress review Final evaluation