Yangquan Coal Mine Methane (CMM) Utilization for Power Generation Project

Updated Investment Analysis

The investment analysis of the Yangquan Coal Mine Methane (CMM) Utilization for Power Generation Project ("the Project") is here below updated to account for the entire 90MW capacity investment.

The principal assumptions for the updated investment analysis are given in Table 1.

Table 1. Investment Analysis Assumptions and Principal Result

Factor	Units	Overall Investment
Total Capital Cost	Million RMB	870
Installed Capacity	MW	90MW
Full-load Hours	Hours	7200
Annual Generation	GWh	648
Aux Power Ratio	%	7.44%
Net Annual Generation	GWh	600
Electricity Sales Price	RMB	0.25/kWhr
Annual Gas Consumption	Million m3 35% CH4	458.5
CMM purchase costs	RMB / m3 35% CH4	0
Operating Costs	Million RMB	26.24
Tax Rates and Reserves		Standard tax rates for China, including VAT (17%), revenue tax, enterprise income tax (33%),
Depreciation	Years	15
Debt to equity	%	70:30
Project Investment Rate of Return	%	5.89

The investment return of the entire project as shown from the updated investment analysis is 5.89%. Though slightly improved, this result is not substantially different from that of investment analysis presented in the PDD Version 4 submitted for registration and the projected project rate of return remains well below the applied sector hurdle rate of 11%[1].

[1] Justification for the selection of this hurdle rate is provided on Page 34 of the PDD.

A sensitivity analysis is performed on the updated investment analysis to test the sensitivity of the result to variances in key input parameters. As before, the parameters selected for this exercise are the investment costs, electricity sales tariff, operating costs and CMM costs, for the reasons already presented on page 35 of the PDD. Table 2 shows the results of the sensitivity analysis performed on the updated investment analysis.

Table 2 Results of Updated Sensitivity Analysis

		-20%	-15%	-10%	-5%	0%	5%	10%	15%	20%
Investment		11.87	10.16	8.61	7.19	5.89	4.70	3.60	2.67	2.03
Electricity Tariff		1.53	2.32	3.29	4.60	5.89	7.17	8.43	9.68	10.91
Operating Costs		7.14	6.83	6.52	6.20	5.89	5.58	5.26	4.94	4.63
Fuel Price	RMB	--	--	--	--	0.00	0.025	0.05	0.075	0.10
	IRR	--	--	--	--	5.89	3.11	1.20	-ve	-ve

The sensitivity analysis shows that the project returns are most susceptible to capital costs – which is typical for a project with zero input fuel costs – and to electricity costs. For all scenarios except one, even the unlikely event of the electricity tariff increasing by 20%, the IRR is lower than the benchmark hurdle rate of 11%. In the event that the capital costs are reduced by 20% and all other assumptions are unchanged then the project return will marginally exceed the hurdle rate. However, this single set of conditions cannot be considered as a likely situation. Even where investment costs are reduced by 15%, the project will still fail to meet the hurdle rate. If fuel costs are charged to the project, as the project sponsor prefers to promote safe utilization of the gas via a gas transfer price then the project cannot even afford a fuel tariff of 0.075RMB/NM3 (mixture) or around US9 cents per NM^3 of mixture, without having a negative IRR.

If CDM is included, assuming a price of 6Euros per CER, then the project return is increased above the benchmark to 22.34%

The above analysis shows that, in the absence of the CDM, this project is not financially attractive. Therefore the ultimate conclusion of Step 2, the Investment Analysis, of the "Tool for Demonstration and Assessment of Additionality" remains that the project is not part of the baseline scenario.