

case study

Desktop Study Performed by:
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Challenge

Can adding solar energy components to a mine power plant be an attractive option to reduce operational expenses? Perhaps, but prior to implementation, it is necessary to understand what is required to properly integrate solar at your site and the realistic payback of this technology.

Solution

Installation of a solar array into the existing power grid can help to reduce expenses at your mine site. How much savings depends on site factors such as current power technology and solar availability. It is important to note that this study and cost structure includes the necessary controls, sizing, and grid stabilization components for successful integration into the existing power systems. The addition of storage technology can help with stabilization and increases the effectiveness of the solar installation, but is not necessary to realize reduced fuel costs.

Results

An analysis of four different generator models under site conditions* show that an addition of a 1 megawatt solar array can reduce fuel costs by up to 2%. With annual fuel expenses in the range of \$14 Million (HFO) to \$29 Million (Diesel), potential savings can surpass \$570,000 yearly with an installation payback in less than 5 years. With the declining solar costs in the market, predictive cost analysis shows that for an "ideal" installation date with payback in less than 4 years, now may be the time to begin looking at a solar solution. Addition of an energy storage solution increases savings by 80%, but also increases payback time by 60%.

	High Speed Diesel Generators		Medium Speed Generators	
	CAT 3512B (1088kWe)	CAT 3516B (1600kWe)	ABC 8DZC1000 (1680kWe Diesel)	ABC 8DZC750 (1327kWe HFO)
Annual Fuel Consumption (L)				
Prior to Solar Install	22,113,311.94	20,737,951.34	18,306,953.57	16,086,309.57
After Solar Install	21,674,294.43	20,326,238.99	17,943,504.03	15,766,946.67
Annual Fuel Savings	439,017.51	411,712.36	363,449.54	319,362.91
Annual Fuel Cost (USD)				
Prior to Solar Install	\$28,747,305.52	\$26,959,336.75	\$23,799,039.64	\$13,834,226.23
After Solar Install	\$28,176,582.76	\$26,424,110.69	\$23,326,555.23	\$13,559,574.13
Annual Fuel Savings	\$570,722.76	\$535,226.06	\$472,484.41	\$274,652.10
Payback Period (Years)	3.75	4	4.53	7.79
10 Year Return on Investment	\$2,996,294.50	\$2,676,130.31	\$2,112,005.30	\$332,329.04
<i>Ideal Installation Date (For 4 Year Payback Period)</i>				
	Q3 - 2014	Q1 - 2015	Q3 - 2015	Q2 - 2017

*ISI's analysis was performed on a site with 12,000 kWe Peak Load, 10,000 kWe Average Load, and 6,000 kWe Maintenance Load. Load provided by either 13 - 1088 kWe CAT 3521B's, 9 - 1600 kWe CAT 3516B's, 9 - 1680kWe ABC 8DZE1000 (DFO), or 11 - 1327kWe ABC 8DZC750 (HFO) gensets. Generators are evaluated at ISO ratings. Diesel fuel is assumed at \$1.30/litre USD cost. HFO is assumed at \$.86/ litre USD cost. Solar availability is assumed to be 1,600,000kWh at (24.0° S, 25.0° E). 10 year ROI assumes 1 year installation period prior to commissioning.

