CASE STUDY: ESS INTIGRATION TO OPTIMISE DIESEL CONSUMPTION (WITH CAPTIVE WIND PLANT)

Objective

To reduce diesel consumption for an industry integrating energy storage with its captive wind Power Plant (CWPP)

Background

Most parts of India suffer from significant power shortages. Southern region of India has around 20% of power deficit throughout the year.

To ensure uninterrupted power supply almost all industries, commercial complexes as well as residential buildings deploy diesel generator (DG) as back-up and emergency supply. The estimate varies between 25,000 to 35,000 MW for installed capacity of DGs in India. Though, current price trends might suggest lower diesel prices for next couple years, however, considering limited resources for oil and gas, diesel prices are expected to rise in long run.

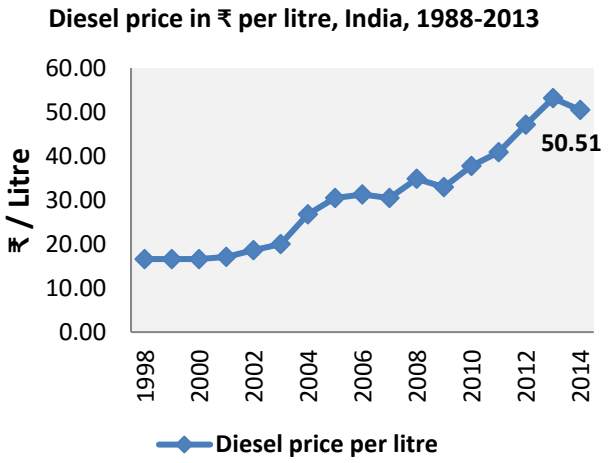

Figure 1: Diesel Price over the years

Per unit DG costs are in the range of ₹ 15 to 50 per kWh (~25-83 US cents / kWh) whereas utility tariffs are around ₹ 4 to 5/kWh for most customers. This leads to an energy arbitrage opportunity for ESS.

Analysis

Here we analysed a typical industry having power cut for around 6-8 years every day. This industry has also installed its own captive Wind power plant (CWPP) in order to get the reliable power. But power outage and wind generation didn't match the requirement. So ESS integration with this wind plant is giving better economic than Diesel Generator. Here we considered 1000 KW of Li-Ion storage for the wind plant of size 4000kW. It will also serve critical load / emergency load during non-availability of power from distribution utility.

To optimize diesel consumption, here we considered Li-Ion battery for wind integration. Storage and financial assumptions are mentioned below.

	Project Economics	
Technology used	Li-Ion	
Application	Diesel optimisation with captive wind plantfor an Industry	
Technology Configuration		
Power Rating	1,000	*kW*
Duration	4	*hr*
Energy Rating	4,000	*kW*
Efficiency	90%	
Capex (INR Crore)	20.40	*INR Crore*
Outcomes		
Diesel Savings	diesel savings	
Potential Revenue		
Diesel Savings	2.80	*INRCrore*
Investment Matrix		
Return on Capital (ROC)	14%	
Simple Payback Period	7	*years*
Unlevered IRR (investment term 10 year)	17%	
Unlevered IRR (investment term 15 year)	20%	
Unlevered IRR (investment term 20 year)	21%	

Table 1 : ESS Assumptions

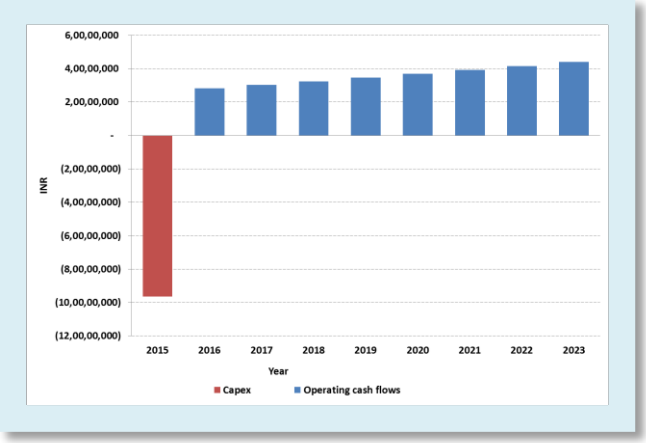

Figure 2: Capex and Operating Cash Flows

In case of diesel optimization, ESS gives a clear advantage on financials for its implementation. Here we didn't consider the charging cost for storage.

From the above analysis, it is evident that states like Andhra Pradesh, Uttar Pradesh, where Power outage is more than 6 hours a day, ESS will make a feasible case for diesel optimization. With better technologies (higher efficiency and longer cycle life), Financial implication will show better IRR and ROI.