

Boiler efficiency	90%		
Thermal efficiency	30%		
Turbine/Generator efficiency	85%		
Overall efficiency of the plant		23%	
Plant capacity in MW	5		
Power input to turbine in MW	5.88		
Heat input rate to boiler in MW	19.60784314		
Heat generated from combustion in MW	21.78649237		
Wind Power	$\frac{1}{2} \rho A v^3 C_p$		
$P = \frac{1}{2} \rho A v^3 C_p$	$\pi r^2$		
Blade length in m	7		
Area swept by the turbine		153.86	
Density of air in kg/m <sup>3</sup>	1.23		
wind speed in m/s	15.00		
Power coefficient, $C_p$	30.00%		
Power output of the plant in kW		95.41724063	
Availability of wind at 15 m/s	10%		
Annual energy generation in kWh		83585.50279	
(assume no wind during 90% of the year)			
Hydro power			
$P = \rho Q g H_{net}$			
$H_{net} = H_{gross} - H_{loss}$			
$Q$ (monthly average) = $(A \times R \times RF) / (30 \times 24 \times 3600)$			
Monthly Rainfall in mm	150.00		
Catchment area in km <sup>2</sup>	5.00		
run off factor	0.70		
Monthly average flow in m <sup>3</sup> /s		0.2025462963	

Gross head in m	120.00		
head loss percentage	5.00%		
Efficiency of turbine and g	80.00%		
Monthly average Power output of plant in kW		181.2125	
Monthly energy generation in kWh		130473	
Solar power			
peak sunlight hours (h)	7.00		
Rated power of sola pv m	350		
Daily energy generation of the module in Wh		2450	
constant load of a house i	22.00		
duration of use (hrs/day)	8.00		
No of solar pv modules required		71.83673469	72
Total energy generation b	25,200		
Voltage of the bateries, V	12.00		
capacity of a battery in Ah	150.00		
Energy storable in one ba	1,800		