Wind-Diesel Hybrid Fuel Saving

Diesel output, fuel use and fuel saved when wind power supplies part of an isolated load, with the diesel's minimum load and a linear fuel curve.

Method: Linear diesel fuel curve with minimum load

Input parameters

Unit system: SI

Parameter	Value	Unit
Load	400.00	kW
Wind power available	250.00	kW
Diesel rated power	500.00	kW
Diesel minimum load (fraction of rating)	30.000	%
Fuel curve no-load coefficient (L per kWh of rating)	0.084150	
Fuel curve slope (L per kWh of output)	0.24600	

Calculated results

Parameter	Value	Unit
Diesel output with wind	150.00	kW
Wind power used	250.00	kW
Wind power dumped	0	kW
Fuel without wind (L/h)	140.47	
Fuel with wind (L/h)	78.975	
Fuel saving	43.780	%

Notes for this case

• Diesel follows the net load but not below its minimum; surplus wind is dumped. Fuel F = aP_r + bP (L/h with powers in kW); the default a and b are a common generic curve. Because of the no-load term, fuel falls less than output: switching diesels off, storage or dump loads with useful heat raise the saving.

Formula and method

$$P_d = \max(f_{min} P_r,\ P_L - P_w), \quad F = a P_r + b P_d$$

Variables

P_L	Load	W
P_w	Wind power available	W
P_r	Diesel rated power	W
f_{min}	Diesel minimum load (fraction of rating)	-
a	Fuel curve no-load coefficient (L per kWh of rating)	-
b	Fuel curve slope (L per kWh of output)	-
P_d	Diesel output with wind	W
$P_{w,used}$	Wind power used	W
P_{dump}	Wind power dumped	W
F_0	Fuel without wind (L/h)	-
F	Fuel with wind (L/h)	-
$1 - F/F_0$	Fuel saving	-

Method and standards

Hybrid dispatch.

Assumptions and limits

- One diesel running; steady snapshot.

References

Linear diesel fuel curve with minimum load

Report details

Report reference	FCC-J4AP-ESNV (the same inputs always give the same reference)
Generated	23 November 2026, 17:34 UTC
Calculator	Wind-Diesel Hybrid Fuel Saving
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Software release	FireCAD Calc, release of 22 November 2026
Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/environmental/wind-power/wind-diesel-fuel-saving

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.