Diesel Generator (DG Set) Fuel Consumption and Cost per kWh

Diesel consumption per hour and per day of a DG set from load and specific fuel consumption, with units generated per litre and the fuel cost per kWh.

Method: Specific fuel consumption definition (ISO 8528 / ISO 3046 rating practice)

Input parameters

Unit system: SI

Parameter	Value	Unit
Electrical load on the set	400.00	kW
Specific fuel consumption at that load, per electrical kWh at the terminals From the maker's data sheet at your load; it rises at part load.	240.00	g/kWh
Fuel density	840.00	kg/m³
Running hours per day	8.0000	h
Fuel price per litre (your currency)	90.000	

Calculated results

Parameter	Value	Unit
Fuel mass flow	96.000	kg/h
Fuel volume flow	1.9048	L/min
Fuel per day	914.29	L
Electricity per litre of fuel	3.5000	kWh/L
Fuel cost per kWh	25.714	
Fuel cost per day	82,286	

Notes for this case

- Fuel only: lubricating oil, maintenance and the set's capital cost add to the cost per kWh.

Formula and method

$$\dot{m}_F = P \cdot SFC, \quad \dot{V}_F = \dot{m}_F / \rho, \quad V_d = \dot{V}_F t$$

$$e_L = \rho / SFC, \quad c_{kWh} = c \cdot \frac{SFC}{\rho}$$

Variables

P	Electrical load on the set	W
SFC	Specific fuel consumption at that load, per electrical kWh at the terminals	kg/J
ρ	Fuel density	kg/m³
t	Running hours per day	s
c	Fuel price per litre (your currency)	-
$\dot{m}_F$	Fuel mass flow	kg/s
$\dot{V}_F$	Fuel volume flow	m³/s
V_d	Fuel per day	m³
e_L	Electricity per litre of fuel	J/m³
c_{kWh}	Fuel cost per kWh	-

C_d	Fuel cost per day	-

Method and standards

Fuel flow is load times specific fuel consumption from the maker's data at that load; dividing by density gives litres. The cost per kWh is the litres per kWh times the price per litre.

Assumptions and limits

- Steady load; SFC from the maker at that load.
- SFC per electrical kWh at the generator terminals. An engine data sheet (ISO 3046) gives SFC per shaft kWh: divide it by the alternator efficiency (about 0.93–0.96) first, or the fuel is understated by 4–7 %.
- Fuel cost only.

References

- Specific fuel consumption definition (ISO 8528 / ISO 3046 rating practice)

Report details

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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/electrical/power/dg-set-fuel-consumption

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.