Boiler Efficiency: Gross (GCV) and Net (NCV) Basis

Converts boiler efficiency from the gross (higher) to the net (lower) calorific value basis, and gives the difference in percentage points.

Method: Same useful heat on two bases: η_NCV = η_GCV × GCV/NCV

Input parameters

Unit system: SI

Parameter	Value	Unit
Efficiency on GCV	70.000	%
Fuel gross calorific value	9,600.0	kJ/kg
Fuel net calorific value	7,400.0	kJ/kg

Calculated results

Parameter	Value	Unit
Efficiency on NCV	90.811	%
Difference (net − gross)	20.811	%

Formula and method

$$\eta_{NCV} = \eta_{GCV} \frac{GCV}{NCV}$$

Variables

η_{GCV}	Efficiency on GCV	-
GCV	Fuel gross calorific value	J/kg
NCV	Fuel net calorific value	J/kg
η_{NCV}	Efficiency on NCV	-
$\Delta\eta$	Difference (net − gross)	-

Method and standards

Definitions.

Assumptions and limits

- Same fuel, with GCV and NCV on the same basis (as fired). The NCV of a wet fuel depends strongly on its moisture, so both values must be for the fuel as it is fired.
- For the reverse conversion use $\eta_{GCV} = \eta_{NCV} NCV/GCV$.

References

- Same useful heat on two bases: η_NCV = η_GCV × GCV/NCV

Report details

Report reference	FCC-YDWH-9NKX (the same inputs always give the same reference)
Generated	17 November 2026, 19:49 UTC
Calculator	Boiler Efficiency: Gross (GCV) and Net (NCV) Basis
Method last reviewed	13 November 2026
Software release	FireCAD Calc, release of 17 November 2026
Release checks	2 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/boilers-power-plant/boilers/efficiency-gcv-ncv-conversion

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.