

Conversion factors and unit abbreviations

General conversion factors for energy

To:	TJ	Gcal	Mtoe	MBtu	GWh
From:	multiply by:				
TJ	1	2.388 x 10 ²	2.388 x 10 ⁻⁵	9.478 x 10 ²	2.778 x 10 ⁻¹
Gcal	4.187 x 10 ⁻³	1	1.000 x 10 ⁻⁷	3.968	1.163 x 10 ⁻³
Mtoe	4.187 x 10 ⁴	1.000 x 10 ⁷	1	3.968 x 10 ⁷	1.163 x 10 ⁴
MBtu	1.055 x 10 ⁻³	2.520 x 10 ⁻¹	2.520 x 10 ⁻⁸	1	2.931 x 10 ⁻⁴
GWh	3.600	8.598 x 10 ²	8.598 x 10 ⁻⁵	3.412 x 10 ³	1

Mtoe: Million tons of oil equivalent (Milhões de toneladas equivalentes de petróleo-Mtep)

Source: IEA. Key World Energy Statistics, 2020, p. 70.

Tabela VIII.5 – Fatores de Conversão para Energia

Table VIII.5 – Energy Conversion Factors

Multiplicar por de	para	J	BTU	cal	kWh	tep (toe)	bep (boe)	to	Multiply by from
Joule	(J)	1	947,8 x 10 ⁻⁶	0,2388	277,8 x 10 ⁻⁹	2,388x 10 ⁻¹¹	1,681 x 10 ⁻¹⁰	(J)	Joule
Unidade Térmica Britânica	(BTU)	1,055 x 10 ³	1	252	293,07 x 10 ⁻⁶	2,52 x 10 ⁻⁹	1,776 x 10 ⁻⁷	(BTU)	British Thermal Unit
Caloria	(cal)	4,1868	3,968 x 10 ⁻³	1	1,163 x 10 ⁻⁶	10 ⁻¹⁰	7,042 x 10 ⁻¹⁰	(cal)	calorie
Quilowatt-hora	(kWh)	3,6 x 10 ⁶	3412	860 x 10 ³	1	8,598 x 10 ⁻⁵	6,061 x 10 ⁻⁴	(kWh)	kilowatt-hour
Tonelada equivalente de petróleo	(tep)	41,868 x 10 ⁹	39,68 x 10 ⁶	10 ¹⁰	11,63 x 10 ³	1	7,0369	(toe)	Tons of oil equivalent
Barril equivalente de petróleo	(bep)	5,95 x 10 ⁹	5,63 x 10 ⁶	1,42 x 10 ⁹	1,65 x 10 ³	0,1421	1	(boe)	barrels of oil equivalent

Fonte: EPE/MME. Balanço Energético Nacional. ano-base: 2019, 2020, p. 227.