

Abbreviations, Symbols and Units Used in Text

Abbreviations

a.c.	alternating current
AFC	alkaline fuel cell
AFV	alternate fuelled vehicles
AGM	absorptive glass-mat
AGR	advanced gas-cooled reactor
ALABC	Advanced Lead – Acid Battery Consortium
BESS	battery energy storage systems
BEV	battery electric vehicle
BP	British Petroleum Company
BWR	boiling water reactor
CAES	compressed air energy storage
CBM	coal bed methane
CCGT	combined-cycle gas turbine
CHP	combined heat and power (co-generation)
CNG	compressed natural gas
CRT	continuously regenerating trap
d.c.	direct current
DG	distributed generation
DHW	domestic hot water
DMFC	direct methanol fuel cell
DoD	depth- of- discharge (for batteries)
DVDs	digital versatile discs
EG	embedded generation
ESES	electrostatic energy storage
EV	electric vehicle

FBR	fast breeder reactor
FC	fuel cell
FCV	fuel cell vehicle
FGD	flue gas desulfurization
GTL	gas-to-liquid (conversion)
HDR	hot dry rocks
HEV	hybrid electric vehicle
HHV	higher heating value
HRSG	heat recovery steam generator
HT	high temperature
HTGCR	high temperature gas-cooled reactor
ICEV	internal-combustion engine vehicle
ICT	information and communications technology
IEA	International Energy Agency
IGCC	integrated gasification combined cycle
IPCC	Inter-governmental Panel on Climate Change
ITER	International thermonuclear experimental reactor
JET	Joint European Torus
LED	light emitting diode
LEV	low emission vehicle
LH ₂	liquid hydrogen
LHV	lower heating value
LNG	liquefied natural gas
LPG	liquefied petroleum gas
LRP	Lead replacement petroleum
LT	low temperature
MCFC	molten carbonate fuel cell
MOX	mixed oxide fuel
Mm	misch metal
MRI	magnetic resonance imaging
MSW	municipal solid waste
MT	medium temperature
NASA	National Aeronautics and Space Administration
NGV	natural gas vehicle
NO _x	nitrogen oxides
OECD	Organisation for Economic Co-operation and Development
OPEC	Organization of Petroleum Exporting Countries
OPVC	organic photovoltaic device

OTEC	ocean thermal energy conversion
OWC	oscillating water column (wave energy device)
PAFC	phosphoric acid fuel cell
PBMR	pebble bed modular reactor
PCs	personal computers
PEMFC	proton exchange membrane fuel cell
PNGV	Partnership for a New Generation of Vehicles
PSoC	Partial state-of-charge
PV	photovoltaic
PWR	pressurized water reactor
RAPS	remote-area power supply
RDF	refuse derived fuel
SDG&E	San Diego Gas & Electric
SMES	superconducting magnetic energy storage
SNG	synthetic natural gas
SoC	state- of- charge (for batteries)
SOFC	solid oxide fuel cell
SPEFC	solid polymer electrolyte fuel cell (same as PEMFC)
SRC	short rotation coppicing
UCC	ultra-clean coal
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
UPS	uninterruptible power supplies
VRLA	valve-regulated lead-acid (batteries)
WEC	World Energy Council (also: Wave Energy Converters)
YBCO	superconducting material of formula $\text{YBa}_2\text{Cu}_3\text{O}_7$
ZEV	zero emission vehicle

Symbols and Units

Sub-units

d	deci	10^{-1}
c	centi	10^{-2}
m	milli	10^{-3}
μ	micro	10^{-6}
n	nano	10^{-9}

Multiple units

k	kilo	10^3
M	mega	10^6
G	giga	10^9
T	tera	10^{12}
P	peta	10^{15}

A, A_2B , AB,
 AB_2 , AB_5 families of metal hydrides

A	ampere
A	area
A h	ampere-hour
atm	atmosphere (=101.325 kPa)
bar	unit of pressure (=0.1 MPa)
bhp	brake horsepower (=745.7 W)
°C	degree celsius
C	coulomb (=1 A s)
C	capacitance
cal	calorie (=4.184 J)
cm	centimetre
<i>d</i>	distance between plates in a capacitor
e^-	electron
ϵ	dielectric constant (or relative permittivity)
eV	electron volt
F	farad (=1 C V ⁻¹)
<i>F</i>	faraday (=96 485 C mol ⁻¹)
g	gram
<i>G</i>	Gibbs free energy (J mol ⁻¹)
ΔG	change in Gibbs free energy (J mol ⁻¹)
<i>H</i>	enthalpy (J mol ⁻¹)
ΔH	change in enthalpy (J mol ⁻¹)
ΔH_f^0	standard molar heat (enthalpy) of formation (J mol ⁻¹)
hp	horsepower (=745.7 W)
<i>I</i>	current (A, mA, μ A)
I_{MP}	current at maximum power point of a photovoltaic cell
I_{SC}	short-circuit current
J	joule (=1 W s)
K	degree kelvin
L	litre
m	metre
min	minute
mol	mass of 6.02×10^{23} elementary units (atoms, molecules, etc.) of a substance
Mtoe	million tonne (of) oil equivalent

N	newton (SI unit of force = 1 kg m s^{-2})
n	number of electrons involved in electrode process
Ω	ohm
P	pressure
Pa	pascal (= 1 N m^{-2} ; = 9.8692×10^{-6} atm)
q	charge on plates of a capacitor (measured in coulombs)
Q	quantity of heat
R	gas constant (= $8.3145 \text{ J K}^{-1} \text{ mol}^{-1}$)
s	second
S	entropy ($\text{J K}^{-1} \text{ mol}^{-1}$)
ΔS	change in entropy ($\text{J K}^{-1} \text{ mol}^{-1}$)
t	tonne
T	temperature ($^{\circ}\text{C}$, K)
T_c	critical temperature
V	volt
V_c	potential difference between plates of a capacitor
V_{MP}	voltage at maximum power point of a photovoltaic cell
V_{OC}	open-circuit voltage of a cell
V_r	reversible voltage of a cell
V_r°	standard reversible voltage of a cell
W	watt
W_e	watt, electrical power
W_p	peak power output, <i>e.g.</i> from a wind generator or solar module
Wh	watt-hour
wt%	percentage by weight
W_{th}	watt, thermal power
x	variable in stoichiometry