

8. Acronyms and Abbreviations

Abbreviation	Definition
0D	Zero-dimensional
1D	One-dimensional
21CTP	21st Century Truck Partnership
2-EHN	2-ethylhexyl nitrate
3D	Three-dimensional
⁷ Li NMR	Lithium nuclear magnetic resonance spectroscopy
A206	A206 composite matrix
AA7075	AA7075 aluminum alloy
AAM	American Axle and Manufacturing
AASHTO	American Association of State Highway and Transportation Officials
ABS	Acrylonitrile butadiene styrene
AC	Alternating current
ACM	American Center for Mobility
ACMZ	Aluminum-copper-manganese-zirconium
ACP50	Areas of concentrated poverty where 50% or more of residents are people of color
ACT	Advanced Clean Truck
ADAS	Advanced driver assistance system
ADOT	Alabama Department of Transportation
ADT	Articulated dump truck
AEC	Advanced Engine Combustion
AFLB	Anode-free lithium-ion batteries
AFV	Alternative fuel vehicle
AG	Artificial graphite
Ah	Ampere-hour
AI	Artificial intelligence
Al	Aluminum
ALD	Atomic layer deposition
ALS	Advanced Light Source

Abbreviation	Definition
AM	Additive manufacturing
AM20	AM20 magnesium cast alloy
AM50	AM50 magnesium cast alloy
AM60B	AM60B magnesium cast alloy
AMBER	Advanced Model Based Engineering Resource
AMR	Annual Merit Review
ANL	Argonne National Laboratory
APS	Advanced Photon Source
APU	Auxiliary power unit
ARC-M1	Army Research Combustor Midsize (ARC-M1)
ARL	Army Research Laboratory
ASE	Argyrodite-type solid electrolytes
ASIC	Application-specific integrated circuit
ASPIRE	Advancing Sustainability through Powered Infrastructure for Roadway Electrification
ASSLSB	All-Solid-State Lithium-Sulfur Battery
ASTM	ASTM International, formerly known as American Society for Testing and Materials
ATD	ATEAM Transmission Distribution
ATEAM	Agent-based Transportation Energy Analysis Model
AV	Autonomous vehicle
AZ91D	AZ91D magnesium cast alloy
B500	Battery 500 Consortium
BAAM	Big area additive manufacturing
BAs	Boron arsenide
BASF	BASF Corporation
BAT	Battery Advanced Technology, a DOE/VTO program
BaTiO ₃	Barium titanate
BCDI	Bragg coherent diffraction imaging
BEAM CORE	Behavior, Energy, Autonomy, and Mobility Comprehensive Regional Evaluator
BES	Basic Energy Sciences

Abbreviation	Definition
BEV	Battery electric vehicle
BFM	Bast fiber material
BGE	Baltimore Gas and Electric
BIL	Bipartisan Infrastructure Law
BIPOC	Black, indigenous, people of color
BMR	Battery Materials Research
BMS	Battery management system
BNL	Brookhaven National Laboratory
BOTTLE	Bio-Optimized Technologies to keep Thermoplastics out of Landfills and the Environment
BP	Budget Period
BTE	Brake thermal efficiency
BTM	Behind the meter
CAE	Computer aided engineering
CAM	Cathode active materials
CAMP	Cell Analysis, Modeling, and Prototyping (CAMP) Facility
CAPEX	Capital expenditure
CAR	Center for Automotive Research
CARB	California Air Resources Board
CAV	Connected and automated vehicle
CAVE	Connected and Automated Vehicle Environment
CBO	Community-based organization
CCD	Critical current density
CCF	Continuous carbon fiber
CDA	Cylinder deactivation
CDA	Cooperative driving automation
CE	Coulombic efficiency
CEI	Cathode electrolyte interphase
CF	Carbon fiber
CFD	Computational fluid dynamics
CFM	Carbon fiber mat

Abbreviation	Definition
CFRP	Carbon fiber reinforced polymer
CFTF	Carbon Fiber Technology Facility
CGM	Carbon-growth-on-metal
CI	Compression-ignition
CIM	Common information model
CMAP	Chicago Metropolitan Agency for Planning
CNG	Compressed natural gas
CNT	Carbon nanotube
CNT-S	Carbon nanotube-sulfur
Co	Cobalt
CO	Carbon monoxide
CO ₂	Carbon dioxide
COMSOL	COMSOL Multiphysics ® modeling software
COOH	Carboxyl
COVID	Coronavirus disease (COVID-19), infectious disease caused by the SARS-CoV-2 virus
CQtCV	Constant lithium plating current (constant dQLi/dt) constant voltage
CRADA	Cooperative Research and Development Agreement
CRC	Coordinating Research Council
CSE	Center for Sustainable Energy
CSTR	Continuous stirred-tank reactor
CTA	Chicago Transit Authority
CTL	Compact track loader
Cu	Copper
CV	Connected vehicle
C-V2X	Cellular-vehicle-to-everything
DAB	Dual active bridge
DAC	Disadvantaged communities
DBC	Direct bonded copper
DC	Direct current
DCDI	Diffraction contrast diffractive imaging

Abbreviation	Definition
DCFC	Direct current fast charger
DEI	Diversity, Equity, and Inclusion
DER	Distributed energy resource(s)
DFI	Ducted fuel injection
DFT	Density functional theory
DHAM	Dual rotor homopolar AC machine
DHM	Digital holographic microscopy
DI	Direct injection
DLP	Digital light processing
DME	Dimethyl ether
DMSO/IL	Dimethyl sulfoxide/ionic liquid
DNS	Direct numerical simulation
DOC	Diesel oxidation catalyst
DOCF	Diesel oxidation catalyzed filter
DOE	U.S. Department of Energy
DORMA	Decarbonization of Off-Road, Rail, Marine, and Aviation
DoX	Design of experiment
dP/dV	Change in pressure with change in voltage
DPF	Diesel particulate filter
dQ/dV	Change in voltage with change in capacity
DRIVE	U.S. DRIVE
DRX	Disordered rock salt
DSF	Dynamic skip fire
dsgrid-flex	NREL Demand Side Grid model
DSRC	Dedicated short range communications
DST	Dynamic stress test
DVI	Drive vehicle interface
DVP&R	Design validation plan and report
DWG	Livewire Data Working Group
DWPT	Dynamic wireless power transfer
EaCAM	Earth-abundant cathode materials

Abbreviation	Definition
EB	Electron-beam
ECN	Engine Combustion Network
EDM	Electric drive machine
EDS	Energy-dispersive X-ray spectroscopy
EEAC	Energy Efficient Advance Compute
EEJ	Energy equity and environmental justice
EEJ Action Plan	Energy Environmental Justice Action Plan
EEMS	Energy Efficient Mobility Systems
EERE	Office of Energy Efficiency and Renewable Energy
EERPAT	Energy and Emissions Reduction Policy Analysis Tool
EGR	Exhaust gas recirculation
EIC	Electron-Ion Collider
EIS	Electrochemical impedance spectroscopy
EJ	Environmental Justice
ELT	Electrification Technologies
EM	Electron microscopy
EMC	Electromagnetic compatibility
EMF	Electromagnetic field
EMI	Electromagnetic interference
EOCV	Electrochemical open circuit voltage
EOL	End-of-life
EP	Electropolymerization
EPA	U.S. Environmental Protection Agency
EPRI	Electric Power Research Institute
ESI/MS	Electrospray ionization / mass spectrometry
ESS	Energy storage system
EV	Electric vehicle(s)
EVAL	Electric Vehicle Adoption Leadership
EVI-Pro	Electric Vehicle Infrastructure Projection Tool
EVI-X	Electric Vehicle Charging Infrastructure Analysis Tools
EVSE	Electric vehicle supply equipment

Abbreviation	Definition
eVTOL	Electric vertical takeoff and landing
FAA	Federal Aviation Administration
FCA	Fiat Chrysler Automobiles
FCC	Federal Communications Commission
FCEB	Fuel cell electric bus
FCET	Fuel cell electric truck
FCEV	Fuel cell electric vehicle
FDMB	Fluoro-dimethoxybutane
FEC	Fluoroethylene carbonate
Fe-zeolite	Iron zeolite
FHWA	Federal Highway Administration
FLHCE	Fluorinated lean high-capacity electrolyte
FMMB	2-Fluoro-1-methoxy-4-(methylsulfonyl)benzene, also known as FMMB, an organosulfur compound
FN	Foreign national
FOA	Funding opportunity announcement
FRA	Federal Railroad Administration
FSD	Tesla Full Self Driving
FSI	Fluoromethanesulfonimide
FSP	Flame spray pyrolysis
FSP	Friction stir processing
FTIR	Fourier transform infrared spectroscopy
FTP	Federal Test Procedure
FY	Fiscal Year
G3 5M	G3 5M steel alloy
GDOES	Glow discharge optical emission spectrometry
GE	General Electric, Inc.
GEM	Greenlink Equity Map
GHG	Greenhouse gas
GIXRD	Grazing incidence X-ray diffraction
GLOSA	Green light speed advisory

Abbreviation	Definition
GM	General Motors
GNSS	Global navigation satellite system
H11	H11 tool steel alloy
H ₂	Hydrogen
H ₂ O	Water
HATCI	Hyundai America Technical Center, Inc
HATN	Hexaazatrinaphthylene
HATN/CNT	Hexaazatrinaphthylene/carbon nanotube
HATN/CNT-S	Hexaazatrinaphthylene/carbon nanotube-sulfur
HAXPES	Hard X-ray photoelectron spectroscopy
HBCU	Historically black colleges and universities
HD	Heavy-duty
HEV	Hybrid electric vehicle
HEVI-LOAD	Heavy-Duty Electric Vehicle Load, Operations, and Deployment
HFE	Fluorinated ether
HHEA	Hybrid hydraulic-electric architecture
HIL	Hardware-in-the-loop
HPDI	High-pressure direct injection
HPLC	High-performance liquid chromatography
HPM	High-performance modeling
HRE	Heavy rare earth
HTC	High temperature carbonization
HUD	U.S. Department of Housing and Urban Development
HV	High voltage
HVM	High-volume manufacturing
HVR	High-velocity riveting
I2V	Infrastructure to vehicle
IC	Ionic conductivity
ICE	Internal combustion engine
ICME	Integrated computation materials engineering
ID	Identification

Abbreviation	Definition
ID	Ignition delay
IEC	International Electric Code
i-EMS	Intelligent energy management system
IGBT	Insulated gate bipolar transistor
IIMo	Institute of Innovative Mobility (Germany)
IIT	Illinois Institute of Technology
INL	Idaho National Laboratory
IP	Internet protocol
IP	Intellectual property
IPM	Integrated power module
IRA	Inflation Reduction Act
ISO	International Standards Organization
ITIC	International Transportation Innovation Center
ITS	Intelligent transportation systems
Kg	Kilogram
kW	Kilowatt
kWh	Kilowatt-hour
L12	Phase of steel crystalline structure
L2	Level 2
LBL	Lawrence Berkeley National Laboratory
LBL	Lawrence Berkeley National Laboratory
LC	Liquid chromatography
LCA	Life cycle analysis
LD	Light-duty
LDI	Lean direct injection (LDI)
LDP	Liveware Data Platform
LEEP	Leadership of Employers for Electrification Program
LES	Large eddy simulation
LFP	Lithium iron phosphate
LHCE	Lean high-capacity electrolyte
Li	Lithium

Abbreviation	Definition
Li ₂ S	Lithium sulfide
LIB	Lithium-ion battery
LiB _x S _y	Any compounds including lithium, boron and sulfur
LIC	Lithium-ion conductor
LiFSI	Lithium bis(fluorosulfonyl)imide
LiNO ₃	Lithium nitrate
LiP _x S _y	Any compounds including lithium, phosphate and sulfur
LiS or Li-S	Lithium sulfur
LiTFSI	Lithium bis(trifluoromethanesulfonyl)imide
LLC	Limited liability corporation
LLCF	Low-lifecycle-carbon-fuels
LLNL	Lawrence Livermore National Laboratory
LLTO	Lithium lanthanum titanate oxide
LLZO	Lithium lanthanum zirconate
LLZTO	Garnet-type fast lithium-ion conductor Li _{6.75} La ₃ Zr _{1.75} Ta _{0.25} O ₁₂
LMCP	Lightweight Metals Core Program
LMFP	Lithium iron phosphate (LiFePO ₄) cathode material with manganese (Mn)
LMO	Lithium-ion manganese oxide
LMR	Lithium metal rich
LMR-NMC	Lithium manganese rich-nickel manganese cobalt material.
LNMO	Lithium-nickel-manganese oxide
LPG	Liquified petroleum gas or propane
LSE	Lithium solid electrolyte
LTE	A wireless data transmission standard
LTO	Lithium titanium oxide
mA	Milliampere
MAC-POST	Mobility Data Analytics Center-Prediction, Optimization, and Simulation toolkit for Transportation Systems
mAh	Milliampere-hour
MAN	MAN Energy Solutions
MAT	DOE VTO Materials subprogram

Abbreviation	Definition
MCA	Magnetocrystalline anisotropy
MCCI	Mixing-controlled compression ignition
MCS	Megawatt charging system
MD	Medium-duty
MDS	Mobility Data Specification
MeOH	Methanol
MEP	Mobility energy productivity
MERF	Materials Engineering Research Facility
METS	Multiharmonic electrothermal microscopy
MFH	Multi-family housing
Mg	Magnesium
MHP	Mixed hydroxide precipitate
MITIE	Micromobility-Integrated Transit and Infrastructure for Efficiency
ML	Machine learning
MMC	Metal matrix composites
Mn	Manganese
MoS ₂	Molybdenum disulfide
MPC	Model predictive control
MPG	Miles per gallon
MPO	Metropolitan planning organization
MR	Molecular Rebar®
MRL	Manufacturing readiness level
MS	Mass spectrometry
MTU	Michigan Technological University
MV	Medium voltage
MVA	Megavolt-ampere
MW	Megawatt
N/P	Negative-to-positive ratio
N ₂ O	Nitrous oxide
NAICS	North American Industry Classification System
NASA	National Aeronautics and Space Administration

Abbreviation	Definition
NC	Nitrogen doped (N-Doped) carbon
NCA	Nickel cobalt aluminum
NCM	Lithium nickel manganese cobalt oxides (abbreviated NMC, Li-NMC, LNMC, or NCM) are mixed metal oxides of lithium, nickel, manganese and cobalt
NCSU	North Carolina State University
NCTCOG	North Central Texas Council of Governments
NEVI	National Electric Vehicle Infrastructure
NFPA	National Fire Protection Association
NG	Natural gas
NGO	Non-government organization
NGV	Natural gas vehicle
NH ₃	Ammonia
NH ₄ NO ₃	Ammonium nitrate
NHTSA	National Highway Traffic Safety Administration
Ni	Nickel
NiFe ₂ O ₄	Nickel ferrite
NIST	National Institute of Standards and Technology
NJFCP	National Jet Fuel Combustion Program
NMC	Nickel manganese cobalt
NMC622	6:2:2 ratio nickel manganese cobalt oxide
NMO	Nickel manganese oxide
NMP	N-methyl-2-pyrrolidone
NMR	Nuclear magnetic resonance spectroscopy
NMVC-R2	Nano- and micro-filler reinforced vitrimer composites using recycled milled carbon fibers
NN	Neural network
NO	Nitric oxide
NO ₂	Nitrogen dioxide
NO _x	Nitrogen oxides
NREL	National Renewable Energy Laboratory
NSF	National Science Foundation

Abbreviation	Definition
NSLS	National Synchrotron Light Source
NSP	Network service provider
NTCIP	National Transportation Communications for Intelligent Transportation System Protocol
NYC	New York City
NYPA	New York Power Authority
O ₃	Ozone
OD	Origin-destination
ODBC	Organic direct bonded copper
OEM	Original equipment manufacturer
OH	Hydroxyl
OP2S	Opposed piston, two stroke
OPEX	Operational expense
ORNL	Oak Ridge National Laboratory
P2D	Pouch-to-depletion
PAEK	Polyaryletherketone
PAN	Polyacrylonitrile
PC	Polycarbonate
PC5	No base stationary intermediary in V2X LTE-Cellular protocol
Pd	Palladium
PDF	Pair distribution function
PE	Polyethylene
PECO	Formerly Philadelphia Electric Company
PEGDA	Polyethylene glycol diacrylate polymer
PET	Polyethylene terephthalate
PEV	Plug-in electric vehicle
PGM	Platinum group metals
PHEV	Plugin hybrid electric vehicle
PI	Principal investigator
PIV	Particle image velocimetry
PLA	Polylactic acid

Abbreviation	Definition
PM	Permanent magnet
PMCP	Powertrain Materials Core Program
PMP	Project management professional
PMTH	Thiuram polysulfides
PNA	Polynuclear aromatics
PNNL	Pacific Northwest National Laboratory
POFM	Porous organometallic framework materials
PP	Polypropylene
PR	Pooled rideshare
PRAM	Pooled rideshare acceptance model
PRCM	Pooled rideshare choice model
Pt	Platinum
PUA	Polyurethane acrylate
PUSP	Power ultrasonic-based surface processing
PV	Photovoltaic
PVDF	Polyvinylidene fluoride
PWA	Powdered activated carbon
PXRD	Powder X-ray diffraction
Q1, Q2, Q3, or Q4	Annual quarters
R&D	Research and development
RDD&D	Research, development, deployment, and demonstration
ReEDS	Regional Energy Deployment System model
Rh	Rhodium
RNG	Renewable natural gas
ROS	Robot operating system
RPT	Rate performance test
RQL	Rich-quench-lean (RQL) combustor
RSU	Single roadside unit
Ru	Ruthenium
RuO ₂	Ruthenium oxide
S	Sulfur

Abbreviation	Definition
SAE	SAE International, formerly the Society of Automotive Engineers
SAF	Sustainable aviation fuel
SATF	Synthetic aviation turbine fuel
SBIR	Small Business Innovation Research
SCAQMD	South Coast Air Quality Management District
SCE	Combination of simulation and experiments
SCHT	Supercritical hydrothermal
SCM	Smart charge management
SCR	Selective catalytic reduction
SCRE	Single-cylinder research engine
SCSA	Sulfur cathode structure/architecture
SDF	Sudamericana de Fibras (company name)
SDO	Standards development organization
Se	Selenium
SEI	Solid-electrolyte interface/interphase
SEM	Scanning electron microscopy
SEMS	Site energy management system
SeS	Selenium sulfide
SFTP	Supplemental Federal Test Procedure
SHA	Single-hole atomizer
ShAPE	Shear assisted processing and extrusion
Si	Silicon
Si/Al	Silicon/aluminum
SiC	Silicon carbide
SIL	Software-in-the-loop
SLIC	Sustainable Lightweight Intelligent Composites
SLPC	Single-layer pouch cells
SMART	Systems and Modeling for Accelerated Research in Transportation
Sn	Tin
SNL	Sandia National Laboratories
SOC	State of charge

Abbreviation	Definition
SOH	State of health
SP	Solution precipitation
SPAN	Sulfurized polyacrylonitrile
SPC	Sulfurized polymer composite
SPE	Solid polymer electrolyte
SRM	Stochastic Reactor Model
SSB	Solid-state battery
SSCB	Solid-state circuit breaker
SSE	Solid-state electrolyte
SST	Solid-state transformer
SULEV30	Super-ultra-low emissions vehicle 30 standard
SUMO	Simulation of Urban Mobility
SUNY	The State University of New York
SUPER	Scalable ultra power-dense extended range
SwRI	Southwest Research Institute
T	Tesla
T4	T4 level of steel temper
T6	T6 level of steel temper
T76	T76 level of steel temper
TAC	Technical advisory committee
TCI	Lithium tricyanoimidazole
TCO	Total cost of ownership
TDM	Travel demand management
TEA	Techno-economic analysis
TEGDME	Tetra (ethylene glycol) dimethyl ether
TEM	Transmission electron microscopy
TEMPO	Transportation Energy and Mobility Pathway Options™
T _g	Glass transition temperature
TGA	Thermogravimetric analysis
TI	VTO Technology Integration subprogram
TiB ₂	Titanium diboride

Abbreviation	Definition
TIM	Thermal interface material
ToF SIMS	Time-of-flight secondary ion mass spectrometry
TPG	Thermal pyritic graphite
TRL	Technology readiness level
TSDC	Transportation Secure Data Center
TSMO	Traffic system management and operations
TSMS	Transit-Centric Smart Mobility System
TTSI	Total Transportation Services, Inc.
TVR	Thermal vapor recompression
TWC	Three-way catalyst
U.S. DRIVE	United States Driving Research and Innovation for Vehicle efficiency and Energy sustainability
UA	University of Alabama
UC	University of California
UCC	Ultra conductive copper
UHMWPE	Ultra-high molecular weight polyethylene
UIC	The University of Illinois at Chicago
UIUC	The University of Illinois Urbana-Champaign
ULEV	Ultra-low emissions vehicle
UMD	University of Maryland
UNT	University of North Texas
UPER	Universal power electronics regulator
URJ	Ultrasonic rivet joining
US	United States
US06	EPA US06, also known as the Supplemental Federal Test Procedure
USA	United States of America
USABC	U.S. Department of Energy/U.S. Advanced Battery Consortium, a subsidiary of USCAR
USC	University of Southern California
USDA	U.S. Department of Agriculture
USW	Ultrasonic welding
Uu	Cellular network communications

Abbreviation	Definition
UV	Ultraviolet
UW	University of Washington
V2G	Vehicle to grid
V2I	Vehicle-to-infrastructure
V2V	Vehicle-to-vehicle
V2X	Vehicle-to-everything
VAN	VTO Analysis (VAN) program
VECTOR	Visual-Enhanced Cooperative Traffic Operations
VED	Volumetric energy density
VGI	Vehicle grid integration
VMT	Vehicle miles travelled
VoICE-MR	Vocation Integrated Cost Estimation for Maintenance and Repair
VPPG	Virtual and Physical Proving Ground
VTO	Vehicle Technologies Office
VTTI	Virginia Tech Transportation Institute
W	Tungsten
WAVE	Wireless Advanced Vehicles Electrification
WBG	Wide bandgap
WFSM	Wound-field synchronous machine
WHR	Waste heat recovery
WLTC	Worldwide Harmonized Light Vehicles Test Cycle
WPT	Wireless power transfer
WVU	West Virginia University
WXFC	Wireless extreme fast charge
XAS	X-ray absorption spectroscopy
XCEL	eXtreme Fast Charge Cell Evaluation of Lithium-Ion Batteries
XFC	Extreme fast charging
XIL	Everything-in-the-loop
XPS	X-ray photoelectron spectroscopy
XRD	X-ray diffraction
XRD/XAS	X-ray Diffraction/X-ray Absorption Spectroscopy

Abbreviation	Definition
ZECT	Zero emission cargo transport
ZEV	Zero-emission vehicle