

9. Acronyms

The following list of Acronyms cited within the report is provided as a reference for readers.

| Acronym | Definition |
|-----------|---|
| 1D or 1-D | One Dimensional |
| 2D | Two Dimensional |
| 3D | Three Dimensional |
| 3-DEP | Three Dimensional Engineered Preform |
| 5-Cycle | Light-duty testing conducted on a chassis dynamometer |
| A123 | A123 Systems |
| ABR | Advanced Battery Research |
| AC | Alternating Current |
| ACCESS | Advanced Combustion Concepts Enabling Systems and Solutions |
| ACE | Advanced Combustion Engines |
| ACEC | Advanced Combustion and Emissions Control |
| ACERT | Advanced Combustion Emission Reduction Technology |
| ACES | Advanced Collaborative Emissions Study |
| ACI | AC Impedance |
| ADMA | ADMA Products, Inc. |
| AE | Acoustic Emission |
| AEC | Advanced Engine Combustion (Sandia National Laboratories) |
| AFDC | Alternative Fuels and Advanced Vehicles Data Center |
| AFR | Air Fuel Ratio |
| Ag | Silver |
| Ah | Ampere-hour |
| AIS4+ | Abbreviated Injury Severity score of severe-to-fatal |
| Al | Aluminum |
| ALMS | American LeMans Series |
| AMOX | Ammonia Oxidation |
| AMR | Annual Merit Review |
| ANL | Argonne National Laboratory |
| APEEM | Advanced Power Electronics and Electric Machines Program |
| APRF | Advanced Powertrain Research Facility |
| APS | Advanced Photon Source |
| Ar | Argon |
| ARC | Accelerated Rate Calorimetry |
| ARL | Army Research Laboratory |
| ARPA-e | Advanced Research Projects Agency-Energy |
| ASAP | As Soon As Possible |
| AS/P | Automotive Supplier / Provider |
| ASI | Area-specific Impedance |
| ARRA | American Recovery and Reinvestment Act |



| ASTM American Society for Testing and Materials | |
|--|----|
| | |
| AT Aftertreatment | |
| ATP-LD Advanced Technology Powertrains for Light-Duty Vehicles | |
| ATR-FTIR Attenuated Total Reflectance Fourier Transform Infrared Spectroscopy | |
| AVFL-18 Project 18 under Advanced Vehicle/Fuel/Lubricants of the Coordinating Research Council | i1 |
| AVTA Advanced Vehicle Testing Activity | |
| B20 Biodiesel blend of 20% neat biodiesel | |
| BAS Bioanalytical Systems, Inc. electrochemical detector | |
| BASF The Chemical Company | |
| BATT Batteries for Advanced Transportation Technologies | |
| BCN Boron carbonitride | |
| BDB Benzodioxaborole | |
| Bi2Te3 Bismuth(III) telluride | |
| BES DOE Basic Energy Sciences | |
| BET Brunauer-Emmett-Teller | |
| BEV Battery Electric Vehicle | |
| BIM Bonded Interface Material | |
| BLRT Bond Line Read Through | |
| BMEP Brake mean effective pressure | |
| BMS Battery management system | |
| BP Boiling Point | |
| BRN Basic Research Needs | |
| BSFC Brake specific fuel consumption | |
| BSST Thermoelectric Temperature Control Solutions | |
| BTE Brake thermal efficiency | |
| BTO Barium Titanate | |
| BYU Brigham Young University | |
| C8 Aromatic hydrocarbon with eight carbon atoms | |
| C Degrees Celsius | |
| C Carbon | |
| C2H2 Acetylene | |
| CA50 Crank Angle of 50 percent mass fraction burned | |
| Ca3Co4O9 Calcium cobalt oxide | |
| CAE Computer Aided Engineering | |
| CAEBAT Computer-Aided Engineering for Electric Drive Vehicle Batteries | |
| CAFE Corporate Average Fuel Economy | |
| CARB California Air Resources Board | |
| CASE Case Western Reserve University | |
| CB Carbon Black | |
| CBS Characteristic-Based Split | |
| CD Charge Depleting | |



| Acronym | Definition |
|---------|---|
| CE | Coulombic Efficiency |
| CFD | Computational Fluid Dynamics |
| CFS | Combustive Flow Simulation |
| CFTF | Carbon Fiber Test Facility |
| СНА | Chabazite |
| CHAdeMO | Direct current fast charger for batteries |
| CI | Compression Ignition |
| CLEERS | Cross-Cut Lean Exhaust Emission Reduction Simulation |
| CLOSE | Collaborative Lubricating Oil Study on Emissions |
| cm | Centimeters |
| CMC | Carboxymethyl cellulose |
| CMS | Carboxymethyl starch |
| CNG | Compressed Natural Gas |
| CNF | Carbon Nano-Fibers |
| CNT | Carbon Nanotubes |
| СО | Carbon Monoxide |
| COTS | Commercial Off The Shelf |
| COV | Coefficient of Variation |
| COVIMEP | Coefficient of Variation of the Indicated Mean Effective Pressure |
| CR | Compression ratio |
| CRADA | Cooperative Research and Development Agreement |
| CRC | Coordinating Research Council |
| CS | Charge Sustaining |
| СТЕ | Coefficient of thermal expansion |
| CV | Cyclic voltammetry |
| CVD | Chemical Vapor Deposition |
| DARPA | Defense Advanced Research Projects Agency |
| DBA | Direct Bonded Aluminum |
| DEC | Diethyl carbonate |
| DERC | Diesel Engine Research Consortium |
| DeNOx | Reduction of nitrogen oxides |
| DDC | Detroit Diesel Corporation |
| DF-2 | Diesel Fuel |
| DFT | Density Functional Theory |
| DI | Direct Injection |
| DISI | Direct injection spark ignited |
| DLFT | Direct Compounded Long Fiber Thermoplastics |
| DMHP | Dual Mode Hybrid Powertrain |
| DNS | Direct Numerical Simulation |
| DOC | Diesel oxidation catalyst |
| DOD | Department of Defense |



| Dob Depth of Discharge DOE Department of Energy DOW Dow Chemical Company DP Dual Phase DPF Dised particulate filter DRIFTS Diffuse Reflectance Infrared Fourier Transform Spectroscopy DSC Differential Scanning Calorimetry Analysis E10 10 percent ethanol blend with gasoline E15 15 percent volume ethanol blend with gasoline E20 20 percent ethanol blend with gasoline E85 85 percent ethanol blend with gasoline E86 85 percent ethanol blend with gasoline EADPF Electrically-assisted Diseal Particulate Filter EC Ethylene carbonate ECV Ethylene carbonate ECV Engine Combustion Network ECU Electric Cortrol Unit EDAB Electric Drive Vehicle (HEV, PHEV, BEV) EDV Electric Drive Vehicle (HEV, PHEV, BEV) EDV Energy Efficiency and Renewable Energy EER Energy Efficiency and Renewable Energy EGR Exhaust Gas Recirculation EISA Energy Independence and | Acronym | Definition |
|---|---------|---|
| DOW Dow Chemical Company DP Dual Phase DPF Disel particulate filter DRIFTS Diffuse Reflectance Infrared Fourier Transform Spectroscopy DSC Diffuse Reflectance Infrared Fourier Transform Spectroscopy DSC Diffuse Reflectance Infrared Fourier Transform Spectroscopy DSC Diffuse Reflectance Infrared Fourier Transform Spectroscopy ELO 10 percent ethanol blend with gasoline ELS 15 percent volume ethanol blend with gasoline ESS 85 percent ethanol blend with gasoline EADY ELECTROSTON EADY ELECTROSTON ECV Electric Drive dend Advanced Battery and Components Testbed EDV Electric Drive vehicle (HEV, PHEV, BEV) EDX Electric Double-Layer Capacitor EDX | DoD | Depth of Discharge |
| DP Diesel particulate filter DRIFTS Diffuse Reflectance Infrared Fourier Transform Spectroscopy DSC Differential Scanning Calorimetry Analysis E10 10 percent ethanol blend with gasoline E15 15 percent volume ethanol blend with gasoline E20 20 percent ethanol blend with gasoline E20 320 percent ethanol blend with gasoline E20 E20 E20 percent ethanol blend with gasoline E20 E20 E20 percent ethanol blend with gasoline E20 E20 E30 percent ethanol blend with gasoline E20 E30 E30 percent ethanol blend with gasoline E20 E40 E40 E40 E40 E40 E40 E40 E40 E40 E4 | DOE | Department of Energy |
| DPF Ditsel particulate filter DRIFTS Diffuse Reflectance Infrared Fourier Transform Spectroscopy DSC Differential Scanning Calorimetry Analysis E10 10 percent ethanol blend with gasoline E15 15 percent volume ethanol blend with gasoline E20 20 percent ethanol blend with gasoline E85 85 percent ethanol blend with gasoline E86 85 percent ethanol blend with gasoline E87 EADPF Electrically-assisted Diesel Particulate Filter EC Ethylene carbonate ECN Engine Combustion Network ECU Electronic Control Unit EDAB Electric Drive Vehicle (HEV, PHEV, BEV) EDAB Electric Drive Vehicle (HEV, PHEV, BEV) EDA Energy dispersive X-ray spectroscopy EERE Energy Elficiency and Renewable Energy EGR Exhaust Gas Recirculation EISA Energy Independence and Security Act of 2007 EMD Electro-Bisel EMS PEV/Energy Management System ENS PEV/Energy Management System EN Electroless nickel EO Engine Out EPA Environmental Protection Agency EPAC Energy Dilectric Orthopents, Modules, and Systems EPPC EN Electric Power Research Institute ERDA Elastic Recoil Detection Analysis EREV Estended Range Electric Vehicle ESS DOE Energy Storage Program ESM Electro-Gover Research Institute ERDA Electro-Gover Research Institute ESS Energy Estended Range Electric Vehicle ESS Energy Storage System ETW EPA Equivalent Test Weight EUMD End Vehicle Supplemental Equipment | DOW | Dow Chemical Company |
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| DSC Differential Seanning Calorimetry Analysis E10 10 percent ethanol blend with gasoline E15 15 percent volume ethanol blend with gasoline E20 20 percent ethanol blend with gasoline E85 85 percent ethanol blend with gasoline EADFF Electrically-assisted Diesel Particulate Filter EC Ethylene carbonate ECN Engine Combustion Network ECU Electronic Control Unit EDAB Electric Drive and Advanced Battery and Components Testbed EDLC Electric Double-Layer Capacitor EDV Electric Drive Vehicle (HEV, PHEV, BEV) EDX Energy-dispersive X-ray spectroscopy EERE Energy Efficiency and Renewable Energy EGR Eshaust Gas Recirculation EISA Energy Independence and Security Act of 2007 EMS Elettro-drive Vehicle (HEV, PHEV) EMS Ethylmethylsulfone EMS PEV/Energy Management System EN Electroless nickel EO Engine Out EPA Environmental Protection Agency EPAC Energy Policy Act EPCOS EPCOS Electronic Components, Modules, and Systems EPCOS EPCOS Electronic Components, Modules, and Systems EPRI Electric Power Research Institute ERDA Elastic Recoil Detection Analysis EREV Extended Range Electric Vehicle ESS DOE Energy Storage Program ESM Electrochemical Strain Microscopy ESS Energy Storage System ETW EPA Equivalent Test Weight EUMD End Use Measurement Device EVSE Electric Vehicle EvSE | DPF | Diesel particulate filter |
| E10 10 percent ethanol blend with gasoline E15 15 percent volume ethanol blend with gasoline E20 20 percent ethanol blend with gasoline E85 85 percent ethanol blend with gasoline EADPF Electrically-assisted Diesel Particulate Filter EC Ethylene carbonate ECN Engine Combustion Network ECU Electronic Control Unit EDAB Electric Drive and Advanced Battery and Components Testbed EDLC Electric Double-Layer Capacitor EDV Electric Drive Vehicle EARE Energy-dispersive X-ray spectroscopy EERE Energy-dispersive X-ray spectroscopy EGR Eshaust Gas Recirculation EISA Energy-dispersive X-ray spectroscopy EMD Electric-Motive Diesel EMS Ethylmethylsulfone EMS PEV/Energy Management System EN Electroloss nickel EO Engine Out EPA Environmental Protection Agency EPAC Energy Diicy Act EPCOS EPCOS Electronic Components, Modules, and Systems EPRI Electric Power Research Institute ERDA Elastic Recoil Detectric Manalysis EREV Extended Range Electric Vehicle ESS Energy Storage Program ESM Electrochemical Strain Microscopy ESS Energy Storage System ETW EPA Equivalent Test Weight EUMD Endt We Measurement Device EVSE Electric Vehicle EVSE EVSE Electric Vehicle Supplemental Equipment | DRIFTS | Diffuse Reflectance Infrared Fourier Transform Spectroscopy |
| E15 15 percent volume ethanol blend with gasoline E20 20 percent ethanol blend with gasoline E85 85 percent ethanol blend with gasoline EADPF Electrically-assisted Diesel Particulate Filter EC Ethylene carbonate ECN Engine Combustion Network ECU Electronic Control Unit EDAB Electric Drive and Advanced Battery and Components Testbed EDLC Electric Drive Vehicle (HEV, PHEV, BEV) EDV Electric Drive Vehicle (HEV, PHEV, BEV) EDX Energy-dispersive X-ray spectroscopy EERE Energy Efficiency and Renewable Energy EGR Eshaust Gas Recirculation EISA Energy Independence and Security Act of 2007 EMD Electro-Motive Diesel EMS Ethylmethylsulfone EMS Ethylmethylsulfone ENS Epty-Energy Management System EN Electroes nickel EO Engine Out EPA Environmental Protection Agency EPAC Energy Dicy Act EPCOS EPCOS EPCOS Electronic Components, Modules, and Systems EPRI Electric Power Research Institute ERDA Elastic Recoil Detection Analysis EREV Extended Range Electric Vehicle ES DOE Energy Storage Program ESM Electroesmical Strain Microscopy ESS Energy Storage System ETW EPA Equivalent Test Weight EUMD End We Measurement Device EV Electric Vehicle EUSE EVSE Electric Vehicle Supplemental Equipment | DSC | Differential Scanning Calorimetry Analysis |
| E20 20 percent ethanol blend with gasoline E85 85 percent ethanol blend with gasoline EADPF Electrically-assisted Diesel Particulate Filter EC Ethylene carbonate ECN Engine Combustion Network ECU Electronic Control Unit EDAB Electric Drive and Advanced Battery and Components Testbed EDLC Electric Double-Layer Capacitor EDV Electric Drive Vehicle (HEV, PHEV, BEV) EDX Energy-dispersive X-ray spectroscopy EERE Energy Efficiency and Renewable Energy EGR Exhaust Gas Recirculation EISA Energy Independence and Security Act of 2007 EMS Electric-Motive Diesel EMS Ethylmethylsulfone EMS PEV/Energy Management System EN Electroless nickel EO Engine Out EPAC Energy Diey Act EPCOS EPCOS Electronic Components, Modules, and Systems EPRI Electric Power Research Institute ERDA Elastic Recoil Detection Analysis EREV Extended Range Electric Vehicle ES DOE Energy Storage Program ESM Electrochemical Strain Microscopy ESS Encrgy Storage System ETW EPA Equivalent Test Weight EUMD End We Measurement Device EVSE Electric Vehicle EVSE Electric Vehicle EVSE Electric Vehicle Supplemental Equipment | E10 | 10 percent ethanol blend with gasoline |
| E85 85 percent ethanol blend with gasoline EADPF Electrically-assisted Diesel Particulate Filter EC Ethylene carbonate ECN Engine Combustion Network ECU Electronic Control Unit EDAB Electric Drive and Advanced Battery and Components Testbed EDLC Electric Double-Layer Capacitor EDV Electric Drive Vehicle (HEV, PHEV, BEV) EDX Energy-dispersive X-ray spectroscopy EERE Energy Efficiency and Renewable Energy EGR Exhaust Gas Recirculation EISA Energy Independence and Security Act of 2007 EMD Electro-Motive Diesel EMS Ethylmethylsulfone EMS PEV/Energy Management System EN Electroless nickel EO Engine Out EPA Environmental Protection Agency EPAC Energy Diey Act EPCOS EPCOS Electronic Components, Modules, and Systems EPRI Electric Power Research Institute ERDA Elastic Recoil Detection Analysis EREV Extended Range Electric Vehicle ES DOE Energy Storage Program ESM Electrochemical Strain Microscopy ESS Energy Storage Program ESM Electrochemical Strain Microscopy ESS Energy Storage System ETW EPA Equivalent Test Weight EUMD End Selectic Vehicle EVS Electric Vehicle EVSE Electric Vehicle Supplemental Equipment | E15 | 15 percent volume ethanol blend with gasoline |
| EADPF Electrically-assisted Diesel Particulate Filter EC Ethylene carbonate ECN Engine Combustion Network ECU Electronic Control Unit EDAB Electric Drive and Advanced Battery and Components Testbed EDLC Electric Drive Vehicle (HEV, PHEV, BEV) EDV Electric Drive Vehicle (HEV, PHEV, BEV) EDX Energy-dispersive X-ray spectroscopy EERE Energy Efficiency and Renewable Energy EERE Eshaust Gas Recirculation EISA Energy Independence and Security Act of 2007 EMD Electro-Motive Diesel EMS Ethylmethylsulfone EMS PEV/Energy Management System EN Electroless nickel EO Brigine Out EPA Environmental Protection Agency EPAC Energy Policy Act EPCOS EPCOS Electronic Components, Modules, and Systems EPRI Electric Power Research Institute ERDA Elastic Recoil Detection Analysis EREV Extended Range Electric Vehicle ES DOE Energy Storage Program ESM Electrochemical Strain Microscopy ESS Energy Storage System ETW EPA Equivalent Test Weight EUMD En dle Sweasurement Device EV Electric Vehicle EVSE Electric Vehicle Supplemental Equipment | E20 | 20 percent ethanol blend with gasoline |
| EC Ethylene carbonate ECN Engine Combustion Network ECU Electronic Control Unit EDAB Electric Drive and Advanced Battery and Components Testbed EDLC Electric Drive Vehicle (HEV, PHEV, BEV) EDX Energy-dispersive X-ray spectroscopy EERE Energy Efficiency and Renewable Energy EGR Exhaust Gas Recirculation EISA Energy Independence and Security Act of 2007 EMD Electro-Motive Diesel EMS PEV/Energy Management System EN Electroless nickel EO Engine Out EPA Environmental Protection Agency EPAC Energy Policy Act EPCOS EPCOS Electronic Components, Modules, and Systems EPRI Electric Power Research Institute ERDA Elastic Recoil Detection Analysis EREV Extended Range Electric Vehicle ES DOE Energy Storage Program ESM EPA Equivalent Test Weight ETW EPA Environental Protection Anderoscopy ESS Energy Storage System EN Electrochemical Strain Microscopy ESS Energy Storage System ETW EPA Equivalent Test Weight EUMD End We Measurement Device EV Electric Vehicle EVSE Electric Vehicle Supplemental Equipment | E85 | 85 percent ethanol blend with gasoline |
| ECN Egine Combustion Network ECU Electronic Control Unit EDAB Electric Drive and Advanced Battery and Components Testbed EDLC Electric Double-Layer Capacitor EDV Electric Drive Vehicle (HEV, PHEV, BEV) EDX Energy-dispersive X-ray spectroscopy EERE Energy Efficiency and Renewable Energy EGR Exhaust Gas Recirculation EISA Energy Independence and Security Act of 2007 EMD Electro-Motive Diesel EMS Ethylmethylsulfone EMS Ethylmethylsulfone EMS PEV/Energy Management System EN Electroless nickel EO Engine Out EPA Environmental Protection Agency EPACE Energy Policy Act EPCOS EPCOS Electronic Components, Modules, and Systems EPRI Electric Power Research Institute ERDA Elastic Recoil Detection Analysis EREV Extended Range Electric Vehicle ES DOE Energy Storage Program ESM Electrochemical Strain Microscopy ESS Energy Storage System ETW EPA Equivalent Test Weight EUMD End Use Measurement Device EV Electric Vehicle Supplemental Equipment | EADPF | Electrically-assisted Diesel Particulate Filter |
| ECU Electroic Control Unit EDAB Electric Drive and Advanced Battery and Components Testbed EDLC Electric Double-Layer Capacitor EDV Electric Drive Vehicle (HEV, PHEV, BEV) EDX Energy-dispersive X-ray spectroscopy EERE Energy Efficiency and Renewable Energy EGR Exhaust Gas Recirculation EISA Energy Independence and Security Act of 2007 EMD Electro-Motive Diesel EMS Ethylmethylsulfone EMS PEV/Energy Management System EN Electroless nickel EO Engine Out EPA Environmental Protection Agency EPAC Energy Policy Act EPCOS EPCOS Electronic Components, Modules, and Systems EPRI Electric Power Research Institute ERDA Elastic Recoil Detection Analysis EREV Extended Range Electric Vehicle ES DOE Energy Storage Program ESM Electrochemical Strain Microscopy ESS Energy Storage System ETW EPA Equivalent Test Weight EUMD End Use Measurement Device EV Electric Vehicle Supplemental Equipment | EC | Ethylene carbonate |
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| EMD Electro-Motive Diesel EMS Ethylmethylsulfone EMS PEV/Energy Management System EN Electroless nickel EO Engine Out EPA Environmental Protection Agency EPAct Energy Policy Act EPCOS EPCOS Electronic Components, Modules, and Systems EPRI Electric Power Research Institute ERDA Elastic Recoil Detection Analysis EREV Extended Range Electric Vehicle ES DOE Energy Storage Program ESM Electrochemical Strain Microscopy ESS Energy Storage System ETW EPA Equivalent Test Weight EUMD End Use Measurement Device EV Electric Vehicle EVSE Electric Vehicle Supplemental Equipment | EGR | Exhaust Gas Recirculation |
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| EMS PEV/Energy Management System EN Electroless nickel EO Engine Out EPA Environmental Protection Agency EPAct Energy Policy Act EPCOS EPCOS Electronic Components, Modules, and Systems EPRI Electric Power Research Institute ERDA Elastic Recoil Detection Analysis EREV Extended Range Electric Vehicle ES DOE Energy Storage Program ESM Electrochemical Strain Microscopy ESS Energy Storage System ETW EPA Equivalent Test Weight EUMD End Use Measurement Device EV Electric Vehicle EVSE Electric Vehicle Supplemental Equipment | EMD | Electro-Motive Diesel |
| EN Electroless nickel EO Engine Out EPA Environmental Protection Agency EPAct Energy Policy Act EPCOS EPCOS Electronic Components, Modules, and Systems EPRI Electric Power Research Institute ERDA Elastic Recoil Detection Analysis EREV Extended Range Electric Vehicle ES DOE Energy Storage Program ESM Electrochemical Strain Microscopy ESS Energy Storage System ETW EPA Equivalent Test Weight EUMD End Use Measurement Device EV Electric Vehicle EVSE Electric Vehicle Supplemental Equipment | EMS | Ethylmethylsulfone |
| EO Engine Out EPA Environmental Protection Agency EPAct Energy Policy Act EPCOS EPCOS Electronic Components, Modules, and Systems EPRI Electric Power Research Institute ERDA Elastic Recoil Detection Analysis EREV Extended Range Electric Vehicle ES DOE Energy Storage Program ESM Electrochemical Strain Microscopy ESS Energy Storage System ETW EPA Equivalent Test Weight EUMD End Use Measurement Device EV Electric Vehicle EVSE Electric Vehicle Supplemental Equipment | EMS | PEV/Energy Management System |
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| EPAct Energy Policy Act EPCOS EPCOS Electronic Components, Modules, and Systems EPRI Electric Power Research Institute ERDA Elastic Recoil Detection Analysis EREV Extended Range Electric Vehicle ES DOE Energy Storage Program ESM Electrochemical Strain Microscopy ESS Energy Storage System ETW EPA Equivalent Test Weight EUMD End Use Measurement Device EV Electric Vehicle Supplemental Equipment | EO | Engine Out |
| EPCOS Electronic Components, Modules, and Systems EPRI Electric Power Research Institute ERDA Elastic Recoil Detection Analysis EREV Extended Range Electric Vehicle ES DOE Energy Storage Program ESM Electrochemical Strain Microscopy ESS Energy Storage System ETW EPA Equivalent Test Weight EUMD End Use Measurement Device EV Electric Vehicle EVSE Electric Vehicle Supplemental Equipment | EPA | Environmental Protection Agency |
| EPRI Electric Power Research Institute ERDA Elastic Recoil Detection Analysis EREV Extended Range Electric Vehicle ES DOE Energy Storage Program ESM Electrochemical Strain Microscopy ESS Energy Storage System ETW EPA Equivalent Test Weight EUMD End Use Measurement Device EV Electric Vehicle EVSE Electric Vehicle Supplemental Equipment | EPAct | Energy Policy Act |
| ERDA Elastic Recoil Detection Analysis EREV Extended Range Electric Vehicle ES DOE Energy Storage Program ESM Electrochemical Strain Microscopy ESS Energy Storage System ETW EPA Equivalent Test Weight EUMD End Use Measurement Device EV Electric Vehicle EVSE Electric Vehicle Supplemental Equipment | EPCOS | EPCOS Electronic Components, Modules, and Systems |
| EREV Extended Range Electric Vehicle ES DOE Energy Storage Program ESM Electrochemical Strain Microscopy ESS Energy Storage System ETW EPA Equivalent Test Weight EUMD End Use Measurement Device EV Electric Vehicle EVSE Electric Vehicle Supplemental Equipment | EPRI | Electric Power Research Institute |
| ES DOE Energy Storage Program ESM Electrochemical Strain Microscopy ESS Energy Storage System ETW EPA Equivalent Test Weight EUMD End Use Measurement Device EV Electric Vehicle EVSE Electric Vehicle Supplemental Equipment | ERDA | Elastic Recoil Detection Analysis |
| ESM Electrochemical Strain Microscopy ESS Energy Storage System ETW EPA Equivalent Test Weight EUMD End Use Measurement Device EV Electric Vehicle EVSE Electric Vehicle Supplemental Equipment | EREV | Extended Range Electric Vehicle |
| ESS Energy Storage System ETW EPA Equivalent Test Weight EUMD End Use Measurement Device EV Electric Vehicle EVSE Electric Vehicle Supplemental Equipment | ES | DOE Energy Storage Program |
| ETW EPA Equivalent Test Weight EUMD End Use Measurement Device EV Electric Vehicle EVSE Electric Vehicle Supplemental Equipment | ESM | Electrochemical Strain Microscopy |
| EUMD End Use Measurement Device EV Electric Vehicle EVSE Electric Vehicle Supplemental Equipment | ESS | Energy Storage System |
| EV Electric Vehicle EVSE Electric Vehicle Supplemental Equipment | ETW | EPA Equivalent Test Weight |
| EVSE Electric Vehicle Supplemental Equipment | EUMD | End Use Measurement Device |
| | EV | Electric Vehicle |
| FAA Federal Aviation Administration | EVSE | Electric Vehicle Supplemental Equipment |
| | FAA | Federal Aviation Administration |



| Acronym | Definition |
|----------|--|
| FACE | Fuels for Advanced Combustion Engines |
| FC | DOE Fuel Cell Technologies Program |
| FCV | Fuel Cell Vehicles |
| Fe | Iron |
| FE | Fuel Efficiency |
| FEERC | Fuels, Engines, and Emissions Research Center |
| FEM | Finite Elements Model |
| FEMS | Trifluoroethylmethylsulfone |
| Fe-Z | Iron zeolite |
| FFV | Flexible fuel vehicle |
| FFVA | Fully Flexible Valve Actuation |
| FIE | Fuel Injection Equipment |
| FLD | Forming Limit Diagram |
| FMC | FMC Corporation |
| FMVSS | Federal Motor Vehicle Safety Standards |
| FSN | Filter Smoke Number |
| FSP | Friction Stir Processing |
| FSW | Friction Stir Welding |
| FTP | Federal Test Procedure |
| FY | Fiscal Year |
| GaN | Gallium Nitride |
| GATE | Graduate Automotive Technology Education |
| GDCI | Gasoline Direct Injection Compression Ignition |
| GE | General Electric |
| GeoEVSE | Google-electric vehicle charging installation partnership |
| GDI | Gasoline Direct Injection |
| GHG | Greenhouse gases |
| GITT | Grid Integration Tech Team |
| GM | General Motors Corporation |
| GTDI | Gasoline Turbocharged Direct Injection |
| GT POWER | Gamma Technologies, Inc. computer-aided engineering software |
| GUI | Graphical User Interface |
| GWP | Global Warming Potential |
| HAN | Home Area Network |
| HBCU | Historically Black Colleges and Universities |
| НС | Hydrocarbon |
| HCCI | Homogeneous Charge Compression Ignition |
| HD | Heavy-duty |
| HDD | Heavy-duty diesel |
| Не | Helium |
| HECC | High Efficiency Clean Combustion |



| Acronym | Definition |
|---------|--|
| HEDGE | High Efficiency Dilute Gasoline Engine |
| HEV | Hybrid Electric Vehicle |
| HfN | Hafnium nitride |
| HIL | Hardware in the Loop |
| HMI | Human Machine Interface |
| HMS | Higher Manganese Silicides |
| HP | Higher-order Ploynomial Approximation |
| HPL | High Power Lithium |
| HPLB | High-Pressure, Lean Burn |
| HT | High Temperature |
| HTMI | high temperature melt integrity |
| HTML | High Temperature Materials Laboratory |
| HV | High Voltage |
| HVAC | Heating Ventilating and Air Conditioning |
| HW | Honeywell |
| HWFE | Highway Fuel Economy |
| H2 | Hydrogen |
| IAC | International Automotive Components |
| IC | Internal Combustion |
| ICE | Internal Combustion Engine |
| ICP | Inductively-coupled Plasma |
| IEEE | Institute of Electrical and Electronics Engineers |
| IGBT | Insulated-gate bipolar transistor |
| IMEP | Indicated Mean Effective Pressure |
| INL | Idaho National Laboratory |
| IP | Intellectual Property |
| IPM | Interior Permanent Magnet |
| IR | Infrared |
| ISFC | Indicated Specific Fuel Consumption |
| ISO | International Organization for Standardization |
| ITE | Indicated Thermal Efficiency |
| ITP | DOE Industrial Technologies Program |
| ITS | Institute of Transportation Studies |
| JCI | Johnson Controls Inc. |
| JM | Johnson Matthey |
| JMI | John Marvin Inc. |
| JPL | Jet Propulsion Laboratory |
| K | Potassium |
| K | degrees Kelvin |
| K | Thousand |
| KAIST | Korea Advanced Institute of Science and Technology |



| Acronym | Definition |
|---------|--|
| KAMAX | Kamax Auto Parts Co., Ltd. |
| kg | Kilogram |
| KIVA | Internal combustion engine simulation code (Los Alamos) |
| KULI | Software package for thermal modeling |
| kWh | Kilowatt hour |
| L | Liter |
| LBNL | Lawrence Berkeley National Laboratory |
| LC | Life Cycle |
| LCCF | Low Cost Carbon Fiber |
| LD | Light-duty |
| LDD | Light-duty Diesel |
| LDRD | Laboratory Directed Research and Development |
| LDV | Light Duty Vehicle |
| LEESS | Lower Energy Energy Storage System |
| LES | Large Eddy Simulation |
| LEVIII | State of California Low-Emission Vehicle III regulations |
| LFP | Lithium iron phosphate |
| LG | LG Chem |
| Li | Lithium |
| LLC | Limited Liability Company |
| LLFC | Lean Lifted Flame Combustion |
| LLNL | Lawrence Livermore National Laboratory |
| LLDPE | Linear Low-Density Polyethylene |
| LLV | Long Life Vehicle (used by USPS) |
| LMR-NMC | lithium- and manganese-rich transition metal oxides |
| LNMO | Lithium Nickel Manganese Oxide |
| LNT | Lean NOx Trap |
| LSP | Laser shock peening |
| LT | Low Temperature |
| LTC | Low Temperature Combustion |
| LTO | Low Temperature Oxide (form of silicon dioxide) |
| M | Million |
| M&S | Modeling and Simulation |
| MC550 | Mesoporous hard carbon |
| MCE | Multi-cylinder Engine |
| MCMB | Mesocarbon Microbeads |
| MD | Medium-duty |
| MECA | Manufacturers of Emissions Control Association |
| MEI | Magnetic-electro Imaging |
| MEMS | Methoxyethyl methyl sulfone |
| MENA | Magnesium Elektron North America |



| MFT Massachusetts Institute of Technology MNC Metal-Nitrogen-Carbon MnSi Manganese Silicide MO Molecular Orbital MOU Memorandum of Understanding MS Masters of Science MSCI Methanesulfoncyl chloride MSF Methanesulfoncyl chloride MSF Methanesulfoncyl fluoride MSU Michigan State University MTU Michigan Technology University NTU Michigan Technology University NA North America NaCo2O4 sodium cobalt oxide NSA National Aeronautics and Space Administration NCA Battery cathode material (nickel cobalt aluminum oxide) NDA Non-Destructive Analysis NDA Non-Destructive Evaluation NEC National Electrical Code NETL National Energy Technology Laboratory NFAC National Full-Scale Aerodynamics Complex NFPA National Fire Protection Association NG Natural Gas NGK NGK Spark Plugs USA NHSA National Highway Traffic Safety Administration NHTSA National Institute of Standards and Technology NMC Nickel-metal hydride NMST National Institute of Standards and Technology NMC Nickel-magnase cobalt NMST National Institute of Standards and Technology NMC Nickel manganese cobalt NMST National Institute of Standards and Technology NMC Nickel manganese cobalt NMST National Institute of Standards and Technology NMC Nickel manganese cobalt NMST National Institute of Standards and Technology NMC Nickel manganese cobalt NMST National Reference Pressure NMR Nuclear Magnetic Resonance NOX Nitrogen Oxide NPSF Non-petroleum Blend Fuels NMST National Rescarch Council NMST. National Rescarch Council NMST. National Rescarch Council NMST. National Rescarch Council | Acronym | Definition |
|--|---------|---|
| MNC Mctal-Nitrogen-Carbon MnSi Maganese Silicide MO Molecular Orbital MOU Memorandum of Understanding MS Masters of Science MSCI Methanesulfoneyl fluoride MSF Methanesulfoneyl fluoride MSF Methanesulfoneyl fluoride MSU Michigan State University MTU Michigan Technology University NA North America NACO204 sodium cobalt oxide NASA National Aeronautics and Space Administration NCA Battery cathode material (nickel cobalt aluminum oxide) NDA Non-Destructive Analysis NDA Non-Destructive Analysis NDA Non-Destructive Evaluation NEC National Electrical Code NETL National Electrical Code NETL National Fire Protection Association NFAC National Fire Protection Association NGA Natural Gas NGK NGK Spark Plugs USA NH3 Ammonia NHTSA National Highway Traffic Safety Administration NHTSA National Highway Traffic Safety Administration NHTSA National Institute of Standards and Technology NMC Nickel-metal hydride NIST National Institute of Standards and Technology NMC Nickel-metal hydride NMS Nuclear Magnetic Resonance NOX Nitrogen Oxide NPBF Non-petroleum Blend Fuels NNOP Nitrous Oxide NPBF Non-petroleum Blend Fuels NNOP National Research Council | | Mordenite Framework Inverted |
| MnSi Manganese Silicide MO Molecular Orbital MOU Memorandum of Understanding MS Masters of Science MSCI Methanesulfoneyl chloride MSF Methanesulfoneyl fluoride MSU Michigan State University MTU Michigan Technology University NA North America NaCo204 sodium cobalt oxide NSA National Aeronautics and Space Administration NCA Battery cathode material (nickel cobalt aluminum oxide) NDA Non-Destructive Analysis NDA Non-Disclosure Agreement NDE Non-Discructive Evaluation NEC National Electrical Code NETL National Electrical Code NETL National Electrical Code NFAC National Fire Protection Association NFA National Fire Protection Association NG NG Spark Plugs USA NH3 Ammonia NH3 National Highway Traffic Safety Administration NIM Nickel-metal hydride | MIT | Massachusetts Institute of Technology |
| MO Molecular Orbital MOU Memorandum of Understanding MS Masters of Science MSCI Methanesulfoneyl chloride MSF Methanesulfoneyl fluoride MSU Michigan State University MTU Michigan Technology University NA North America NaCo204 sodium cobalt oxide NASA National Aeronautics and Space Administration NCA Battery cathode material (nickel cobalt aluminum oxide) NDA Non-Destructive Analysis NDA Non-Disclosure Agreement NDE Non-Destructive Evaluation NEC National Electrical Code NETL National Energy Technology Laboratory NFAC National Full-Scale Aerodynamics Complex NFPA National Fire Protection Association NG Natural Gas NG Natural Gas NGK NGK Spark Plugs USA NH3 Ammonia NHTSA National Highway Traffic Safety Administration NiMH Nickel-metal hydride | MNC | Metal-Nitrogen-Carbon |
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| MTU Michigan Technology University NA North America NaCo2O4 sodium cobalt oxide NASA National Aeronautics and Space Administration NCA Battery cathode material (nickel cobalt aluminum oxide) NDA Non-Destructive Analysis NDA Non-Disclosure Agreement NDE Non-Destructive Evaluation NEC National Electrical Code NETL National Energy Technology Laboratory NFAC National Fire Protection Association NG Natural Gas NGK NGK Spark Plugs USA NH3 Ammonia NHTSA National Highway Traffic Safety Administration NiMH Nickel-metal hydride NIST National Institute of Standards and Technology NMC Nickel manganese cobalt NMEP Net Mean Effective Pressure NMR Nuclear Magnetic Resonance NOX Nitrogen N2 Nitrogen N20 Nitrous Oxide NPBF Non-petroleum Blend Fuels NRC | MSF | Methanesulfoneyl fluoride |
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| NaCo2O4 sodium cobalt oxide NASA National Aeronautics and Space Administration NCA Battery cathode material (nickel cobalt aluminum oxide) NDA Non-Destructive Analysis NDA Non-Disclosure Agreement NDE Non-Destructive Evaluation NEC National Electrical Code NETL National Energy Technology Laboratory NFAC National Full-Scale Aerodynamics Complex NFPA National Fire Protection Association NG Natural Gas NGK NGK Spark Plugs USA NH3 Ammonia NHTSA National Highway Traffic Safety Administration NiMH Nickel-metal hydride NIST National Institute of Standards and Technology NMC Nickel manganese cobalt NMEP Net Mean Effective Pressure NMR Nuclear Magnetic Resonance NOx Nitrogen Oxide NPBF Non-petroleum Blend Fuels NRC National Research Council | MTU | Michigan Technology University |
| NASA National Aeronautics and Space Administration NCA Battery cathode material (nickel cobalt aluminum oxide) NDA Non-Destructive Analysis NDA Non-Disclosure Agreement NDE Non-Destructive Evaluation NEC National Electrical Code NETL National Energy Technology Laboratory NFAC National Full-Scale Aerodynamics Complex NFPA National Fire Protection Association NG Natural Gas NGK NGK Spark Plugs USA NH3 Ammonia NHTSA National Highway Traffic Safety Administration NIMH Nickel-metal hydride NIST National Institute of Standards and Technology NMC Nickel manganese cobalt NMEP Net Mean Effective Pressure NMR Nuclear Magnetic Resonance NOX Nitrogen Oxide N2 Nitrogen N2O Nitrous Oxide NPBF Non-petroleum Blend Fuels NRC National Research Council | NA | North America |
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| NHTSA National Highway Traffic Safety Administration NiMH Nickel-metal hydride NIST National Institute of Standards and Technology NMC Nickel manganese cobalt NMEP Net Mean Effective Pressure NMR Nuclear Magnetic Resonance NOx Nitrogen Oxide N2 Nitrogen N2O Nitrous Oxide NPBF Non-petroleum Blend Fuels NRC National Research Council | NGK | NGK Spark Plugs USA |
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| NMRNuclear Magnetic ResonanceNOxNitrogen OxideN2NitrogenN2ONitrous OxideNPBFNon-petroleum Blend FuelsNRCNational Research Council | NMC | Nickel manganese cobalt |
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| N2NitrogenN2ONitrous OxideNPBFNon-petroleum Blend FuelsNRCNational Research Council | NMR | Nuclear Magnetic Resonance |
| N2O Nitrous Oxide NPBF Non-petroleum Blend Fuels NRC National Research Council | NOx | Nitrogen Oxide |
| NPBF Non-petroleum Blend Fuels NRC National Research Council | N2 | Nitrogen |
| NRC National Research Council | N2O | Nitrous Oxide |
| | NPBF | Non-petroleum Blend Fuels |
| NREL National Renewable Energy Laboratory | NRC | National Research Council |
| | NREL | National Renewable Energy Laboratory |
| NSF National Science Foundation | NSF | National Science Foundation |
| NSR NOx Storage/Reduction | NSR | NOx Storage/Reduction |
| NTC Negative Temperature Coefficient | NTC | Negative Temperature Coefficient |
| NTIS National Technical Information Service | NTIS | National Technical Information Service |



| Acronym | Definition |
|------------|---|
| NTRC | National Transportation Research Center |
| NVH | Noise/vibration/harshness |
| NVO | Negative valve overlap |
| OE | DOE Office of Electricity Delivery and Energy Reliability |
| OE | Original Equipment |
| OEM | Original Equipment Manufacturer |
| OIT | DOE Office of Industrial Technologies |
| ORC | Organic Rankine cycle |
| ORMAT | Ormat Technologies Inc. |
| ORNL | Oak Ridge National Laboratory |
| OSU | Ohio State University |
| OSU | Oregon State University |
| OVT | Office of Vehicle Technologies |
| PACCAR | Commercial Vehicle Manufacturer (Kenworth, Peterbilt, DAF) |
| PAH | Polycyclic Aromatic Hydrocarbon |
| PAN | Polyacrylonitrile |
| PASS | Passive Ammonia SCR System |
| PbTe | Lead(II) Telluride |
| PCCI | Premixed Charge Compression Ignition |
| PDF | Adobe Portable Document Format |
| PEV | Plug-in Electric Vehicle |
| PFI | Port Fuel Injected |
| PGM | Precious-group metals |
| PHEV | Plug-In Hybrid Electric Vehicle |
| PHEV40 | Plug-In Hybrid Electric Vehicle with a 40-mile range on a single charge |
| PI | Principal Investigator |
| PIV | Particle Image Velocimetry |
| PLC | Programmable Logic Controller |
| PM | Particulate Matter |
| PM | Propulsion Materials |
| PN | Particulate Number |
| PNA | Polynuclear Aromatics |
| PNNL | Pacific Northwest National Laboratory |
| PREA | Partnership for Roadway Electrification & Automation |
| PRESICE | Combustion Model |
| PSAT | Powertrain Systems Analysis Toolkit |
| PSD | Particle Size Distribution |
| PSE gPROMS | Process Systems Enterprise Limited (PSE) advanced process modeling |
| PV | Photovoltaic |
| PVdF | Polyvinylidene Fluoride |
| PZT | Lead zirconate titanate film |



| Acronym | Definition |
|---------|---|
| RAPTR | Regenerative Air Preheating and Thermochemical Recuperation |
| RB | Reverse Blocking |
| RBIGBT | Reverse Blocking Insulated Gate Bipolar Transistor |
| RBC | Route Based Control |
| RBS | Rutherford Backscattering Spectrometry |
| RCCI | Reactivity Controlled Compression Ignition Combustion |
| RCF | Rapid Compression Facility at the University of Michigan |
| RCM | Rapid Compression Machine |
| R&D | Research and Development |
| RD&D | Research, Development, and Demonstration |
| RNG | Renormalization Group |
| RFSII | Renewable Fuel Standard, as amended |
| RON | Research Octane Number |
| RPM | Revolutions Per Minute |
| RSM | Response Surface Methodology |
| S | Sulfur |
| SACI | Spark Assisted Compression Ignition |
| SAE | Society of Automotive Engineers |
| SAFT | The Saft Group |
| SANS | Small Angle Neutron Scattering |
| SA-HCCI | Spark-Assisted Homogeneous Charge Compression Ignition |
| SBR | Styrene butadiene rubber |
| ScN | Scandium nitride |
| SCR | Selective Catalytic Reduction |
| SEI | Solid electrolyte interface |
| SEM | Scanning Electron Microscope |
| SEP | Smart Energy Profile |
| SHNC | Superhard Nanocomponent |
| Si | Silicon |
| SI | Spark Ignition |
| SiC | Silicon Carbide |
| SLA | Sealed Lead Acid |
| SLMP | Stabilized Lithium Metal Powder |
| SNL | Sandia National Laboratories |
| SO2 | Sulfur Dioxide |
| SO3 | Sulfite |
| SOC | State of Charge |
| SOD | Superoxide Dismutase |
| SOI | Start of Injection |
| SOM | Solid Oxide Membrane |
| SOP | Standard Operating Procedure |



| Acronym | Definition |
|---------|--|
| SP | Single Phase |
| SPX | SPX Service Solutions |
| SSITKA | Steady State Isotopic Transient Kinetic Analysis |
| STEM | Scanning Transmission Electron Microscopy |
| SUNY | State University of New York |
| SWRI | Southwest Research Institute |
| T2B2 | Tier 2 Bin 2 Emissions Standards |
| TACOM | Tank-automotive and Armaments Command |
| TARDEC | Tank Automotive Research, Development, and Engineering Center |
| TBC | Thermal Barrier Coating |
| TDL | Tunable Diode Laser |
| TE | Thermoelectrics |
| TEG | Thermoelectric Generator |
| TEM | Transmission Electron Microscope |
| TEMats | Thermoelectric Materials |
| TGA | Thermogravimetric Analysis |
| TiO2 | Titanium dioxide |
| TNO | Nederlandse Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek |
| TWIP | Twinning-Induced Plasticity |
| TWC | Three-way Catalyst |
| UAB | University of Alabama Birmingham |
| UC | University of California |
| UCLA | University of California, Los Angeles |
| UCON | University of Connecticut |
| UDDS | Urban Dynamometer Driving Schedule |
| UHC | Unburned Hydrocarbons |
| UIUC | University of Illinois at Urbana-Champaign |
| UL | Underwriters Laboratories |
| UM | University of Michigan |
| UNLV | University of Nevada Las Vegas |
| USABC | US Advanced Battery Consortium |
| USAMP | U.S. Automotive Materials Partnership |
| USCAR | United States Council for Automotive Research |
| USDA | United States Department of Agriculture |
| USPS | United States Postal Service |
| USW | Ultrasonic Welding |
| UT | University of Tennessee |
| V2G | Vehicle to Grid |
| VDA | Verband der deutschen Automobilindustrie or Association of German Automobile Manufacturers |
| VGC | Vehicle to Grid Communication |
| VGCF | Vapor-grown Carbon Fiber |



| Acronym | Definition |
|----------|---|
| VLBT | Variable-load Bearing Test |
| VPI & SU | Virginia Polytechnic Institute and State University |
| VT | Vehicle Technologies |
| VTC | Vehicle to charger |
| VtG | Vehicle to Grid |
| VTP | Vehicle Technologies Program |
| VVA | Variable Valve Actuation |
| Wh | Watt hour |
| WHR | Waste Heat Recovery |
| WJP | Water Jet Peening |
| WPAFB | Wright-Patterson Air Force Base |
| WPT | Wireless Power Transfer |
| WWMP | World Wide Mapping Point |
| X-Prize | Progressive Automotive X-Prize Competition |
| XAFS | X-ray Absorption Fine Structure |
| XPS | X-ray Photoelectron Spectroscopy |
| WG | Working Group |
| XRD | X-ray Diffraction (Crystallography) |
| Z | Zinc |
| ZCSI | Z-source Current Source Inverter |
| ZT | Thermoelectrics figure of merit (measure of efficiency) |