

### Safety & Electric Vehicle (EV) Systems

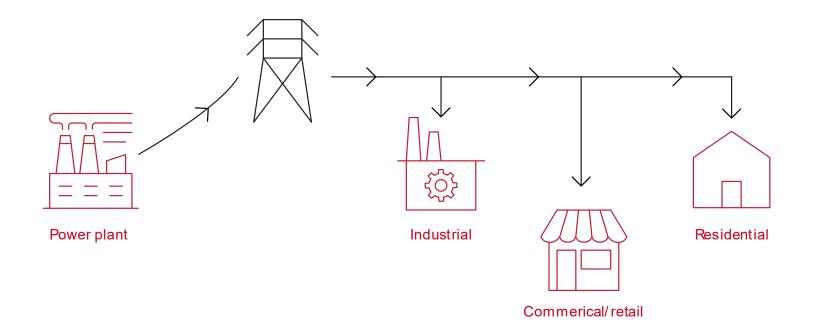
Christian Roatta, Senior Trade & Multilateral Affairs Specialist, UL Solutions

October 2023

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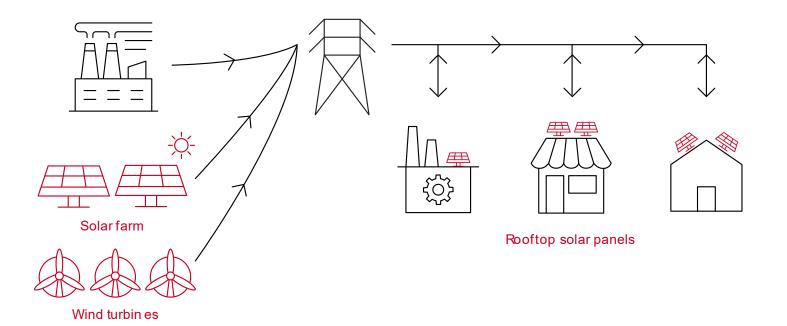
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#### **Traditional power plants**



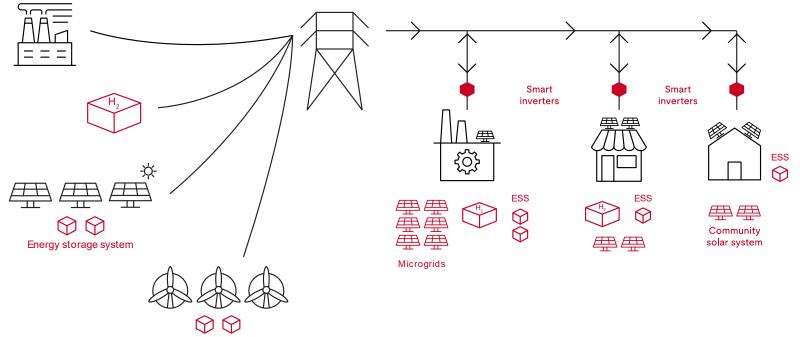
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### **Diversified and greener**



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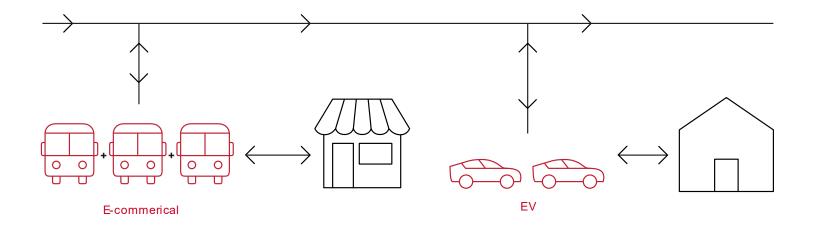
# Advanced technology and energy storage







# Infrastructure and vehicle fleet convergence





#### Energy storage system cascading thermal runaway



### Comprehensive safety and performance testing and certification services for the electric (EV) systems and electric vehicle supply equipment (EVSE) supply chains

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DC charging station
                                    Onboard connectors
                                                                                                                                                                                                                                                              EV relay
          Onboard charger
                                    UL 2734
                                                                                                                                                                                                                                                            UL 61810-20
                                                                                                                                                                                                                                                                               UL 2202
                                                                                                                                                                                                                                                                                    Standard for DC Charging Equipment
                                       Sine of Investigation for Connectors and Service Plags for
                                                                                                                                                                                                                                             Annex to Outline for Electric Vehicl
                         UL 2202
                                      se with On-Board Electrical Vehicle (EV) Charging Systems
                                                                                                                                                                                                                                            Electromechanical Elementary Relay
                                                                                                                                                                                                                                                                               for Electric Vehicles
           The Standard for DC Charging
                                                                                                                                                                                                                                                                               IEC 61851-1
          Equipment for Electric Vehicl
                                      Onboard wire and
                      IEC 61851-1
                                                                                                                                                                                                                                                                               IEC 61851-23
                                      cable/tubing
                                                                                                                                                                                                                     AC charging station
                    IEC 61851-23
                                                                                                                                                                                                                                                                               IEC 61851-21-2
                                                                                                                                                                  Personnel protection
                   IEC 61851-21-2
                                                                                        Material relative thermal index (RTI)
                                      UL 2733
                                                                                                                                                                                                                                                                               IEC 61851-24
                                                                                                                                                                                                                                        UL 2594
                                                                                                                                                                  equipment
                    IEC 61851-24
                                                                                                                                                                                                                             The Standard for Electric
                                                                                                                                                                                                                                                                               IEC 61439-7
                                        artace Vehicle On-Board Cable
                                                                                        Non-metallic materials in battery packs, electrical equipment
                                                                                                                                                                                                                            Vehicle Supply Equipment
                     IEC 61439-7
                                                                                                                                                                  UL 2231-1 and UL 2231-2
                                                                                         inclosure materials.
                                                                                                                                                                                                                                     IEC 61851-1
                                                                                                                                                                  The Standard for Per
                                          EV inlets
                                                                                                                                                                  for Electric Vehicle (EV) Scenic Circuits
                                                                                                                                                                                                                                                                                     Bidirectional charging station
                                                                                                                                                                                                                                 IEC 61851-21-2
                                                                                                                                                                  IEC 61008-1
                                                                                             Onboard batteries
                                          UL 2251
                                                                                                                                                                                                                                    IEC 61439-7
                                          The Standard for Pluge, Receptacies,
and Couplers for Electric Vehicles
                                                                                                                                                                  IEC 61009-1
                                                                                                                                                                                                                                                                                     UL 9741
Onboard inverters
                                                                                                                                                                                                                                                                                        tline of Investigation for Electric Vehicle Power
                                                                                            III 2580
                                                                                                                                                                  IEC 62955
                                                                                             The Standard for Batteries for Use In Diectric Vehicles
                                                                                                                                                                                                                                                                                     Export Equipment (EVPE)
                                          IEC 62196-1
                                                                                                                                                                  IEC 62423
               UL 458A
                                                                                                                                                                                                                                                                                                                                                        Energy storage
                                          IEC 62196-2
    Outline of Investigation to
                                                                                            ECE R100/GB 38031/LV 124/OEM
                                                                                                                                                                                                                                                                                                                                                        system
Power Converters/Inverters for
                                          IEC 62196-3
       Electric Land Vehicles
                                                                                                                                                                                                                                                                                                   Energy storage
                                                                                            Product verification (PV) beating
                                                                                                                                                                                                                                                                                                                                                        UL 9540
                                                                                                                                                                                                                                                                                                              battery
                                                                                                                                                                                                                                                                                                                                                        The Standard for Energy Storage
                                                                                                                                         Cord sets
                                                                                                                                                                                                                                                                                                                                                        Systems and Equipment
                                                                                                                                                                                                                                                                                                                UL 1973
                                                                                                                                             UL 2594
                                                                                                                                                                                                                                                                                                 The Standard for Batteries fo
                                                                                                                                                                                                                                                                                                                                                        UL 9540A
                                                                                                                                   The Standard for Electric
                                                                                                                                                                                                                                                                                                 Use in Stationary and Motive
                                                                                                                                                                                                                                                                                                                                                        The Standard for Test Method for
                                                                                                                                 Vehicle Supply Equipment
                                                                                                                                                                                                                                                                                                 Auxiliary Power Applications
                                                                                                                                                                                                                                                                                                                                                        Evaluating Thermal Runnersy Eire
                                                                                                                                           IEC 62752
                                                                                                                                                                                                                                                                                                                                                        Propagation in Battery Energy
                                                                                                                                                                                                                                                                                                              IEC 61619
                                                                                                                                                                                                                                                                                                                          Power
                                                                                                                                                                                                                                                                                                                                                        Storage Systems
                                                                                                                                          IEC 61851-1
                                                                                                                                                                                                                                                                                                           IEC 62485-5
                                                                                                                                                                                                                                                                                                                           conversion
                                                                                                                                                                                                                                                                                                                                                        IEC 62933
                                                                                                                                                                                                                                                                                                                            equipment
                                                                                                                                         EV relay
                                                                                                                                                                                                                                                                                                                           UL 1741
                                                                                                                                                                                                                                                                                                                            The Standard for Inverters
                                                                                                                                       UL 61810-20
                                                                                                                                                                                                                                                                                                                           Converters, Controllers and
                                                                                                                               innex to Outline for Electric
                                                                                                                                                                                                                                                                                                                           Interconnection System
                                                                                                                               Vehicle Dectromechanical
                                                                                                                                                                                                                                                                                                                           Equipment for line With
                                                                                                                                     Clamantery Gales
                                                                                                                                                                                                                                                                                                                            Distributed Energy Resources
                                                                                                                                                                                                                                                                                                                           IEC 62109
                                                                                       Offboard cable
                            EV Relay
                                              Onboard motors
                                                                                                    UL 2263
                                                                             The Standard for Electric Vehicle Cable
                          UL 61810-20
                                              UL 1004-1
                 Outline for Electric Vahicle
                                              The Standard for Rotating
                                                                                                IEC 62893-1
                                              Electrical Machines
                                                                                               IEC 62893-2
                                                                                                                                     Wireless charger
                                                                                             IEC 62893-4-1
                                                                                             IEC 62893-4-2
                                                                                                                                     UL 2750
                                                                                                                                         Ine of Investigation for Wireless Power
                                                                                             DIN EN 50620
                                                                                                                                     Transfer Equipment for Electric Vehicles
                                                    Electric vehicle
                                                                                                                                                                                                                                                                                                                                  Energy storage
                                                                                                                                                                                                                                 EV charger
                                                     with battery
                                                                                                                                                                                                                                                                                                                                        system
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## Thank you

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