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Electric Vehicle
EVITP
Infrastructure Training Program

EVITP 4.0

CEC, April 16, 2021

What is the Electric Vehicle Infrastructure Training Program (EVITP)?

A non-profit, volunteer, brand neutral, national EV industry collaborative training program that addresses the technical requirements, safety imperatives, and performance integrity of industry partners and stakeholders including:

- Automobile Manufacturers
- Investor-Owned and Municipal Utilities
- Electric Vehicle Supply Equipment/EVSE (“Charging Station”) Manufacturers
- Electrical Energy Storage Device Manufacturers
- State and Local Electrical Inspectors
- Electrical Contractors and Electrical Workers
- First Responders

EVITP Partner Advisors

PG&E

SDGE connected
A Sempra Energy utility

BMW

GM

TOYOTA

SOUTHERN CALIFORNIA EDISON
An EDISON INTERNATIONAL Company

KCP&L
energizing life

DTE Energy

EATON
Powering Business Worldwide

Duke Energy

NFPA

NECA
NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION
SOUTHEASTERN MICHIGAN CHAPTER

AV
aerovironment

GE

HUBBELL POWER SYSTEMS

INTERNATIONAL BROTHERHOOD OF ELECTRICAL WORKERS

UCDAVIS
UNIVERSITY OF CALIFORNIA

ecotality

Consumers Energy
Count on Us

BOSCH

OUC
The Reliable One

IAEI

FOUNDATION for CALIFORNIA COMMUNITY COLLEGES

AEP OHIO
A unit of American Electric Power

legrand

LEVITON

ComEd
An Exelon Company

Schneider Electric

Ameren
MISSOURI

Exergonix
INCORPORATED

MILBANK

SMITH

PEP stations
CHARGING ACTIVATED.

CLIPPERCREEK
THE Electric Vehicle Charging Station

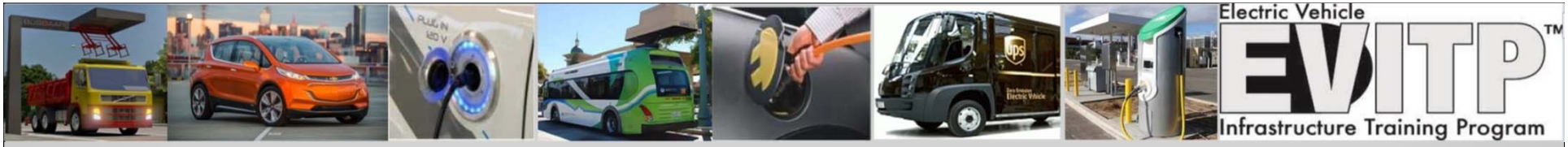
Why EVITP?

EV Infrastructure

- Training
- Education
- Safety, Safety, Safety
- Performance
- Reliability
- Risk and Liability Reduction & Safety. Reduces Risk First and Foremost for People and Property, also Governments, Financial Institutions, Insurers, and the EV Industry

Course Information & Access

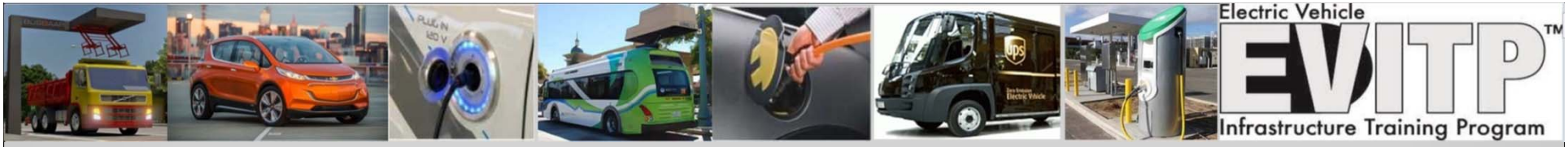
- 20 hour class with proctored in-person certification exam
- Classes listed at EVITP.org. Frequency based on demand
- $275 total class fee includes facility, instructor, exam proctoring, exam facility, etc. EVITP receives $75 per student (out of the $275) for record keeping, certification documents and delivery, web site maintenance, and administration
- EVITP 3 year continuing education requirement aligns with California state requirement
- Taught in Canada, too
- EVITP office in Royal Oak, Michigan



Eligibility: State Certified Electricians

Minimum Requirement for EVITP Certification: **California State Certified General Electricians** who have completed 8,000 hours of on-the-job training and pass the state exam.

A key to EVITP success is that the training builds on the platform of state certified electrician's extensive knowledge, skills, and experience.



EVITP Curriculum Updates

- Updated roughly every 18 months
- Key focal points: New code, technology, and applications
- Example: EVITP 3.0 to 4.0
- Light, **medium, and heavy-duty trucks (120/208/240/480VAC)**
- **Heavy duty vehicles (480VAC, up to 600VAC)**
- **Wireless inductive charging**
- **New code**

EVITP 4.0 Curriculum *(Updated 2020)*

Comprehensive Residential, Commercial, Industrial Charging Infrastructure Training

- Level 2 (220V) Residential Charging
- Commercial / Institutional Level 2 Charging
- DC Fast Charging
- Medium Duty (MD) Commercial / Institutional
- Heavy Duty (MD) Commercial & Industrial
- Code, site assessment and load calculations (core)
- Maintenance, Troubleshooting and Repair
- Wireless Conductive Energy Transfer

EVITP 4.0 - Syllabus

1. Electric Vehicles (EVs)

1.1 Introduction to EVs
1.2 The History of EVs
1.3 EV Types and Technology
1.4 Modern EVs
1.5 Heavy Vehicles - commercial/industrial delivery including transit, delivery, port transport, etc.

2. Electric Vehicle Supply Equipment /EVSE ("Charging Stations")

2.1 What is EVSE & types
2.2 AC EVSE – level 1, 2, and High Power
2.3 DC Charging – High Power and Overhead
2.4 Wireless charging
2.5 EVSE Communications and Networks

Electric Vehicle EVITP Infrastructure Training Program

EVITP 4.0 - Syllabus

3. 2017 National Electrical Code (NEC)

3.1 NEC Art. 90
3.2 NEC Chapter #1
3.3 NEC Chapter #2
3.4 NEC Chapter #3
3.5 NEC Art. 625 + add notes on 702 and 705
3.6 NECA 413-2012 Standards for EVSE Installation

4. Load Calculations, Based on National Electrical Code (NEC)

4.1 Planning and Installing EVSE (introductory materials)
4.2 Load considerations
4.3 Ampacity considerations including conductors, temperature ratings, and OCPD.
4.4 BC, Feeder, and Service Calculations
4.5 Voltage Drop
4.6 Examples

Electric Vehicle EVITP Infrastructure Training Program

Conductor Calculation Formulas

$$V_d = \frac{2 * K * I * L}{cm\ a}$$

$$cm\ a = \frac{2 * K * I * L}{V_d}$$

$$V_d = \frac{1.732 * K * I * L}{cm\ a}$$

$$cm\ a = \frac{1.732 * K * I * L}{V_d}$$

$$V_d\% = \frac{V_d}{V_{source}} * 100$$

- cma = conductor size from Chapter 9, T8
- K = 12.9 for Cu, K = 21.2 for Al
- L = length from supply to load

(One of 6 Pages of Load Calc. Formulas)

EVITP 4.0 - Syllabus

5. Site Assessment

5.1 Customer service / considerations / and facility tour (meet and greet)
5.2 EVSE market drivers – incentives, LEED
5.3 Locating
5.4 Signage
5.5 ADA – accessibility
5.6 Installation
5.7 Shawbell's Hardware case study

6. Commissioning

6.1 Why commission?
6.2 Documentation
6.3 Municipality and Utility considerations
6.4 Equipment and cord management
6.5 EVSE communications and networking, customer interface, setting up network interface (cards and RFID)

Electric Vehicle EVITP Infrastructure Training Program

EVITP 4.0 - Syllabus

7. Troubleshooting

7.1 Common EVSE failure point
7.2 Troubleshooting examples
7.3 EVITP troubleshooting flow chart
7.4 Troubleshooting tips
7.5 EV simulators

Comprehensive Proctored Exam including Residential, Commercial and Industrial applications, the National Electrical Code by category, Site Assessment, Load Calculations, and Troubleshooting Problems

Electric Vehicle EVITP Infrastructure Training Program

Electric Vehicle
EVITP™
Infrastructure Training Program

Inductive Charging

How EVITP is Different

Objectives, approach, and content

- Non-proprietary and brand neutral vs. brand focused
- Comprehensive vs. specific
- Electricians often take some training from the brand of equipment they will install. That's helpful.
- EVITP is much more in depth at 20 hours
- Heavy emphasis on code, standards, site assessment and load calculations + demanding 2 hour exam
- The only training …

U.S. DoE Clean Cities for Contractors

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Plug-In Electric Vehicle Handbook

for Electrical Contractors

Clean Cities
U.S. Department of Energy

EVITP is the Only Training Featured

EVSE Training for Electrical Contractors

Establishing a well-trained, nationally distributed group of electrical contractors able to install PEV infrastructure is essential to the widespread deployment of PEVs. To meet this need, a number of organizations offer PEV infrastructure training for electrical contractors. One such organization is the Electric Vehicle Infrastructure Training Program (EVITP).

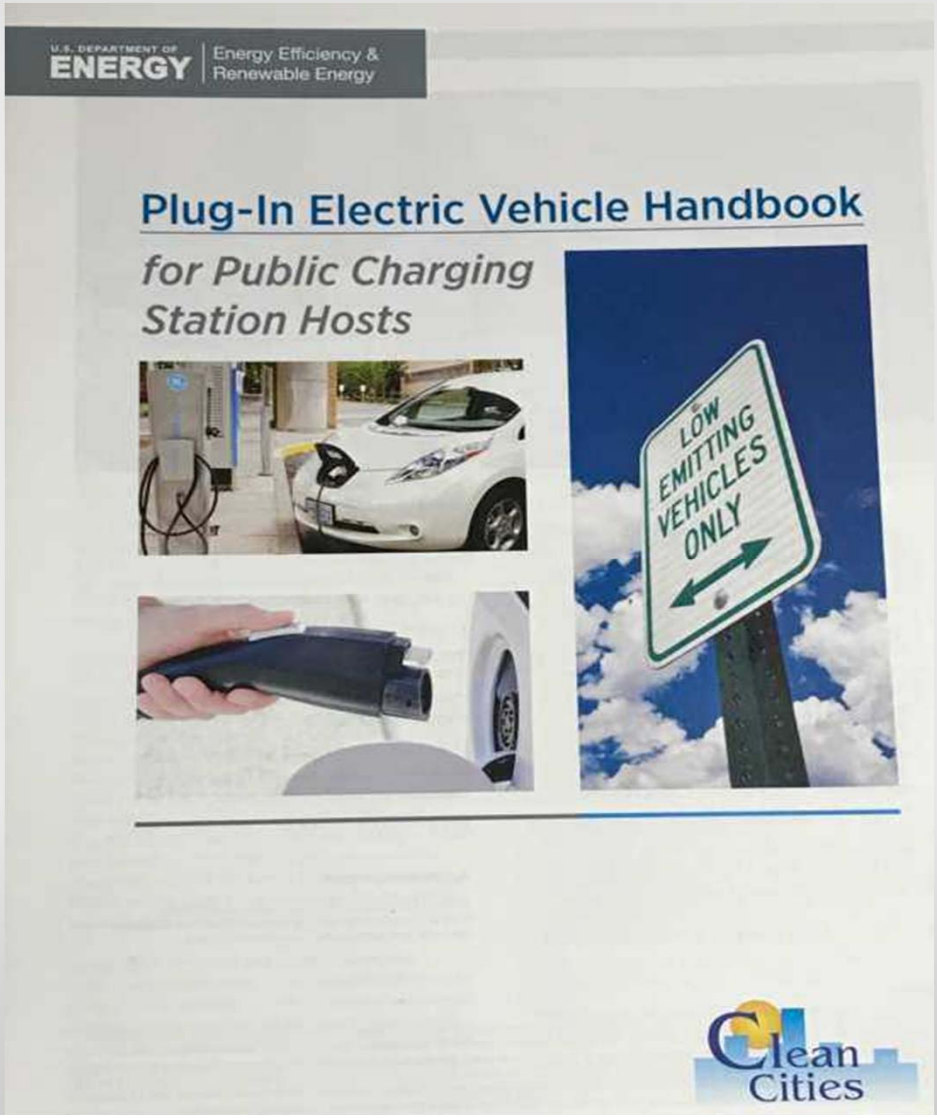
EVITP is a non-profit partnership of PEV stakeholders, including automakers, utilities, EVSE manufacturers, energy storage device manufacturers, electrical inspectors, electrical contractors, electrical workers, and first responders. It was established to provide a structured platform to facilitate training and certification for EVSE installation in the residential, commercial, and public markets. The EVITP training program addresses the technical, safety, and performance requirements of its stakeholders. Its goal is to create a nationally recognized training standard for EVSE installation, commissioning, maintenance, and customer service.

EVITP's training is offered at community colleges and electrical training centers nationwide and taught by experienced instructors. To learn more, contact EVITP at *Info@EVITP.org*.

EVITP Phase One Class List of Topics

- Overview of Electric Vehicles
- Types of Electric Vehicles – Present and Future
- Electric Vehicle Manufacturers
- EVSE Manufacturers
- Electrical Vehicle Charging Stations and Charging Load Requirements
- Electrical Vehicle Charging Site Assessment
- Electric Vehicle Rules and Regulations
- Code Officials and Inspection
- First Responders
- Utility Policy and Integration
- Renewable Energy and Electric Vehicles
- Customer Code of Excellence/Contractor's Role, Electrician's Role
- Electrical Codes, Electrical Safety Requirements, Other Regulations, and Standards
- Electric Vehicle Charging Installations
- Field Installation Practicum (Lab)
- Electric Vehicle Certification, Phase One

U.S. DoE Clean Cities for Public Hosts



EVITP is the Only Training Featured

Plug-In Electric Vehicle Handbook *for Public Charging Station Hosts*

Installing and Maintaining Charging St

The Electric Vehicle Infrastructure Training Program is one of the organizations that trains electrical contractors in EVSE installation. *Photo from Electric Vehicle Infrastructure Training Program*

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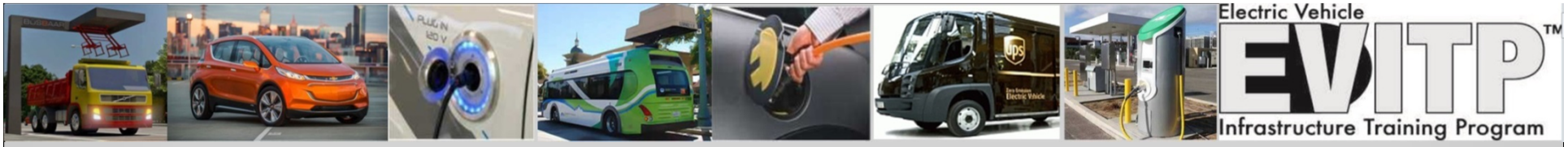

Thank You

Electric Vehicle Infrastructure Training Program (EVITP) 4.0