

Electric Vehicle Charging Infrastructure Deployment Guidelines British Columbia

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Electric Transportation
Engineering Corp



Electric
Mobility
Canada

Mobilité
électrique
Canada

ETEC Company Background

- Established in 1996 (Phoenix Arizona)
- Subsidiary of ECOtality (OTCBB:ETLY)

Markets

- On-Road EVs/PHEVs
 - EVSE Provider
 - Infrastructure Planning EV Micro-Climate
- **Minit-Charger®) Fast Charging**
 - Airline eGSE Charging
 - Industrial Applications
 - 12 Years Experience
 - Over 5,500 charge ports installed
 - Fortune 500 Companies
- Low Speed Vehicles (LSV)
- Consulting/Engineering Services
 - Battery Cycling and Development
 - Product Development Programs
 - U.S DOE AVTA Primary Contractor
- Hydrogen Infrastructure and HICE Vehicle Development & Conversions



Acknowledgements

Electric Vehicle Charging Infrastructure Deployment Guidelines - British Columbia

Sponsor: Natural Resources Canada

Review Committee

- Office of Energy R&D, Natural Resources Canada
- Emerging Energy Systems, Manitoba Hydro
- Sustainability Group, City of Vancouver
- Electric Mobility Canada
- Vancouver Electric Vehicle Association
- Straightforward BC, Ministry of Small Business, Technology & Economic Development (STED),
- Government of British Columbia
- Ministry of Energy and Mines, Government of British Columbia
- Hydro-Quebec, IndusTech
- GM Canada
- Mitsubishi Motor Sales Canada

Project Management

- British Columbia Hydro and Power Authority

Author

- Electric Transportation Engineering Corporation

Infrastructure Deployment Guidelines

- Reference Codes and Standards in BC
 - CSA, CEC, Building Code, Regulatory Agencies
 - Charge Power, Connectors/Inlets, Accessibility, Signage
- Plug-In Vehicle Technology
 - Vehicle Configurations, Types, Batteries
- Charging Applications
 - Single Family, Multi-Family, Commercial, Public
- Utility Integration
 - Demand Response, Vehicle-to-Grid
- Planning Considerations
 - Power, Communications, internet,
- Cost Estimating



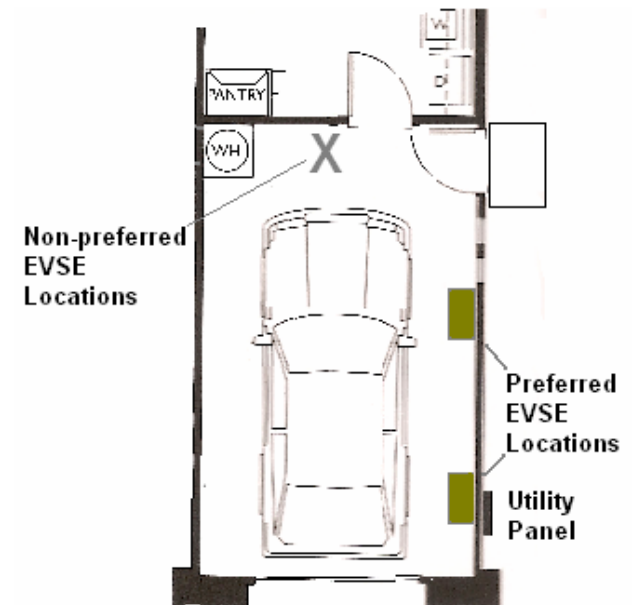
Charge Power Levels

- CEC: 125 VAC, 15 or 20 amp / Greater than 125 VAC or greater than 20 amp

Type of Vehicle	Typical Usable Battery Capacity (kWhrs)	Level 1 Convenience Charger Time (hours)	Level 1 20 amp Circuit Time (hrs)	Level 2 Charge Time (hours)	Level 3 Charge Time (minutes)
DC Power to Battery		1.1kW	1.5kW	6kW	60kW
PHEV-10 (mid-size)	4	3.6	2.7	.67	4
PHEV-20 (mid-size)	8	7.3	5.3	1.3	8
PHEV-40 (mid-size)	16	14.5	10.7	2.7	16
BEV (mid-size)	35	31.8	23.3	5.8	35
City EV (Economy)	20	18	13.3	3.3	20
LSV	8	7.3	5.3	1.3	8
Commercial Hybrid Bus (40ft Transit)	40	n/a	n/a	6.7	40

Charging Scenarios

- Residential Garage
- Residential Car Port
- Apartment/Condominiums
- Commercial Fleet
- Public Charging
- Fast Charging



Residential Single Garage

Public Charging Infrastructure



EVSE Infrastructure Challenges

- Private Level 1 or Level 2
- Public Level 1 and/or Level 2
- Building Codes and Standards – Pre-wire
- Utility Infrastructure Planning – Demand/Transformers/Smart Grid Options
- Point of Sale Options
- Weather Concerns
- Block Heater Circuits
- Lighting and Security
- Streamlining Engineering, Permitting & Construction

US DOE/ETEC Infrastructure Project

- ETEC, US DOE & Nissan
 - collaborate to build and study a mature charge infrastructure
- A total of \$200 million will be expended to develop mature charge infrastructures
 - 5 market areas
 - 8 cities
 - 5 States
- Infrastructure studies and modeling
 - Data collection
 - Lessons learned
 - Grid interaction



Etec Infrastructure Partners

- American Lung Association of California
- ATX/Cross Country
- Bovis Lend Lease
- BP America
- CB Richard Ellis
- Center for Sustainable Energy (CA)
- Coulomb Technologies
- City of Chattanooga
- City of Knoxville
- City of Phoenix
- City of Seattle
- Easton Corporation
- Gridpoint
- Hamilton County (TN)
- Idaho National Laboratory
- Knoxville Utilities Board
- King County (WA)
- Maricopa association of Governments (AZ)
- Nissan North America
- Oak Ridge National Laboratory
- Ohio State University
- Pima Association of Governments (AZ)
- Portland General Electric
- Puget Sound Energy
- Salt River Project
- San Diego Association of Governments (CA)
- San Diego Clean Fuels Coalition
- San Diego Gas & Electric
- San Diego Miramar College
- Seattle City Light
- Snohomish County PUD
- State of Oregon
- State of Tennessee
- State of Washington
- Tennessee Valley Authority
- Tucson Electric Power
- University of California – Davis
- Yazaki North America
- Zipcar
- 350 Green

Infrastructure Project Overview

- Nissan rollout 1000 BEVs w/data loggers in 5 Market Areas
- 5,000 Level 2 residential EVSE w/data monitoring
- 6,000 Level 2 Commercial/Fleet EVSE w/data monitoring
- Proposed 2,000 Level 1 and Level 2 EVSE Public Charging in each market area w/data monitoring
- 250 Level 3 Fast Chargers in Transportation Corridors
- Market Area Stakeholders Involvement
- Monitoring and Data Analysis
- First Responder Training
- Smart Grid Development
- Public Awareness Programs
- Solar Charging Integration

- Review, Analysis, Modification

