The EVSE Cluster Analysis proposes nine land use “clusters” that represent zones of opportunity for current and future EVSE deployment.

- These clusters were chosen based on:
  - The behavior of the typical user;
  - The site’s operations;
  - External influences like geography and demographics; and
  - The ability of a cluster to provide benefits to the EVSE host and wider public.

- The analysis also uses case studies to demonstrate how the clusters can effectively support EV use.

The clusters are:
- Medical Campus
- Downtown
- Higher Education
- Workplace
- Retail
- Multi-Family
- Leisure Destination
- Regional Transportation
- Fleet and Freight
Concentration of EVSE by Cluster

PUBLICLY ACCESSIBLE EVSE DEPLOYMENT IN THE TCI REGION BY CLUSTER, 2012

Concentration of EVSE Installations by Cluster

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-Family Housing</td>
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<tr>
<td>Medical Campus</td>
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<tr>
<td>Regional Transportation</td>
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</tr>
<tr>
<td>Leisure Destination*</td>
<td>41</td>
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<tr>
<td>Fleet and Freight**</td>
<td>45</td>
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<tr>
<td>Higher Education</td>
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<tr>
<td>Workplace***</td>
<td>61</td>
</tr>
<tr>
<td>Retail†</td>
<td>103</td>
</tr>
<tr>
<td>Downtown‡</td>
<td>122</td>
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<tr>
<td>Total</td>
<td>488</td>
</tr>
<tr>
<td>Other</td>
<td>443</td>
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</table>

These numbers represent discrete EVSE locations within the TCI region, not number of EVSE. Many locations have more than one charging station. An additional 39 locations were identified during a survey of key commercial sectors (retail and financial services, restaurants, utility providers, and workplaces), but were not classified as a part of any of the above cluster groupings.

* Leisure includes leisure destinations as well as hotels.
† Retail includes restaurant establishments and a large number (21) of food store locations.
‡ Downtown includes public and private garages. Private garages outnumber public garages by two to one.

Cluster Typologies

**DOWNTOWN CLUSTER**
Downtowns, including main streets and central business districts, offer strong potential as an EVSE cluster, with their combination of municipally managed parking lots and garages, longer dwell times for local shopping and leisure, and accessibility to all driver demographics.

**RETAIL CLUSTER**
Retailers have good incentive to install EVSE as a customer amenity. Cutting-edge firms that attract or would like to attract customers fitting the early EV adopter profile can deploy EVSE to aid their marketing and branding efforts. Food markets, shopping malls and other retail operations with longer customer dwell times will experience the best early opportunities for EVSE.

**WORKPLACE CLUSTER**
Many offices, particularly those engaged in the technology sector, can offer EVSE as an employee benefit while also representing themselves as a cutting-edge firm. Workplace charging is seen as the second most important opportunity for EV drivers, after overnight charging at home.

**HIGHER EDUCATION CLUSTER**
More than 200 presidents of colleges and universities across the TCI region have signed the American College and University Presidents Climate Commitment, signifying their environmental concern. EVSE availability increases an institution’s marketability to prospective applicants, faculty and donors, and college towns are well positioned as ideal early adopter communities.

**FLEET AND FREIGHT CLUSTER**
Fleets domiciled in urban areas have begun to incorporate zero-emissions delivery vehicles and to deploy EVSE. Fuel price volatility, corporate goal setting and the negative impacts of diesel trucks and well likely continue to drive adoption of fleet EVs in manufacturing areas that are often close to environmental justice communities concerned with the effects of air pollution.

**LEISURE DESTINATION CLUSTER**
Wetland parks, botanical gardens, museums, science centers, sports stadiums and other major cultural institutions in major metropolitan areas are all examples of leisure destinations that offer growing EV early adopter demand and good EV exposure. National and state parks and recreation destinations such as ski resorts in more rural areas offer opportunities for EVSE deployment as well. Setting EVSE in this cluster extends vehicle range throughout the region.

**REGIONAL TRANSIT CLUSTER**
Regional rail stations and park and ride lots are fertile venues for EVSE deployment due to the short driving distances between the homes and the station of a typical commuter. EVSE deployment in this cluster may also build ridership for metropolitan transportation authorities around the TCI region.

**MEDICAL CAMPUS CLUSTER**
The high-traffic locations and demographics of many health practitioners and researchers make medical campus facilities an important potential EVSE cluster. The air quality benefits of EVs, the public health mission of medical facilities and research campuses’ interest in clean technology innovation together create increased interest among institutions in this cluster to provide EVSE.

**MULTI-FAMILY HOUSING CLUSTER**
Residents will drive demand for residential charging in multi-family housing, a difficult market to establish EVSE availability due to cost, regulatory and resident tenure barriers. New multi-family dwellings offer opportunity for EVSE deployment when required through municipal zoning or code, or when encouraged through incentives.
In Columbia, MD, EVSE planning will occur through standard channels—a town planning board, represented by the Columbia Association; commercial interests and organizations & homeowners, tenants or condo associations.

Chick Rhodehamel of the Columbia Association stated that EVSE deployment “could be transformative. Columbia could be a leader—an EV-friendly community 20 minutes from Baltimore and 20 minutes from DC.”

Phillip Nelson, the President of the Association, identified the EVSE zones of opportunity as “facilities, our village centers, leisure-time destinations—our pools & rec centers and at our shopping malls.”
Retail Cluster

- **Pricechopper (PC)** is a regional supermarket chain with 129 locations in the Mid Atlantic states and New England. 95% of its stores are open 24 hrs/day/7 days/week. The average dwell time for a shopper’s vehicle is between 45 minutes and 1.25 hours.

- The chain has received planning board approval for installation of 3 EVSE (GE Watt Stations) at its Niskayuna, NY location. Joseph Berman of Pricechopper described the planning board as “enthusiastic, inquisitive, progressive, and excited by the possibility that the transportation technology could come into the community, advance a green agenda and differentiate the community”.

- Berman calls EVSE locations an “alternative fuel pad.” A cantilevered parking canopy with “co-branded media” will be utilized to bring awareness of technology, promote PC’s tech partners, and to clearly identify the charging area. Ultimately, branding partners will cover cost of operations for charging pads. Berman’s goal is to make EVSE deployment “a cost-neutral program while facilitating technology transfer.”
Workplace

- The General Electric corporate campus in Plainville, CT is the headquarters for GE’s Industrial Solutions (IS) unit. Industrial Solutions, which largely handles distribution equipment for low voltage power and makes GE’s EVSE products, includes engineering, testing, sales and marketing teams.

- The IS parking lot includes 500 spaces, including 40 spaces located under a 100kW solar carport (6 of which are equipped with EVSE). The new carport is located close to a busy intersection in Plainville, highly visible from nearby public streets. Power from the carport’s PV array supports LED lighting in the parking lot and EV charging.

- GE employees and visitors pay no fees to park in the lot or plug in their vehicles and there are no plans to move to a fee-based system. The first 4 EV chargers GE installed on the campus are intended for public use—some Volt owners visiting the facility have in fact used them. The second 6 chargers were installed under the solar carport and are designated for GE employees. GE personnel with other fuel efficient or alt fuel vehicles are also entitled to park under the carport.

- Seth Cutler, Lead Project Manager, EV Infrastructure cited the public awareness objectives the highly visible deployment helped achieve. “If you look at the market, you hear that range anxiety is the number 1 challenge, but being out in the field, what you learn is that the number 1 challenge is lack of education. Employees at GE have the benefit of seeing the technology on a daily basis. That helps build awareness and receptiveness to EVs.”
Leisure Destinations

• The Maryland Stadium Authority (MSA) manages surfaces lots and parking facilities in and around Camden Yards in Baltimore. The parking facilities under MSA’s oversight include 4,500 spaces in the 92 acre development

• In addition to the Orioles and Ravens, other users include the Baltimore Convention Center, the University of Maryland, and commercial tenants of the Warehouse, a nearby mixed-use development

• Jeff Provenzano, Director of Facility Management, Football Operations, for the MSA, cited “institutional will” as the principal obstacle to the broader deployment of EVSE at MSA parking facilities

• Provenzano also noted the centrality of co-branding, pre-existing sponsorship agreements, and buy-in from the two teams in all facilities procurement decision-making. Specific lease language influences the marketing of products deployed at the sports venues

• Provenzano observed that customer profile, vehicle dwell time, and nearby uses—especially a light rail station—made MSA’s lots ideal candidates for EVSE deployment. “We’re centrally located, near highways. Most employees live 20-25 miles away. But mostly, it’s the right thing to do.”
Regional Transit Center

- Metro North Railroad (MNR) serves 7 suburban counties in the New York metro area. MNR piloted EV early adoption programs in the past and continues to have a strong interest in encouraging use of EVs

- Current EVSE pilots are underway at Chappaqua MNR station (self-funded by village), as well as at Brewster, Southeast, and North White Plains (funded by the NY Power Authority)

- Up to 64 MNR parking spaces system-wide (up to 8 locations, up to eight spaces/location) could be equipped with EVSE through a NYPA-funded pilot. Bundled PV-EVSE installations in Cortland and Tarrytown underway.

- MNR cited a preference for regional commuter hubs—which draw commuters from as far as 25 miles away and which have no wait-list for parking spaces—for EVSE deployment

- MNR’s EVSE discussions have been driven by mission of the organization, not yet by consumer demand. “EVSE is a service to commuting public. Not a market consideration yet,” observed Wendy Johnston, MNR’s Assistant Director for Parking & Facilities Planning

- “Metro North has an essential role in encouraging early adopter: If we install the charging station, it will encourage more early adoption. Commuters are the key,” noted Todd Lange, MNR’s Assistant Director, Sustainability and Environmental Affairs
Fleet & Freight

- The use of EVs is part of Frito Lay’s corporate strategy that considers multiple possible routes to emissions reductions, including fuel sources and vehicle design.

- Frito-Lay distribution facilities in five cities house a total of 47 electric-drive Smith-Newton delivery trucks, with an additional 40 vehicles expected to serve an expanded delivery range by the end of 2012.

- The 2.5–3 hours of unloading time that Frito-Lay allocates per stop on bulk delivery routes may offer opportunities for range-extension charging. Dense urban delivery will probably never need “range-extension” charging since NYC max route length is probably 25-28 miles/day.

- Frito-Lay’s initial per-unit EV infrastructure costs ran as high as $25,000, over time falling to $20,000, with funding provided by the NYSERDA and the U.S. Department of Energy. Frito-Lay has expressed interest in separate EVSE electrical service and meters to avoid extra demand charges and participate in utility programs such as demand-response.