





# SARTA Key Facts

- Transport 2.8 million passengers in 2019
- 212 employees
- \$23 million budget
- Operates express routes to Akron and Cleveland (the longest route in Ohio)
- 30 routes and countywide paratransit

A vertical strip on the left side of the slide shows a close-up of a fuel cell bus component, likely a stack of cells, with several circular ports or sensors visible. The background of the slide is a solid blue color.

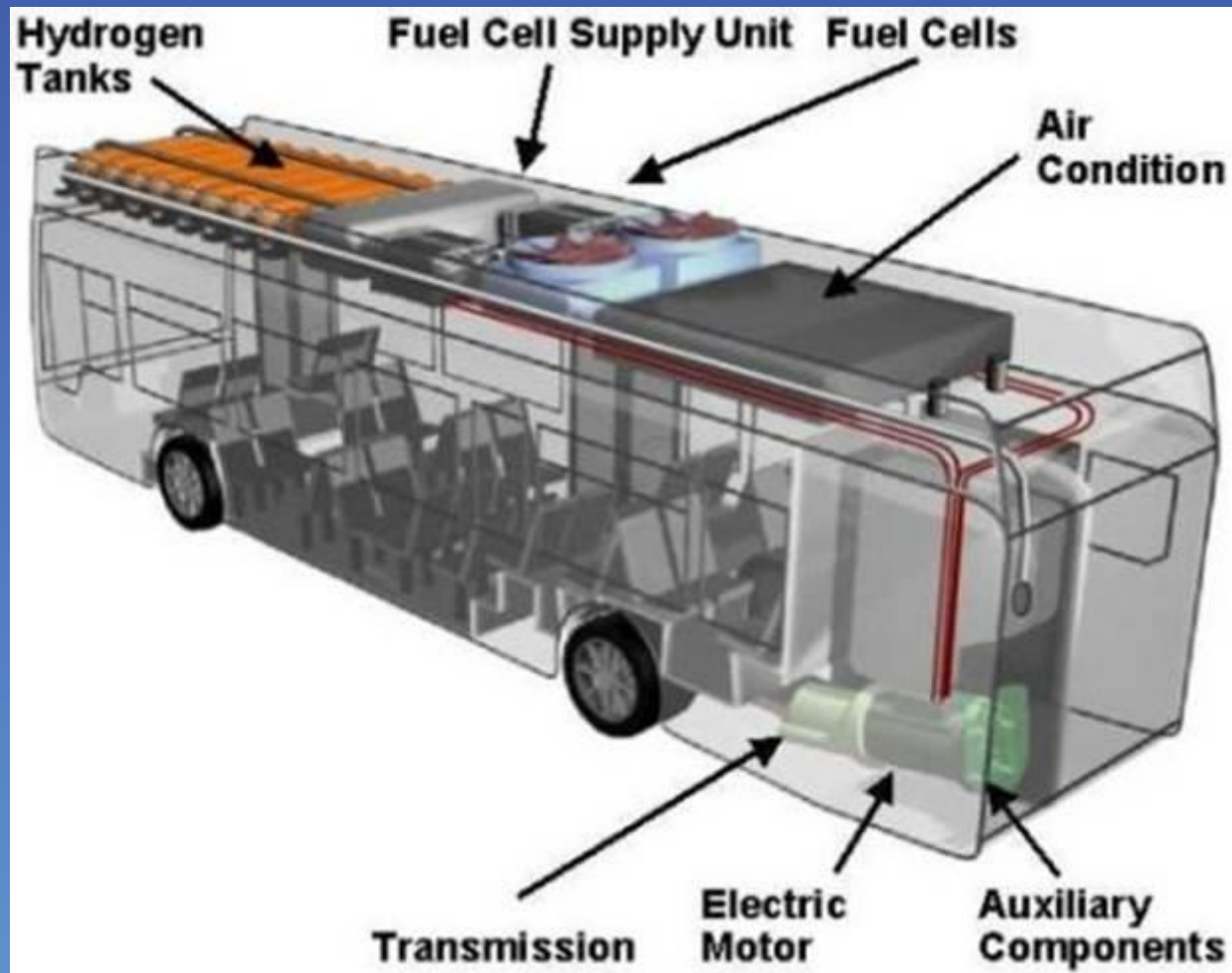
# National Fuel Cell Bus Program

- Part of a \$90 million Federal Transit Administration program
- Goal is to demonstrate fuel cell buses
- Set goals for performance and demonstration of vehicles
- Deployed vehicles IN NY, CA, MA, and SC
- 2 fuel cell buses will be in Canton
- Total federal funding is \$5.54 million

# Bus at the Statehouse



# System Layout



# Hydrogen compressors



# Compressor Pad



# Station Controls







# Operations

- Range 220 miles
- Operate every day
- 15 minute fill
- Getting about 7 mpg compared to 4 for diesel
- Program evaluated by NREL

# THE MIDWEST HYDROGEN CENTER OF EXCELLENCE

*A Key Initiative of the Renewable Hydrogen Fuel Cell Collaborative*



RENEWABLE  
**HYDROGEN  
FUEL CELL**  
COLLABORATIVE



# Efforts of Midwest Center

May 5, 2017 Green on the Green – Worthington, OH - Hydrogen bus demonstration

Apr 17-19 2017 OPTA Conference - Columbus, OH – Booth and Hydrogen bus demonstration

Jul 25-26, 2017 – 2 day Hydrogen Workshop at Stark State College/ SARTA

Aug 2017 EcoFest - Grove City, OH - Hydrogen bus demonstration

Sep 13-14, 2017 – 2 day Hydrogen Workshop at Stark State College/ SARTA

Jul 26- Aug 6 2017 Ohio State Fair – Columbus, OH - Booth and Hydrogen bus demonstration – Blue Ribbon Award of Merit – Technology Education

Data loggers installed Jul 2018 for CTE study completed and published Jul 22, 2020 (Using the Birmingham NFCBP Bus for Regional Outreach in Ohio)



# Efforts of Midwest Center

Below is the list of the 4 Midwest Working Group site visits:

1. SARTA (7/24/19)
2. Moline (10/8/19)
3. TARC (10/24/19)
4. New Flyer VIC (8/4/2020)

Below are the workshops:

1. Intro (12/2018)
2. Infrastructure part 1 working with utilities and H2 providers (2/2019)
3. Infrastructure part 2: Onsite production and storage (5/2019)
4. Tech Assessment and Procurement (10/3/19)
5. Fuel Cell Bus Deployments (1/14/2020)
6. Rural Transit Deployments (2/20/2020)



# Efforts of the Midwest Center

- North American ZEB conference
- Mid West ZEB workshop
- Borrow a bus

# Center Research

Topic	Principal Investigator	Year
Supply Chain Opportunities in Ohio	Cleveland State	2017
Estimating Social Costs for Transit Fuel Strategies	RHFCC	2019
Survey of Hydrogen Fuel Cell Bus Performance at SARTA	CALSTART	2019
Effects of Cold Weather on Battery Electric and Hydrogen Fuel Cell Buses	RHFCC	2019
Techno-Economic and Carbon Emission Comparison of Steam Methane Reforming to Electrolysis at Transit Facilities	RHFCC	2020 (Jan)
Market Development Review and Supply Chain Analysis	OFCC/RHFCC	2020 (Jan)
How the Midwest Can Lead Hydrogen: Mapping Hydrogen Markets to Supplies	RHFCC	2020 (Feb)
Measuring Interest in Refueling Infrastructure: Market Survey of Long Haul Trucking	OFCC/RHFCC	2020 (May)
On Site Hydrogen Generation for Transit	CALSTART	2020 (May)
Carbon Capture and Use for Steam Methane Reformation at Transit	RHFCC	2020 (Aug)
Transit Cooperative Purchasing Strategies for Hydrogen Fuel Cell Buses	Center for Transportation and the Environment	2020 (Aug)
Update on Effects of Cold Weather on Battery Electric, Fuel Cell Electric Buses; CNG Buses	RHFCC/CTE	2020 (Sept)
Microgrid Feasibility Study at SARTA	CALSTART	2020 (Sept)

**Does not Include Birds**

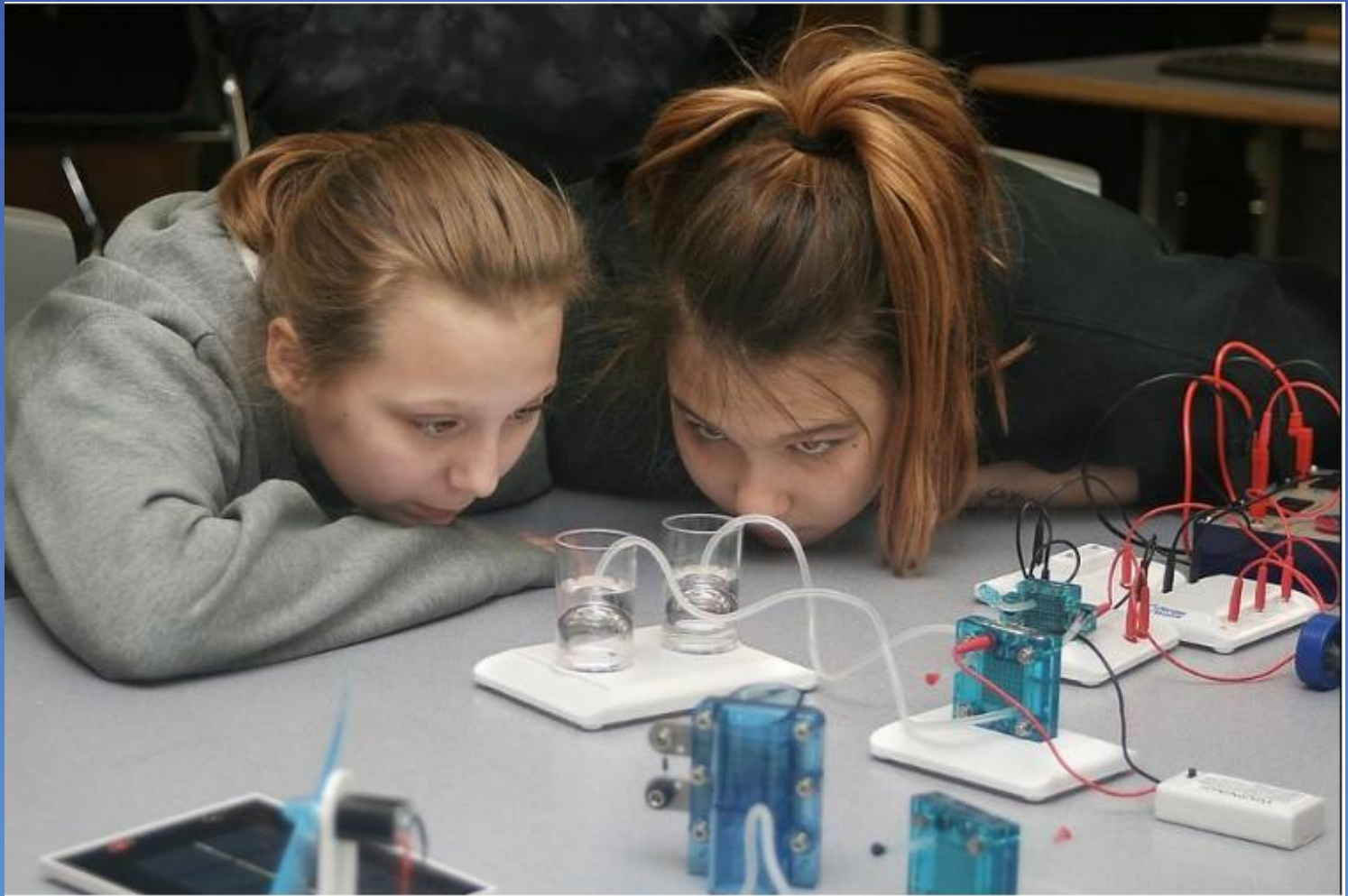


# School Visits





# Alliance Middle School



# Experiment



# OSU President Drake @ Horseshoe



# The Prince

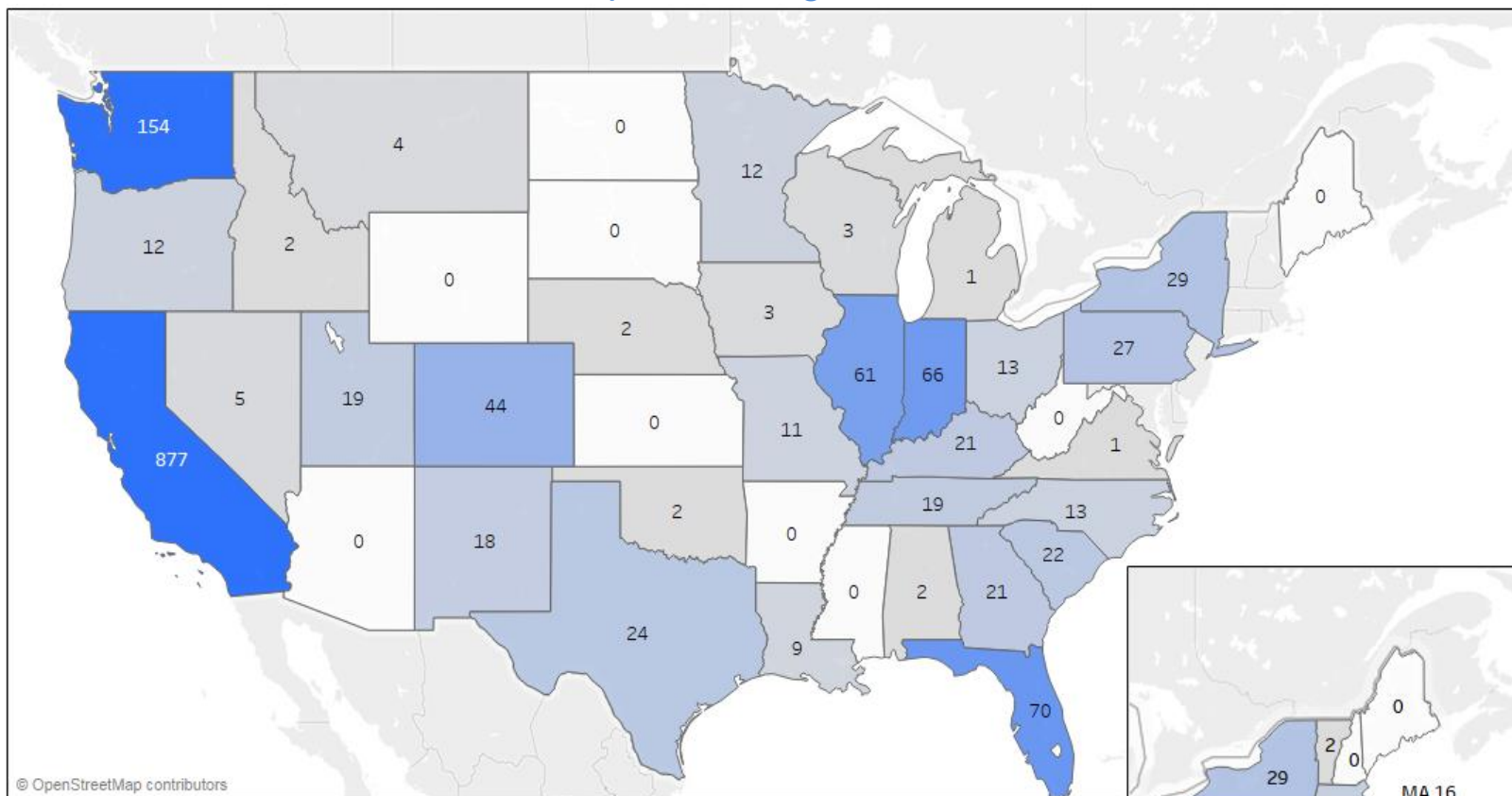


# Walking Behind the Prince



# Battery and Fuel Cell Electric Transit Buses Currently Deployed, On Order, or Soon To Be On Order Within the United States of America

Last Updated: August 17, 2018

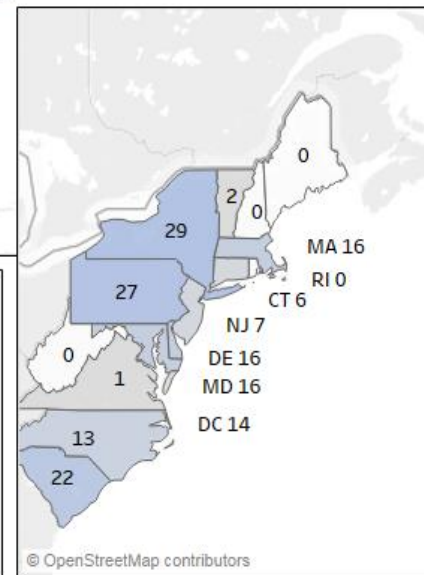
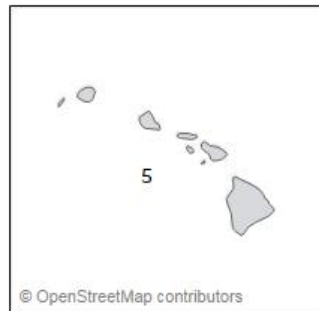


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Total ZEBs per State



Source: Popel, E. (2018, August 17). Battery and Fuel Cell Electric Transit Buses Currently Deployed, On Order, or Soon To Be On Order Within the United States of America CALSTART, Inc.

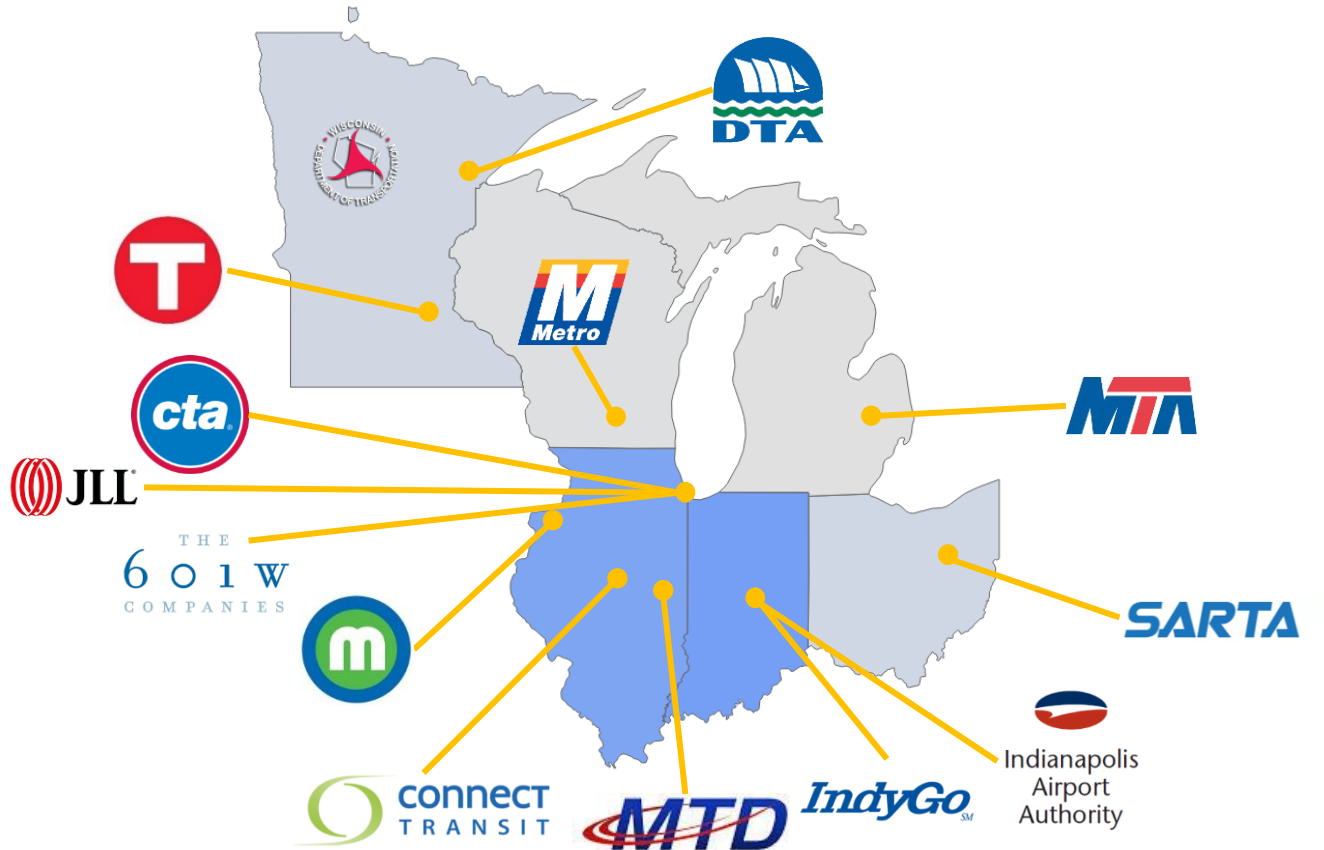


# Transit Properties with Battery or Fuel Cell Electric Transit Buses

Last Updated: August 17, 2018

## FTA Region 5- Midwest 157 ZEBs

### 3 FCEB Properties SARTA, Champagne and Flint



Map not to scale

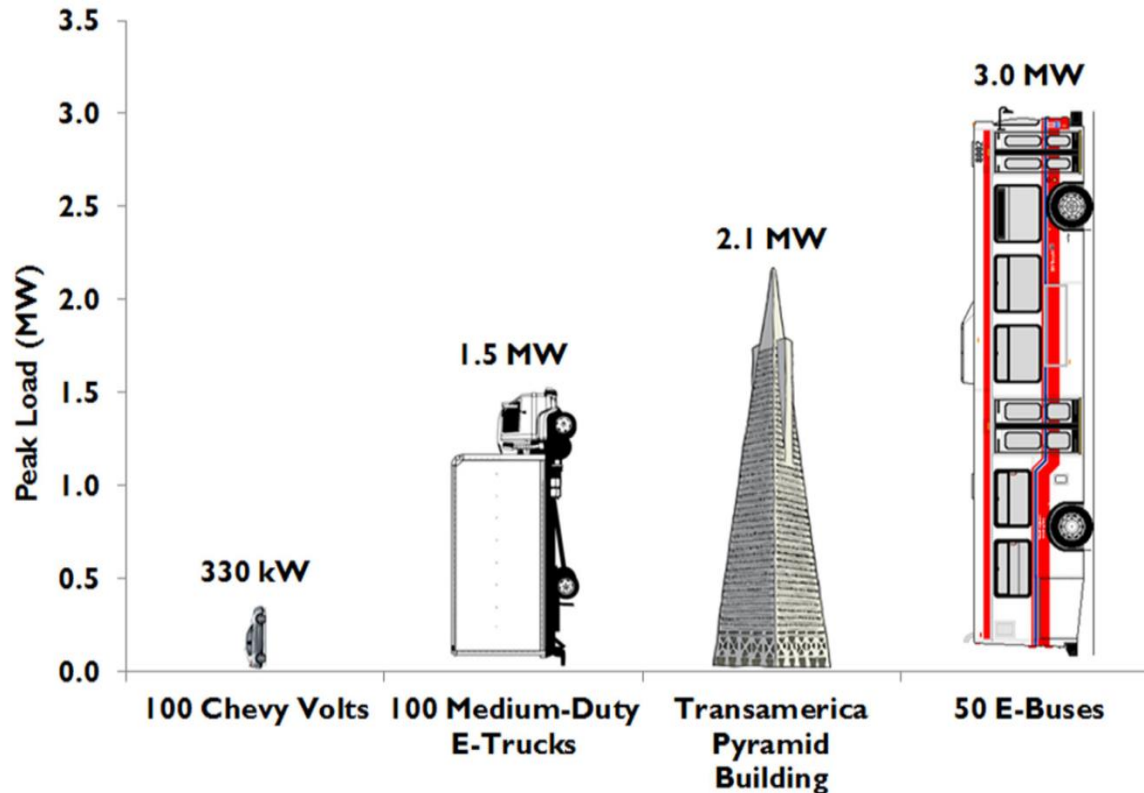
# Working Group Participants





# Infrastructure the Near Term Challenge for ZEBs

## Peak Loads Considerations for Battery Electric Buses



**Assumptions: the Chevy Volt charging rate is 3.3 kW, the medium-duty E-Truck charging rate is 15 kW and the E-Bus charging rate is 60 kW.**