Introducing:

The Uber Skyport Mobility Hub

Soaring above traffic congestion is now possible with aerial rideshare. As our skies become more accessible and novel transportation networks are developed, a convenient and well-choreographed transition between air and ground rider modalities is essential to the success of Urban Air Mobility.

UBER ELEVATE SUMMIT 2019
SKYPORT MOBILITY HUB
PRESENTED BY

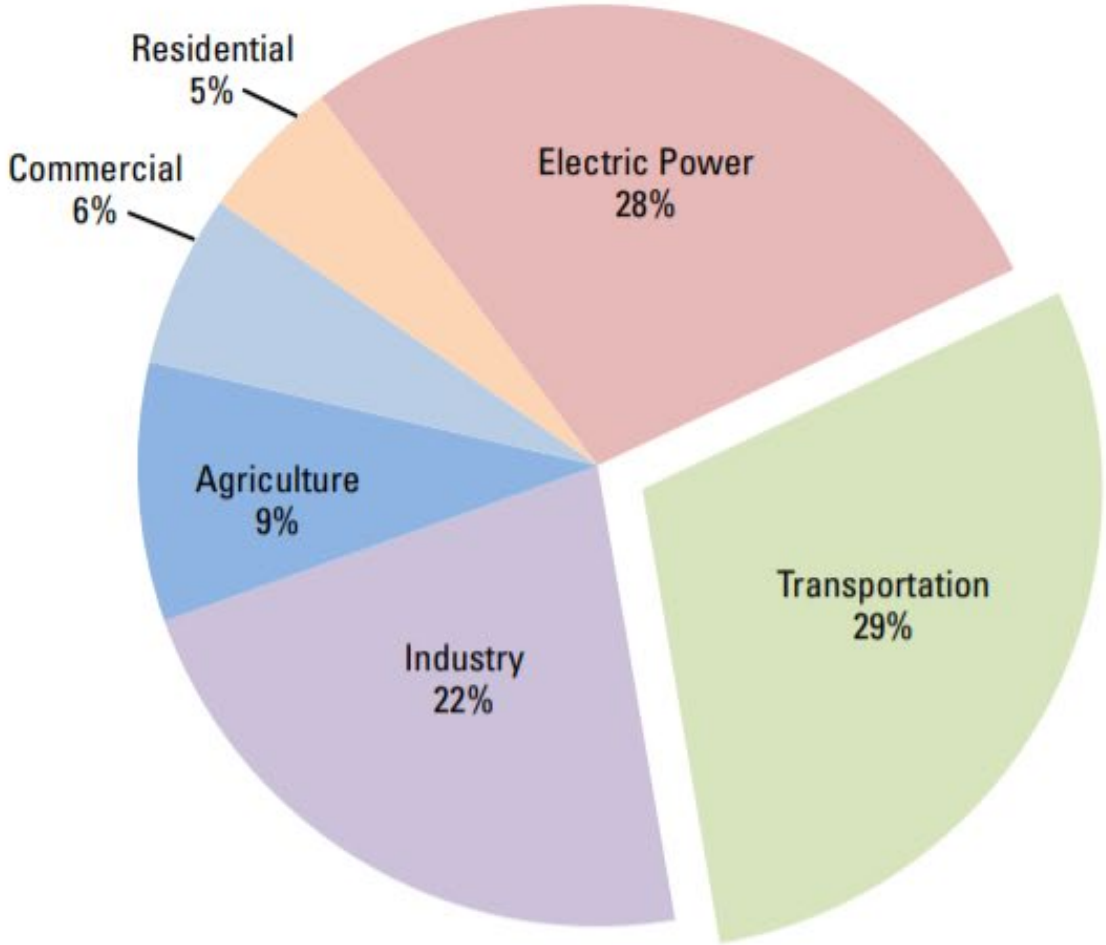
CORGAN

Austin

Kimley»Horn

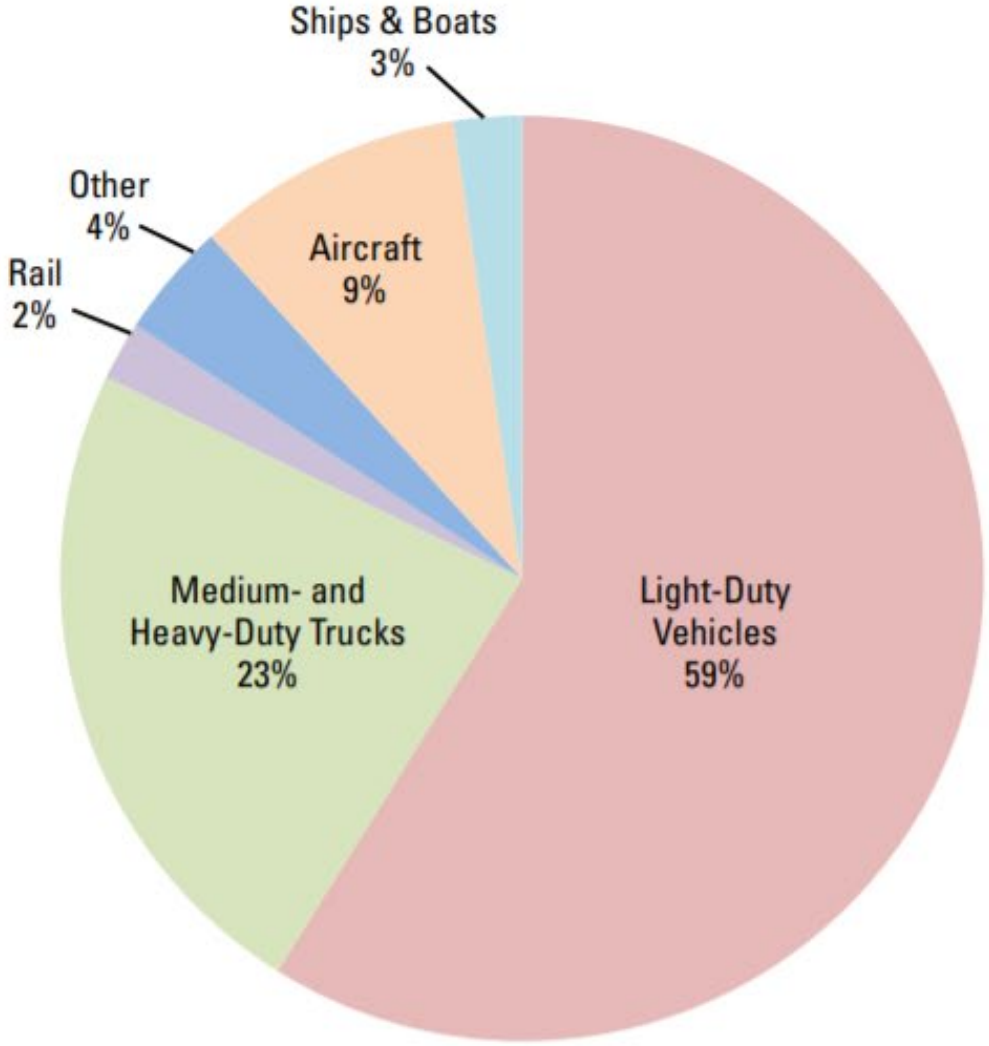
wsp

Source: US EPA



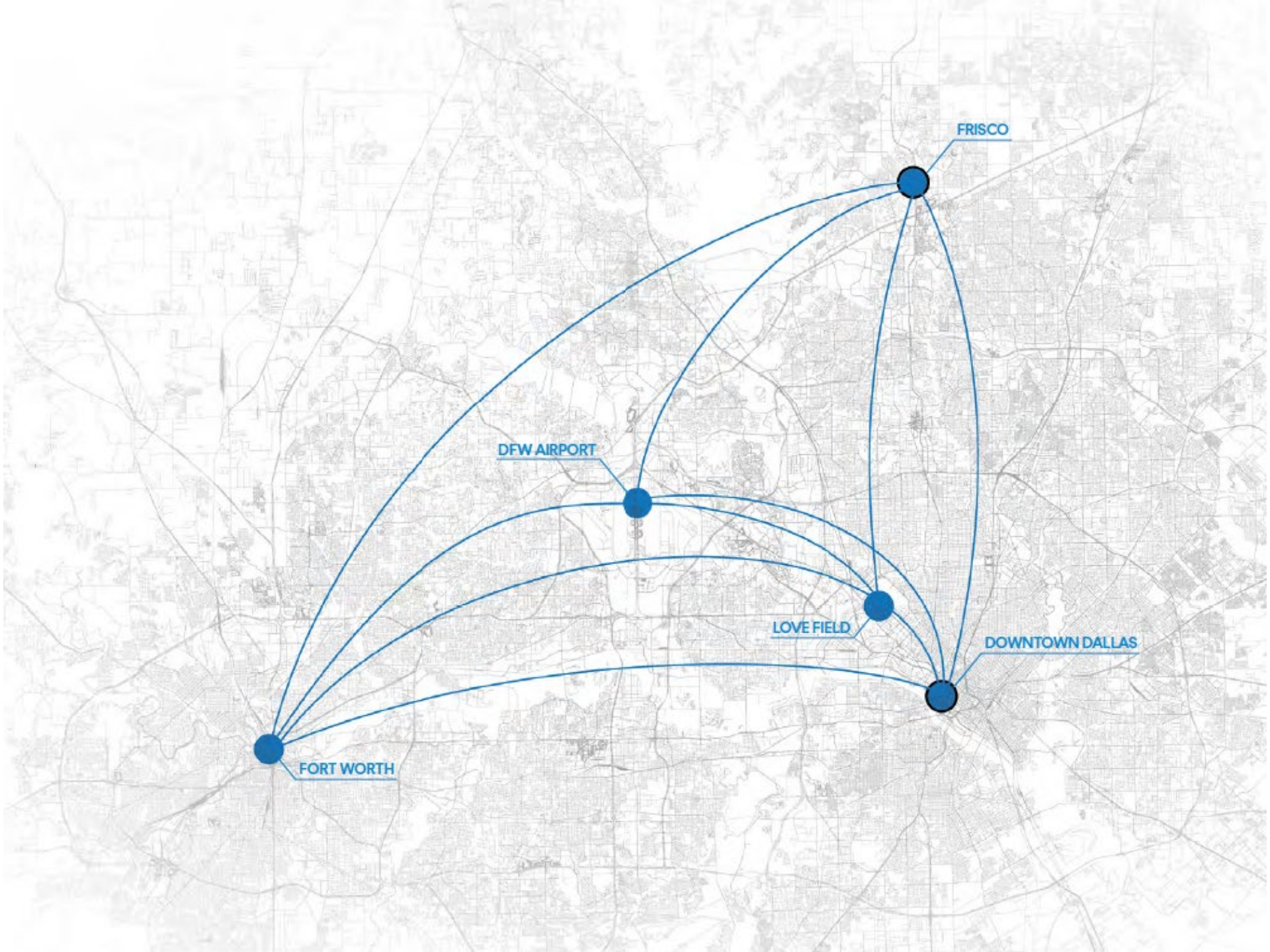
Share of U.S. GHG Emissions by Sector, 2017[3,4]

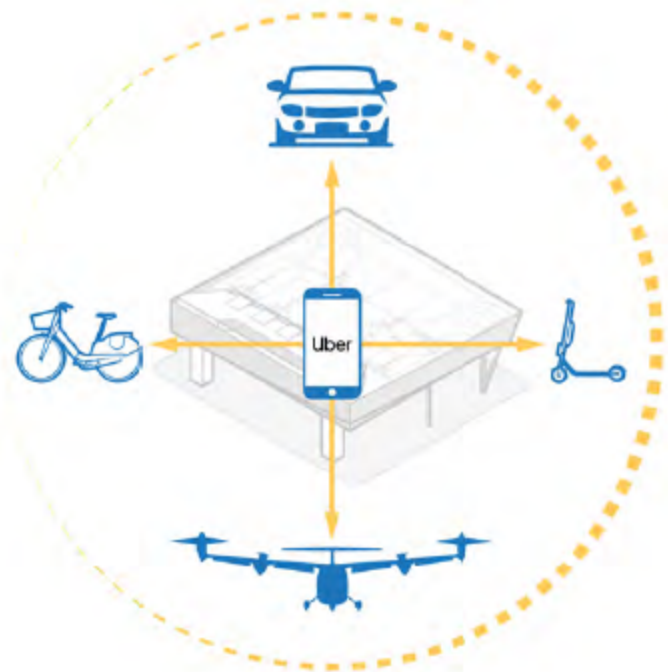
Note: Totals may not add to 100% due to rounding.



Share of U.S. Transportation Sector GHG Emissions by Source, 2017[4,5]

Note: Totals may not add to 100% due to rounding.


FRISCO
DFW AIRPORT
LOVE FIELD
DOWNTOWN DALLAS
FORT WORTH



Convenience

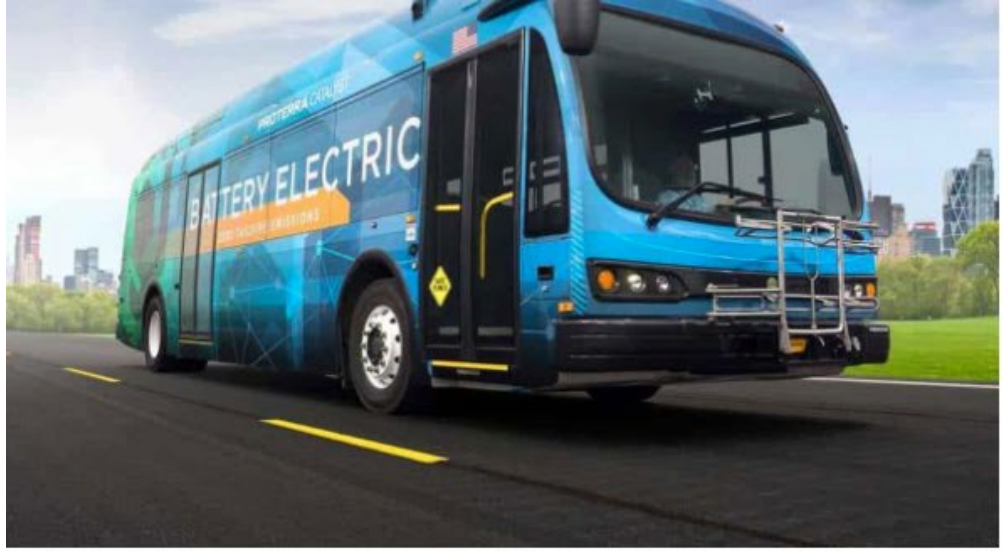
For urban air mobility to be a success, it must integrate effortlessly into the lifestyle of the user. Uber's current on-demand service is intuitive and easy to use, convenient for both the passenger and the driver. By first leveraging familiar technology and behaviors, the Skyport Mobility Hub will reinforce the ease already associated with Uber's service, creating a facility that is convenient for daily commuters, episodic explorers, annual travelers, and novice tourists alike. Choosing convenient locations for these facilities will also play a major role in their use. They must be sited in locations that are both easily accessible by designated skylanes, but also in areas of the city to which passengers and pedestrians alike are wanting to connect. Locating these facilities near offices, schools, residences, civic buildings, and entertainment venues, while also providing a programmatic mix that supports the surrounding community enables use throughout the day, allowing the facility to fit easily into multiple lifestyles and ensuring lasting value.


Uber
Uber


uber

Design Requirements

Mode	Site Quantity (Max)	Power Requirements
eVTOL	5 parking pads	600 kwh batteries; 30% per charge in 5 min; 5-15 min on the ground **2.2 MW / Charger**
eBike	200 bikes	200 W -h per bike
eScooter	200 scooters	200 W -h per scooter
eAV	100 EVs	100 kWh per eAV 50 Dual Chargers (Level 3: 62.5 kW ea)
Building	1 building	0.5 MW Peak Load



Catalyst 35 ft.

SPECS

Energy on Board	Up to 440 kWh
Max Range	234 miles
MPGe	Up to 25.8
Peak Horsepower	510
Acceleration 0-20 mph	5 seconds
Seating Capacity	29

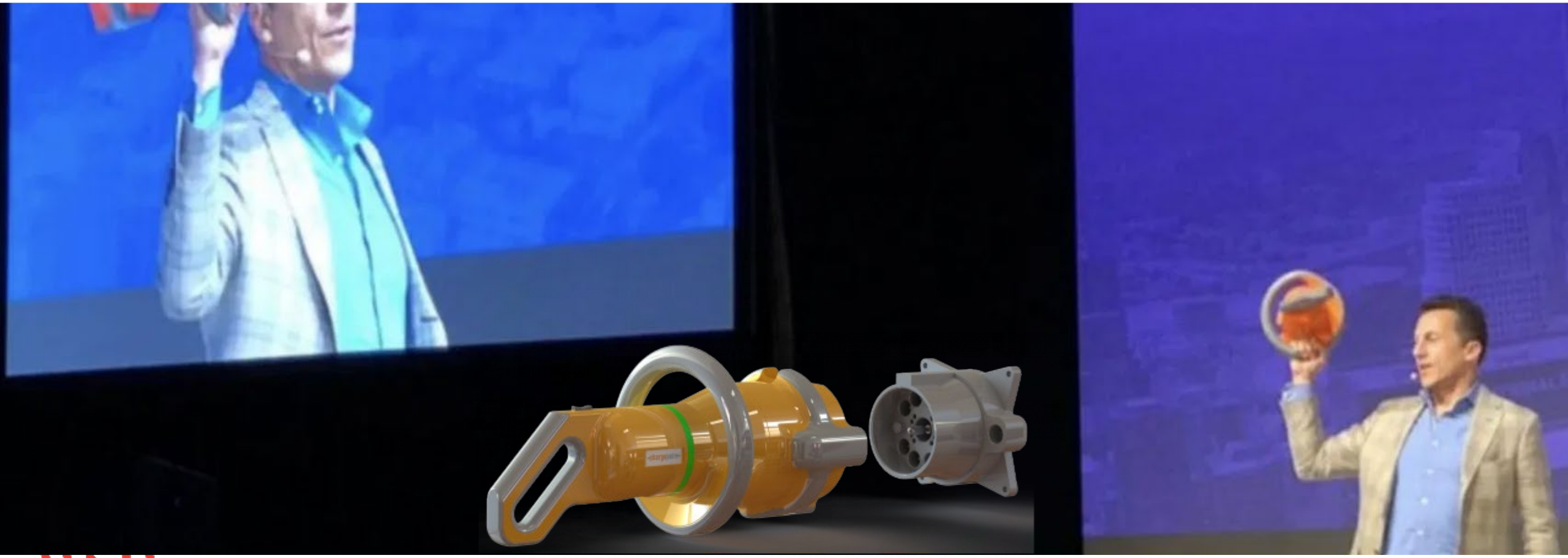
Catalyst 40 ft.

SPECS

Energy on Board	Up to 660 kWh
Max Range	328 miles
MPGe	Up to 25.3
Peak Horsepower	510
Acceleration 0-20 mph	5 seconds
Seating Capacity	40

ChargePoint unveils new 2-MW charger for electric aircraft and semi-trucks

Fred Lambert - May. 10th 2018 5:58 am ET @FredericLambert



MAY 14, 2019 at 11:49AM

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By: Mark Kane

This world's biggest electric ferry runs between Sweden and Denmark 46 times per 24 hours.

The most recent episode of Fully Charged is about an electric ferry, which reportedly turns out to be the world's biggest electric ship conversion. It entered service in November 2018.

It's equipped with a massive **4.1 MWh** battery (640 packs) and **6 MW** of power (four 1.5 MW propellers) with a diesel engine onboard only for emergencies.

The ferry runs between Helsingborg in Sweden and Helsingor in Denmark - just around 4 km (2.5 miles), but it runs a lot - 46 crossings per 24 hours (184 km/114 miles) and up to 17,000 per year!

The energy consumption of the ship is beyond imagination as the 4.1 MWh pack would last only for 3.5 runs (14 km/8.7 miles). However, the crew makes sure that keep the state-of-charge within 40-66% of the battery capacity and there's a fast charger on each side of the trip so the battery will last longer. It's expected that the battery will survive some 5 years, maybe more, while the payback period is around 8 years (in the middle of the second battery's lifespan we assume).


100% Electric Ferry Crossing | Fully Charged 4k
Watch later
Share
FULLY CHARGED
Electric Ferry

World's Second-Largest Ferry Oper From Diesel to Batteries

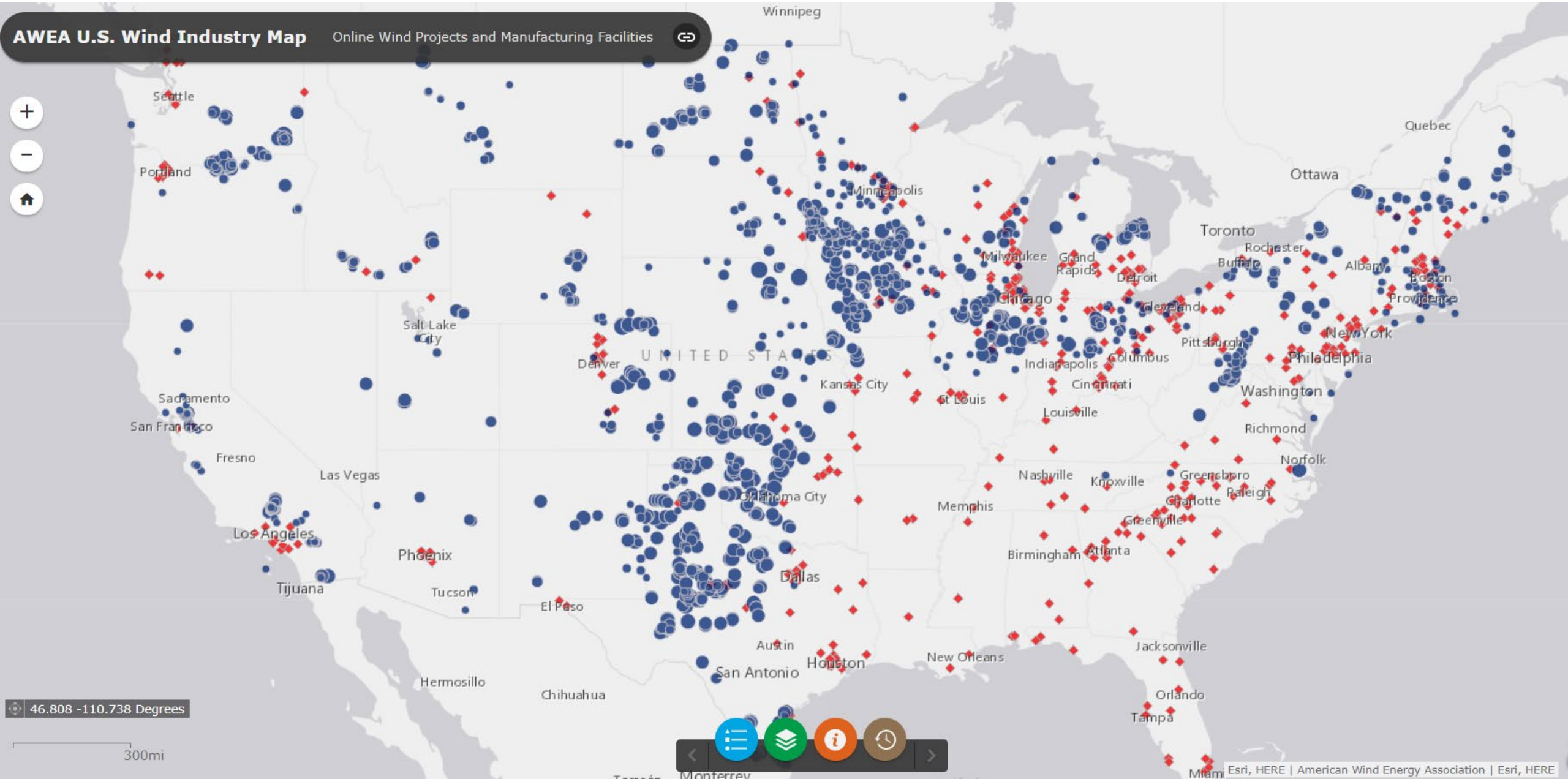
Washington State Ferries consumes as much fuel as a midsized airline.

JASON DEIGN | NOVEMBER 29, 2019

The fleet's most polluting vessels will soon be equipped with Siemens battery systems

Uber Skyport Energy Strategy –Grid Stability

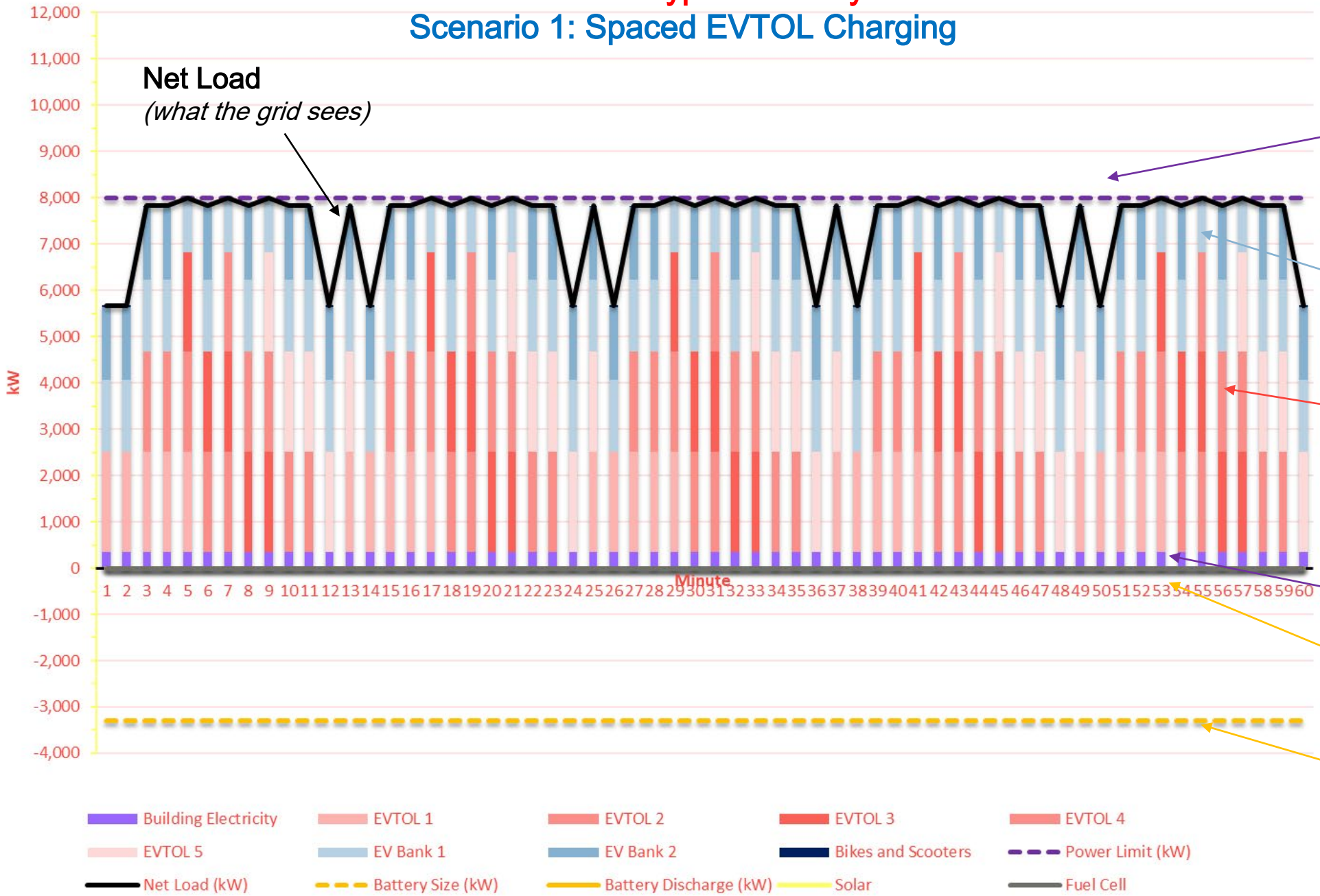
1. Goal: Allow simultaneous charging of all 5 EVTOL pads, 2.2 megawatts (MW) each
2. **Limit peak load to 8 MW** , corresponding to non -emergency condition service
3. **Selectively charge EVs** (cars, bikes, scooters) when there is capacity available under the 8MW peak (i.e. when 3 EVTOLs or fewer are charging).
4. **Split EVs into multiple charging "banks"** that can be charged in order of priority
5. **Include onsite solar** (~1-2 MW)
6. **Use a battery** (2-4MW) to limit peak loads and support rapid load ramping when EVTOLs begin to charge
7. *Optional* , use onsite generation to cover resulting baseload (~4MW)
   a) Fuel cell: no air quality emissions, only CO2. Significant GHG reductions in year 1, diminishing over time as the grid becomes cleaner
   b) Cogeneration or Trigeneration: to be used if a large heating or cooling load exists nearby (likely not onsite)


AWEA U.S. Wind Industry Map
Online Wind Projects and Manufacturing Facilities
Winnipeg
Seattle
Portland
Minneapolis
Quebec
Ottawa
Toronto
Rochester
Buffalo
Albany
Boston
Providence
Milwaukee
Grand Rapids
Detroit
Chicago
Cleveland
Salt Lake City
Denver
UNITED STATES
Pittsburgh
New York
Philadelphia
Indianapolis
Columbus
Cincinnati
Kansas City
St Louis
Washington
Sacramento
San Francisco
Louisville
Richmond
Fresno
Norfolk
Las Vegas
Nashville
Knoxville
Greensboro
Raleigh
Charlotte
Oklahoma City
Memphis
Greenville
Los Angeles
Phoenix
Birmingham
Atlanta
Tijuana
Tucson
Dallas
El Paso
Austin
Houston
New Orleans
Jacksonville
San Antonio
Hermosillo
Chihuahua
Orlando
Tampa
Monterrey
46.808 -110.738 Degrees
300mi
Esri, HERE | American Wind Energy Association | Esri, HERE

Power Use Scenarios
(Peak Hours)
Example of V2G1.0

Load Profile for a Typical Midday Hour
Scenario 1: Spaced EVTOL Charging

Battery Required: 0 KWh
EV Bank 1: 100%
EV Bank 2: 76%



Peak Load Limit

EV Charging
(2 Controlled Banks)

EVTOL Charging
(5 vehicles staged every other minute, 5 min charge each)

Relatively Small Building Loads

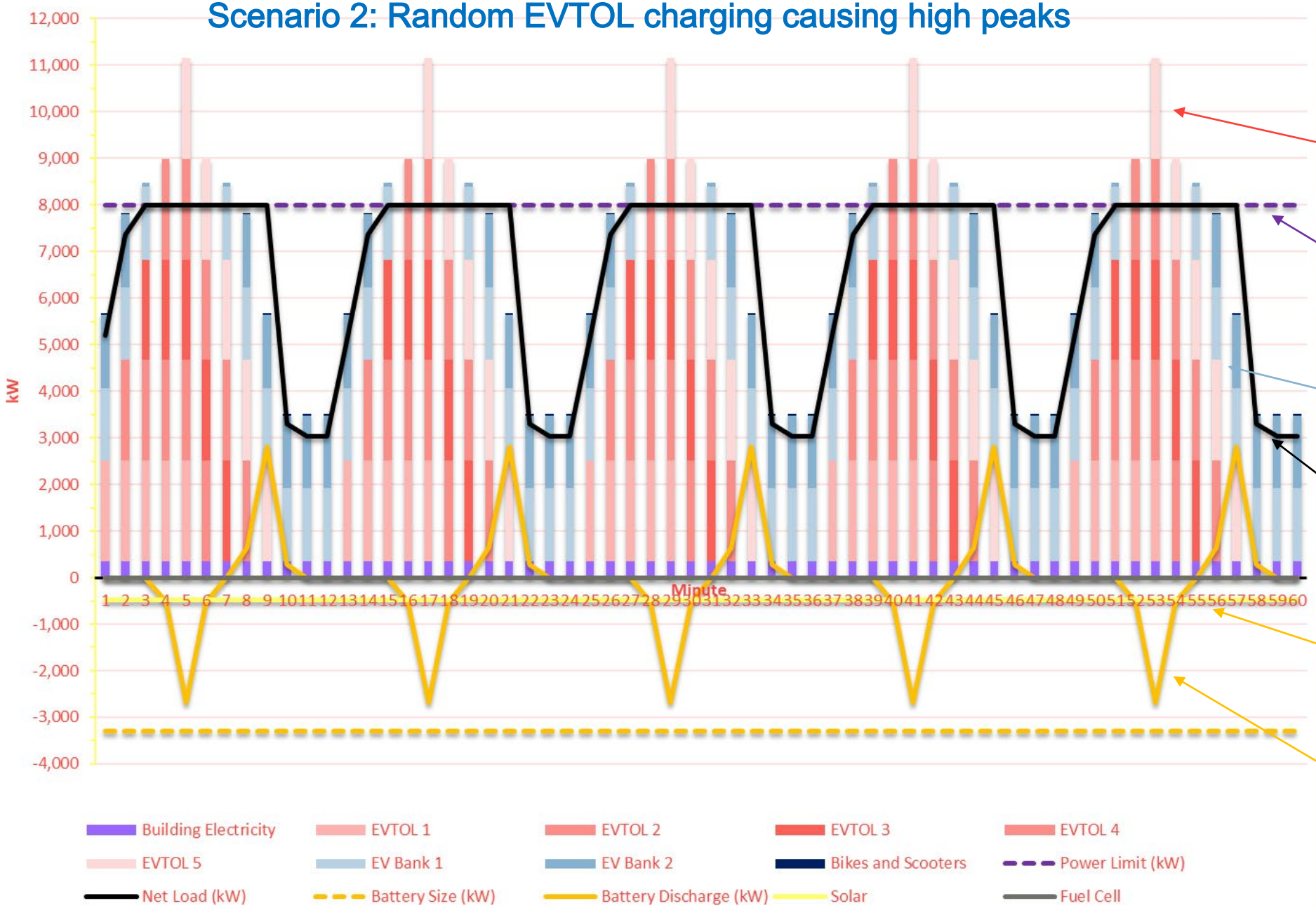
No solar this hour

Battery capacity not needed

Load Profile for a Typical Midday Hour

Scenario 2: Random EVTOL charging causing high peaks

Battery Required: 67 KWh
EV Bank 1: 75%
EV Bank 2: 59%



EVTOL Charging
(5 vehicles charging every minute, 5 min charge each; exceeding 8 MW limit)

Peak Load Limit

EV Charging
(2 Controlled Banks)

Net Load
(what the grid sees)

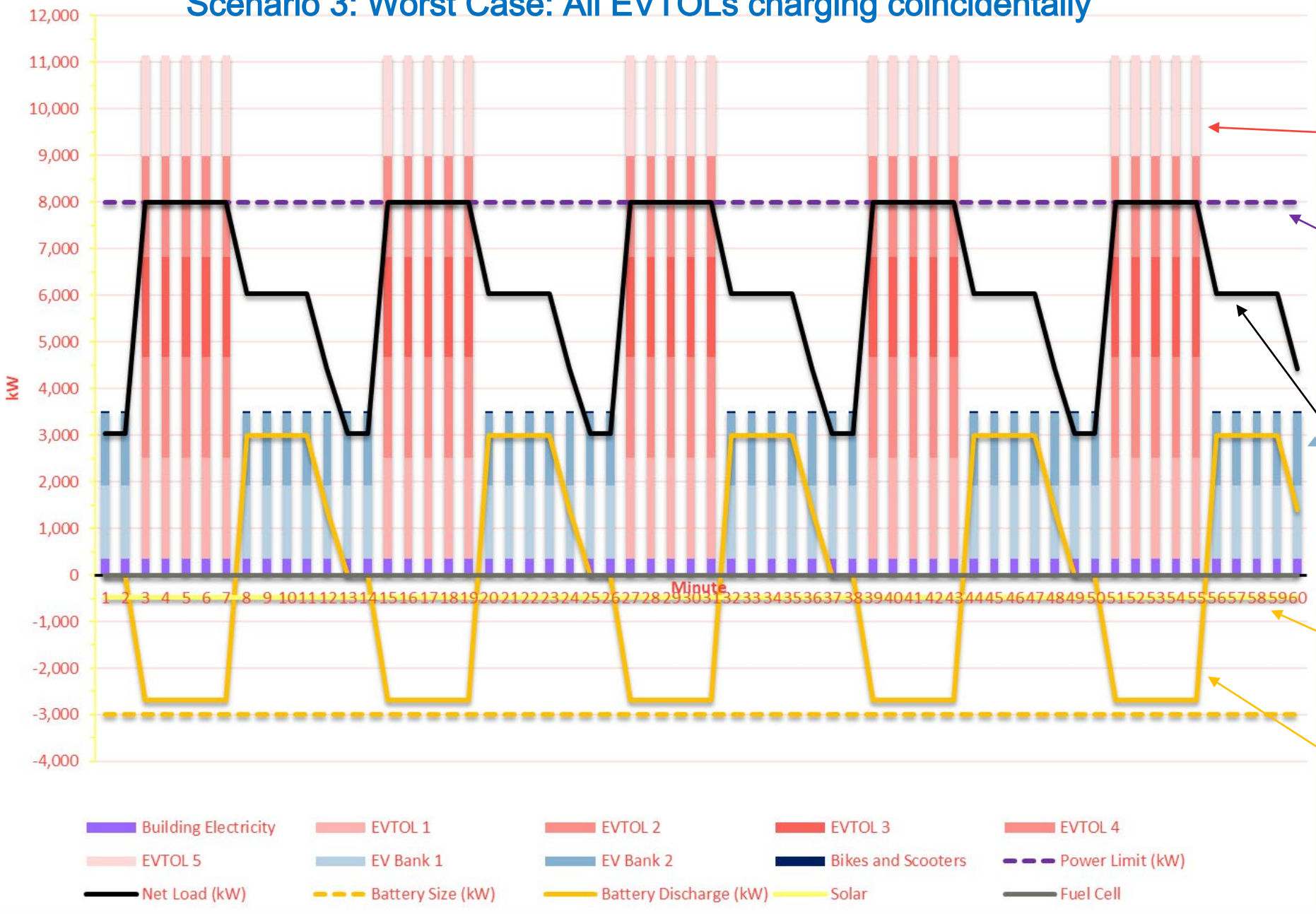
Solar production

Battery discharging when total load > 8 MW

Load Profile for a Typical Midday Hour

Scenario 3: Worst Case: All EVTOLs charging coincidentally

Battery Required: 233 KWh
EV Bank 1: 58%
EV Bank 2: 58%



EVTOL Charging
(5 vehicles charging every minute, 5 min charge each; exceeding 8 MW limit)

Peak Load Limit

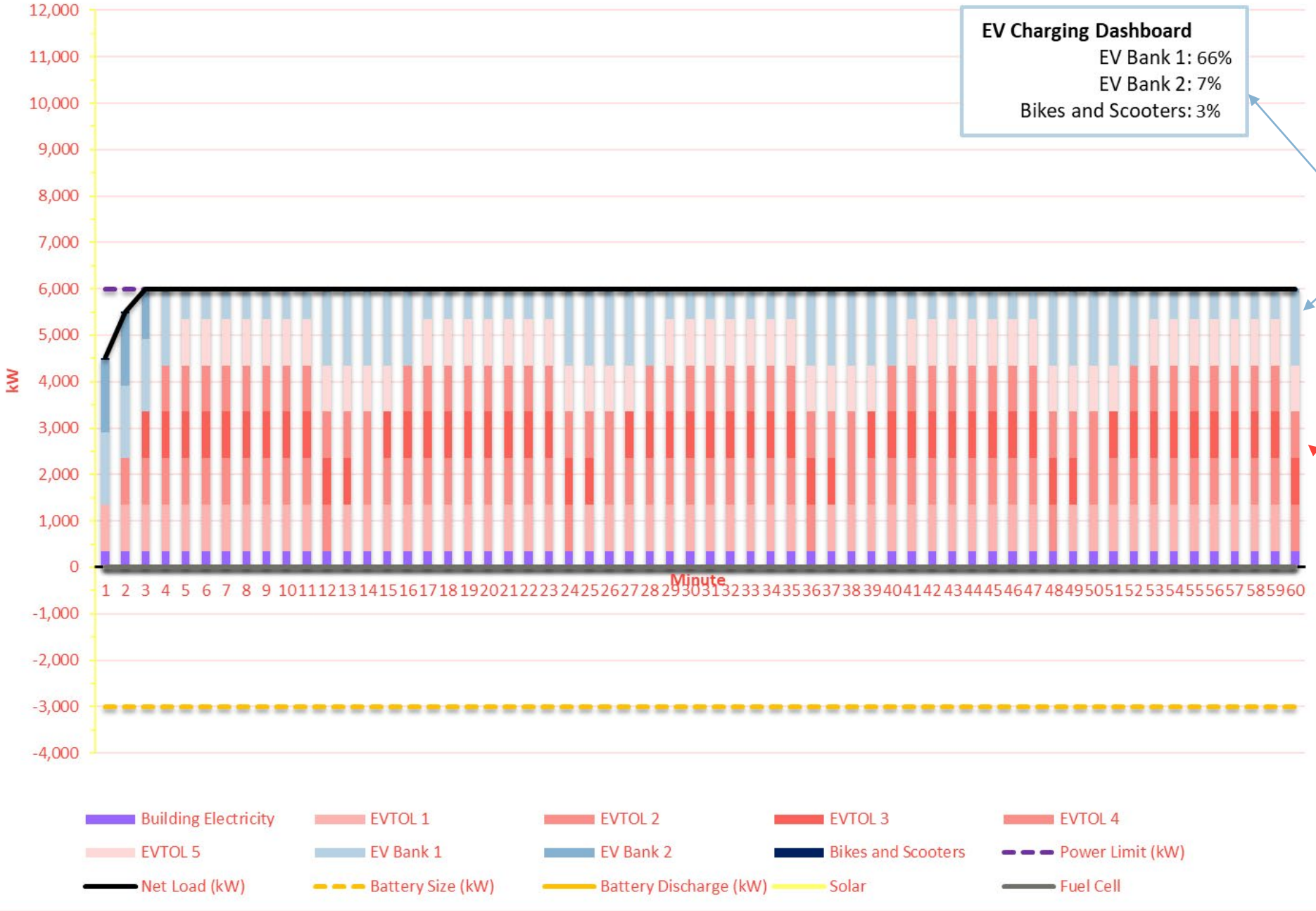
EV Charging
(2 Controlled Banks)

Net Load
(what the grid sees)

Solar production

Battery discharging when total load > 8 MW

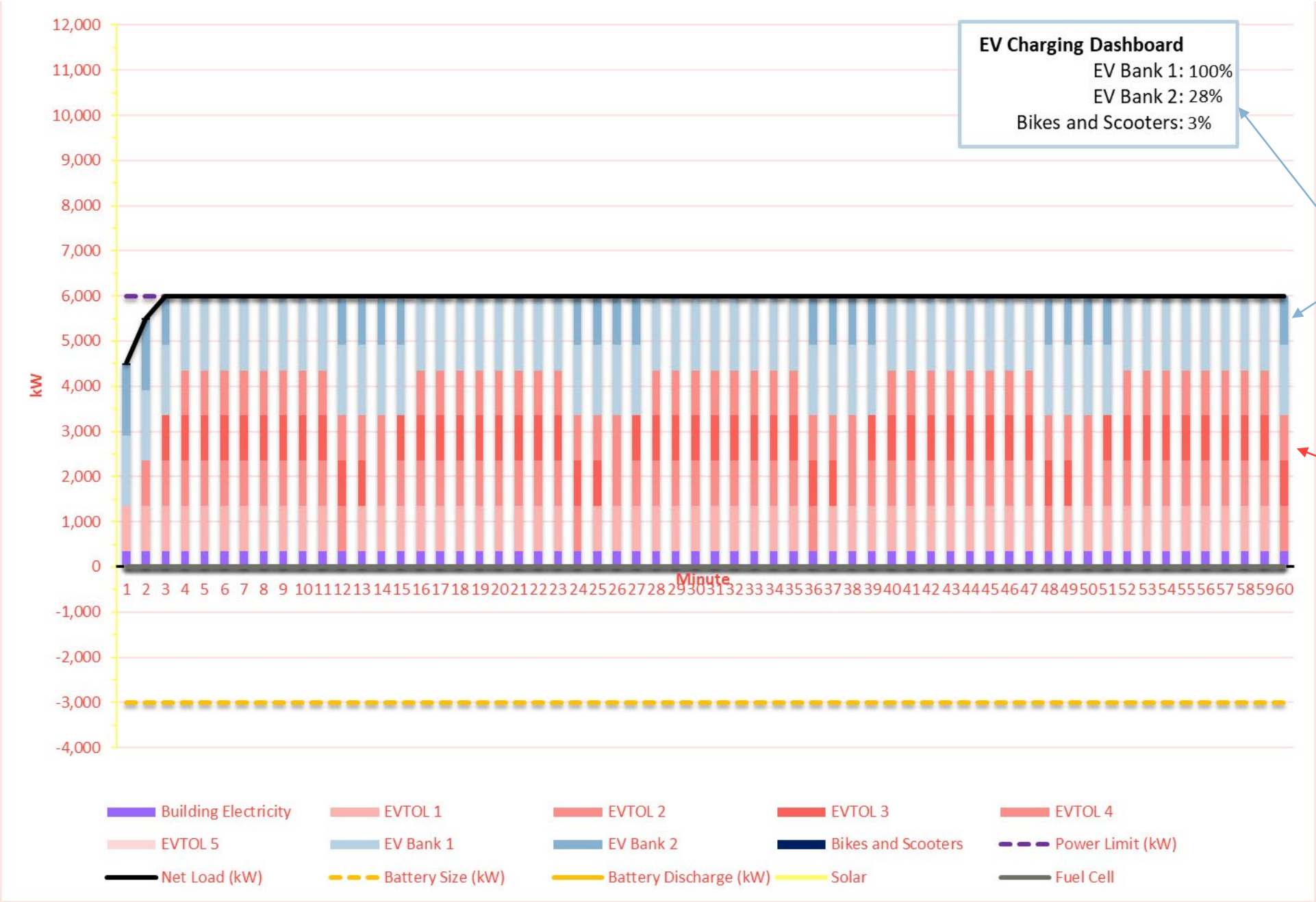
Goal: Maintain Power Under 6 MW



Limited capacity for EV Charging

All 5 EVTOLs charge at 1 MW for 10 min each. This means that **boarding and charging would take place simultaneously** .

Goal: Maintain Power Under 6 MW



Increased capacity for EV Charging

Or reduce to 4 EVTOLs and/or fewer total flights per hour (15).

Conclusions

1. **Electrification** is the key to decarbarbonization of the transportation sector (and other sectors too)
2. **Vehicle to Grid 1.0** is here and can add significant grid benefits
3. **Vehicle to Grid 2.0** is coming!!
4. **Load management** is easier when you have several discrete controllable loads and sources
5. **Buildings** can be important **grid resources**
6. **Flying electric cars** are coming??

wsp