

Vehicle-to-Grid

NUVVE

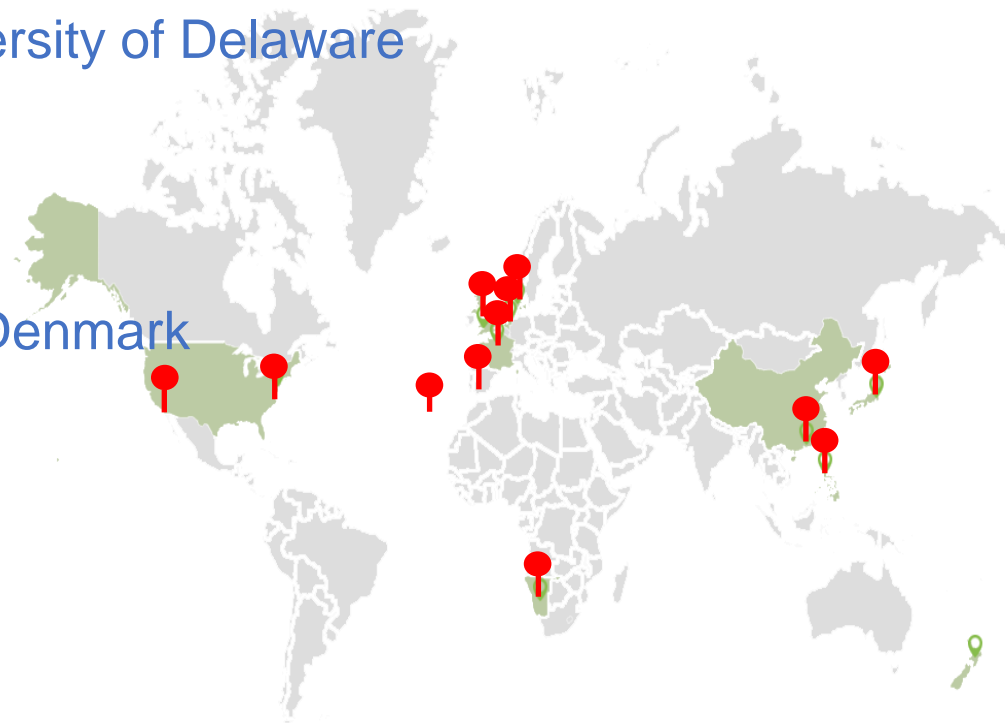


NUVVE

We Make Electric Vehicles Greener

# Nuvve is Vehicle to Grid?

- **Inventors** in 1996 of the V2G concept at the University of Delaware
- **10 years** operation, HQ in San Diego
- **Worldwide V2G Projects and Operations**
- **Longest continuous V2G operation: 4 years in Denmark**
- **Corporate investors**
  - EDF Renewable Energy
  - Toyota Tsusho



📍 V2G Operations



Awards:



ENERGY®  
STORAGE  
NORTH AMERICA



# Nuvve V2G Technology Timeline



# What does Nuvve do?

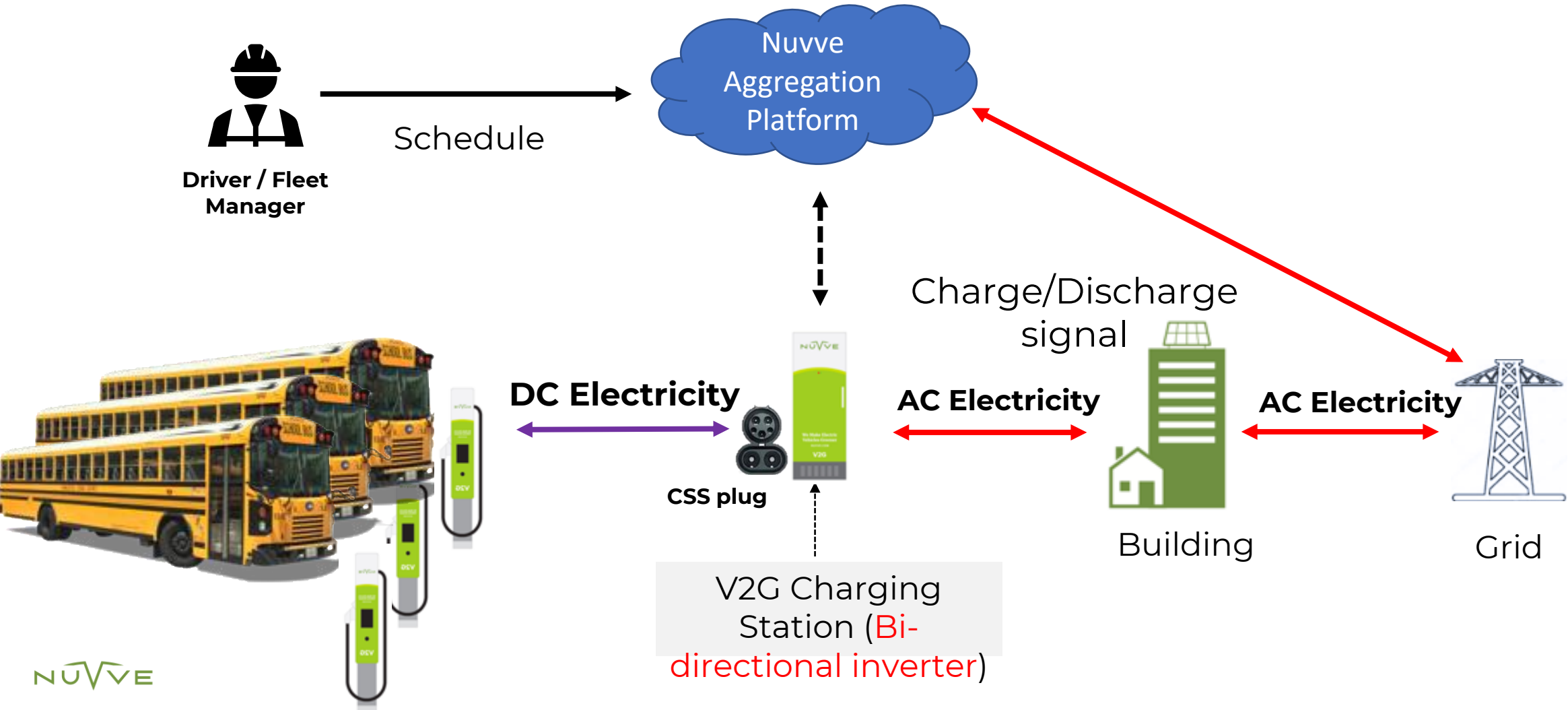
- **Software company** that delivers precise and secure V2G services to grid, buildings and EV customers.
- **Don't manufacture** hardware chargers (EVSE) but **we partner** with manufacturers to purchase and deliver complete solutions to our customers in both AC or DC configurations for bidirectional or regular charging
- **Turnkey Financing** which includes financing, installation, chargers, V2G services, maintenance, fleet management tools, and in some cases EV financing as well.
- **Specialists** in deployments of V2G assets worldwide

# How does V2G create value?

1. **Revenues** from Energy Markets (Ancillary, Spot, Demand Resp. etc.) *These markets require qualifications and aggregation for access.*
2. **Savings** from optimizing energy flow to buildings and EVs. *Savings depend on local site setup and metering*



# What is the V2G Platform Technology



# Nuvve Charging Station Options (North America)

## Nuvve PowerPort - AC Charging

### Overview

- Level 2 EVSE
- 80amps for 19.2kW max power
- UL Certified
- Energy Star certified
- 3 phase SAE J3068 version available (99kW max)
- Dual-mount pedestal available
- AC-V2G capability with specially configured vehicles\*
- Input voltage: 240V / 1Ø



EVSE-B-P1-H1

## Nuvve V2G 60kW – DC Charging

### Overview

- V2G capable with specific EV models
- CCS1 connector
- 60kW charge and discharge power level
- UL1741-SA certified for California (Rule 21) interconnection
- Input voltage: 480V / 3Ø



RES-HD60-V2G



*\*vehicle must be upfitted with bi-directional onboard charger*

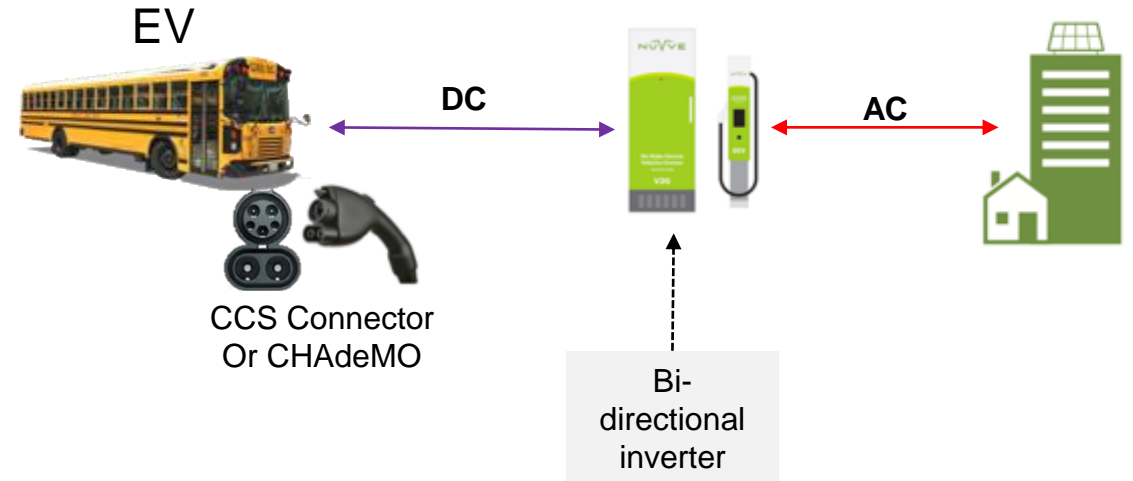


# V2G: AC vs. DC Configuration

## AC-V2G (J1772)



## DC-V2G (CCS)



<b>Description</b>	Power conversion <u>on-board</u> the vehicle
<b>Advantages</b>	Simple: <u>cheaper</u> , smaller, lighter, and easier to install
<b>Disadvantages</b>	Utility interconnection process is more <u>complicated</u> due inverter on vehicle

<b>Description</b>	Power conversion <u>off-board</u> the vehicle
<b>Advantages</b>	Interconnection process is <u>straight forward</u> as inverter is off-board
<b>Disadvantages</b>	Station and installation is more <u>expensive</u> than AC charging stations





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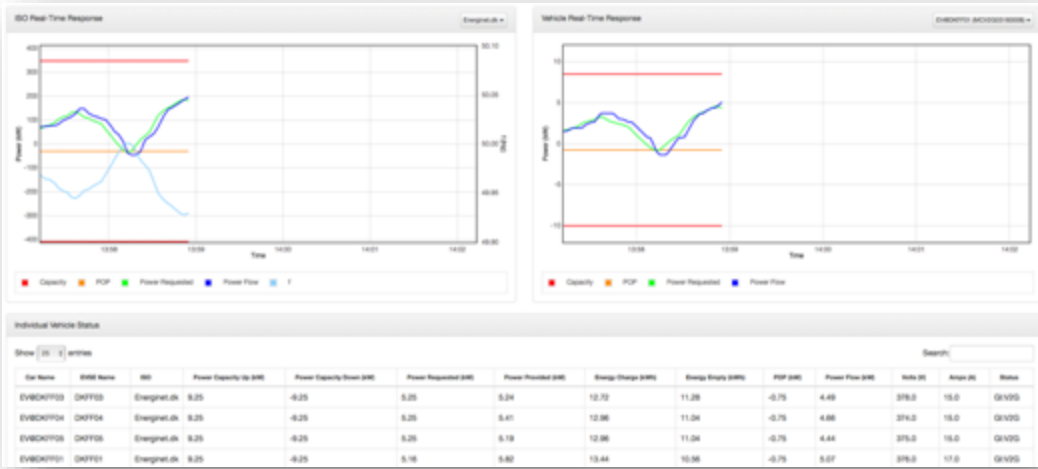
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# Nuvve GIVe Platform



## HIGH LEVEL OF CONTROL

- Integrates variable sized resources (KWh)
- Independent control of each asset (EV)
- Second-by-second control



## MOBILE MANAGEMENT

- Set charge levels and enable last-minute charging remotely
- Available as a mobile app and web interface



Drivers can adjust charge needs on the go



## VERSATILE INTEGRATION

- Third party integrations with existing systems including EVSEs, OEMs, and utilities
- Secure REST API available
- Support for multiple communication protocols



## PERFORMANCE INSIGHTS

- 24/7 dashboard view of EV usage and charging
- Live energy delivery performance reporting
- Custom reports



Monitor your entire fleet with the Nuvve dashboard

# V2G Benefits



- **Reduces the cost** of Electrification of Transport
- **Defers investment** in traditional grid infrastructure, accelerates distributed energy resource infrastructure
- **Contributes to reducing CO2** and pollution from vehicles and power plants
- **Supports additional Renewable Energy** sources on the grid



# Customer Offer

- Platform Financing through V2G revenues available
  - Dependent on geography and site
  - Ten to twelve year contract
- Overall financing package covers the following:
  - Bus
  - EVSE – DCFC 60 kw Bidirectional
  - Warranty on the Bus and EVSE
  - Maintenance of the bus and EVSE
  - GIVE software platform

# Thank You

**V2G will provide the lowest cost of ownership for electric vehicles**



Contacts:

Dick Johnson [djohnson@nuvve.com](mailto:djohnson@nuvve.com)

Tel: 215-498-2111

V2G charging solutions: <https://nuvve.com/>