



# Keys to Electrical Vehicle Infrastructure Deployment for DoD



# Speakers



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# DoD ENERGY RESILIENCE

Zero emissions vehicles (ZEV) are an essential tool for the DoD to achieve energy security and sustainability

77%

DoD represents most of the federal government's energy consumption.

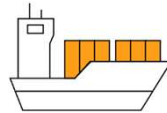


The DoD estimates that every \$1 increase in the price of a gallon of petroleum-based fuel **costs the military billions in additional fuel costs.**

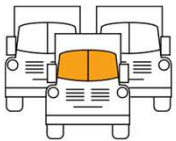
*(DoD Operational Energy Strategy)*



The US military is the largest single consumer of fuels in the world.



One study estimates that the United States has spent \$8 trillion protecting oil cargoes in the Persian Gulf since 1976, with at least one aircraft carrier being stationed in the region during any given time.



**Executive Order 14008 and 14057: Transitioning to a Zero-Emission Fleet.** Each agency's light-duty vehicle acquisitions shall be zero-emission vehicles (ZEV) by the end of fiscal year 2027

Fleet strategy → optimizing fleet size and composition

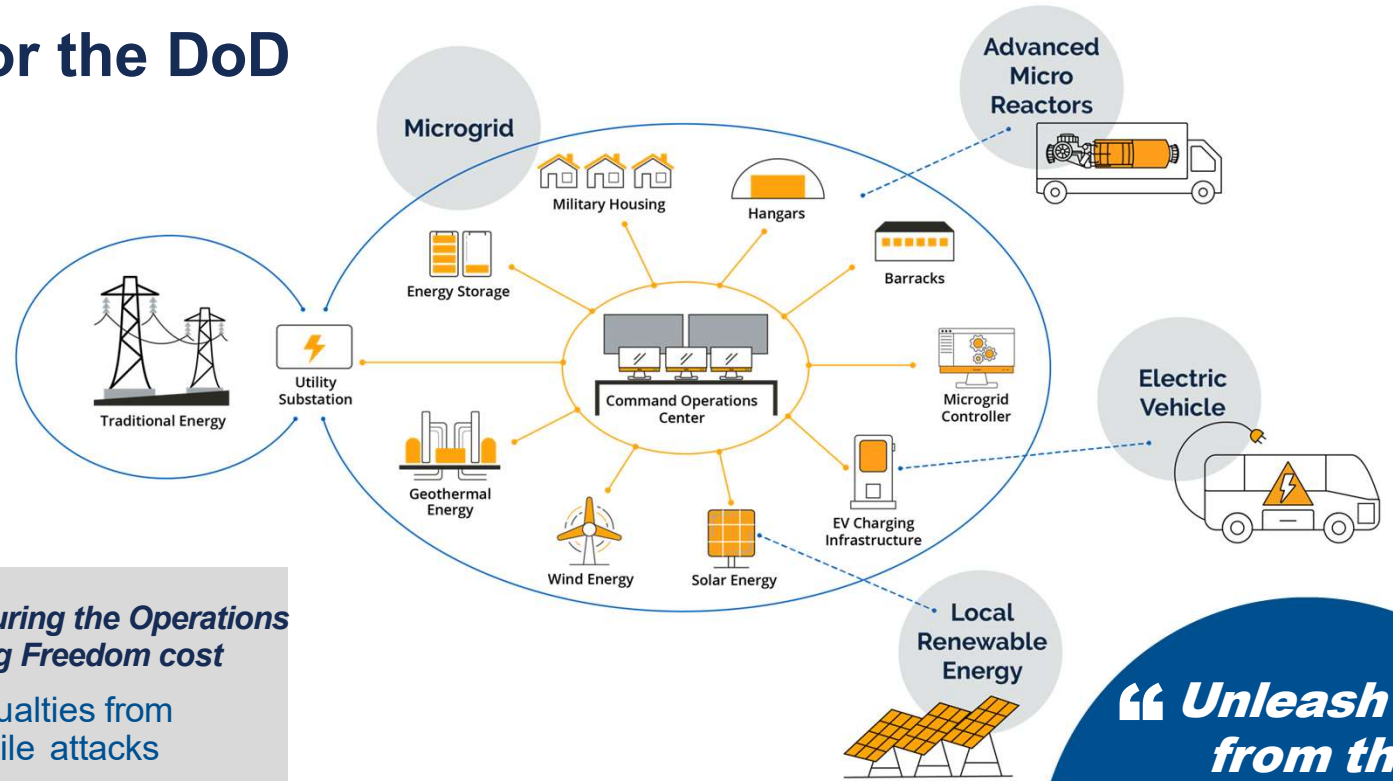
ZEV re-fueling infrastructure

Maximize acquisition and deployment of light, medium, and heavy-duty ZEV [GSA]

# HOLISTIC ENERGY SECURITY

The end vision for the DoD

EVs enable the Federal Government to mitigate and adapt to climate change



Ground delivery of liquid fuel during the Operations Iraqi Freedom and Enduring Freedom cost

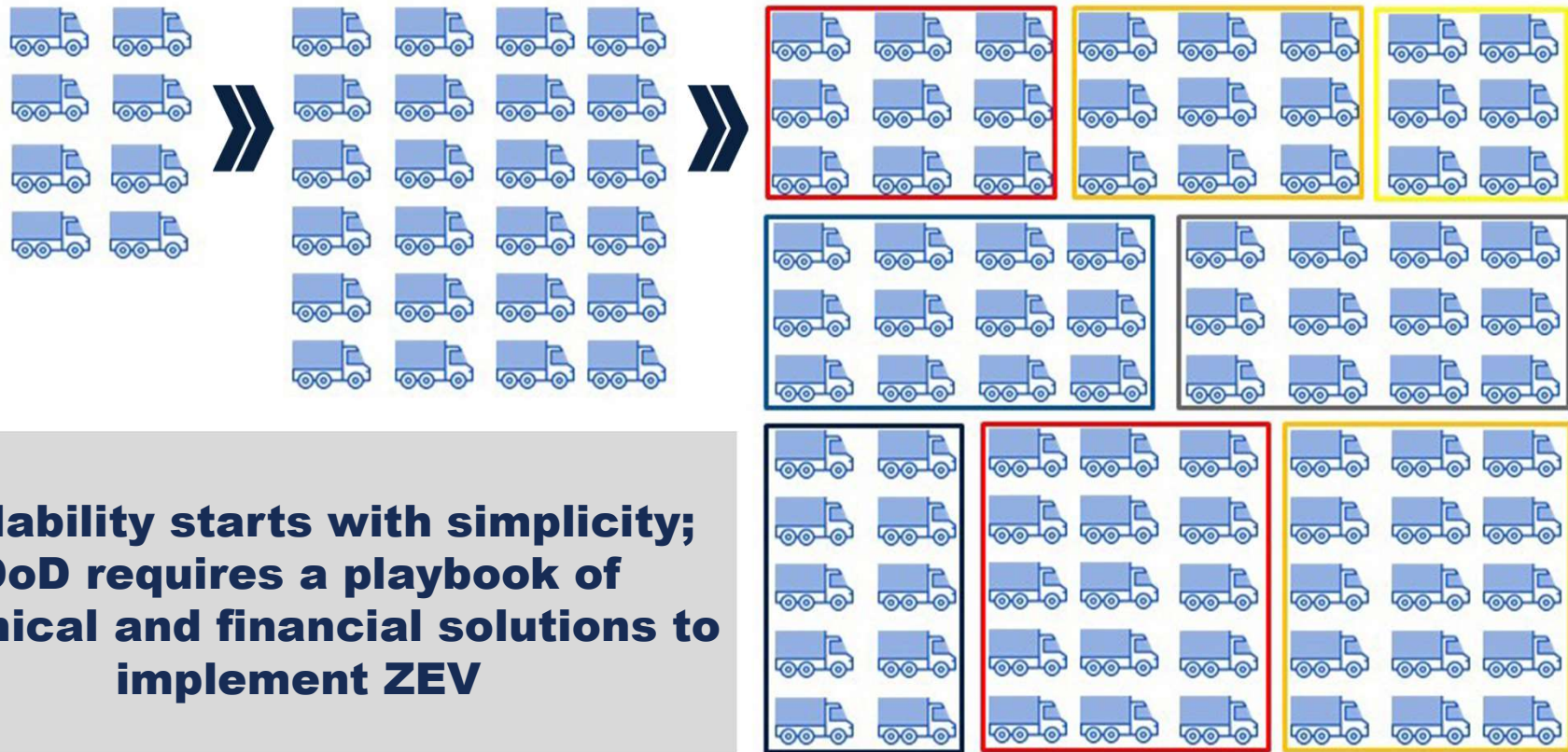
**18,700** casualties from hostile attacks

**52% of total casualties**

**“Unleash us from the tether of fuel”**

- Gen. James Mattis

# PILOT WHILE PLANNING FOR SCALE

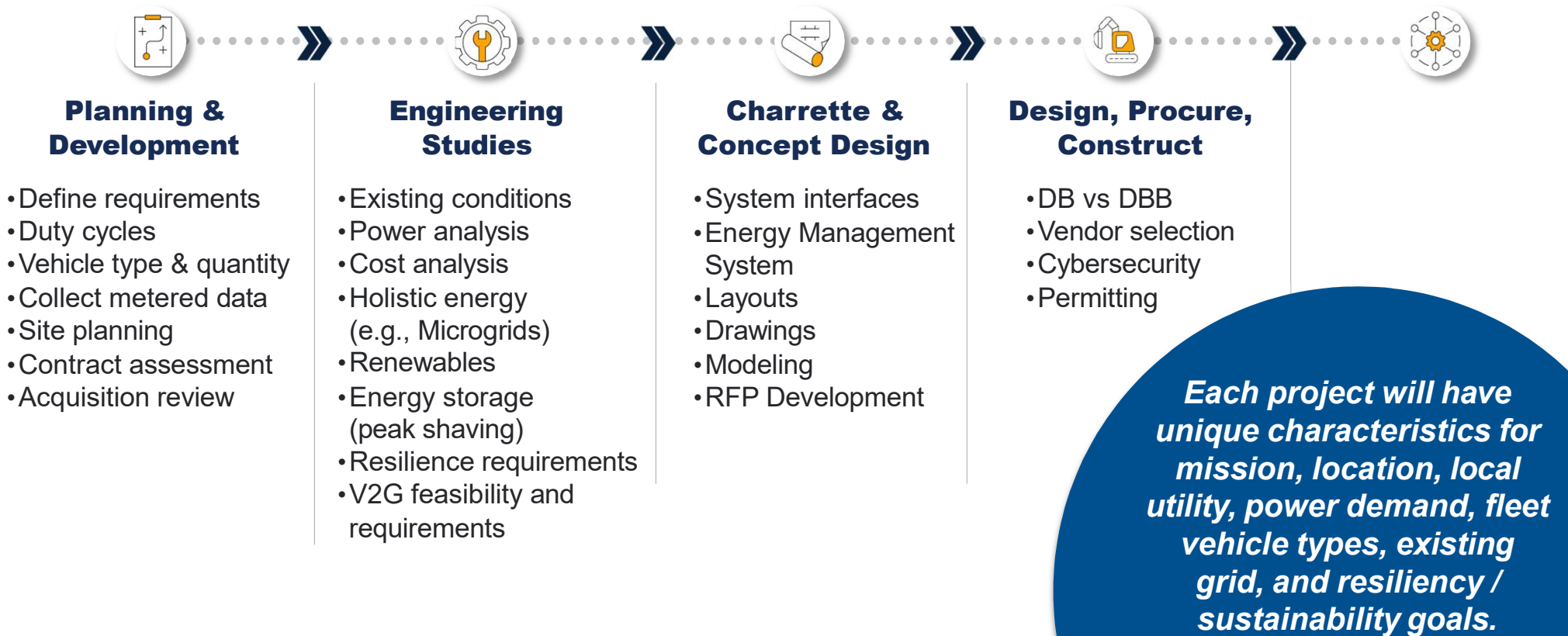


**Scalability starts with simplicity;  
DoD requires a playbook of  
technical and financial solutions to  
implement ZEV**

— BLACK & VEATCH — EVS30 "PRIMING THE U.S. GRID FOR HIGH-POWER CHARGING"

**One size doesn't fit all: Target efficient modular solutions.**

# FLEET ELECTRIFICATION FOR THE DoD



# FLEET ELECTRIFICATION FOR THE DoD

## Proper planning & development is critical to effective implementation of Fleet Electrification

### Key Questions

- Project Stakeholders?
- Vehicle requirements?
- Mission Requirements?
- Existing contracts?
- Available real-estate?

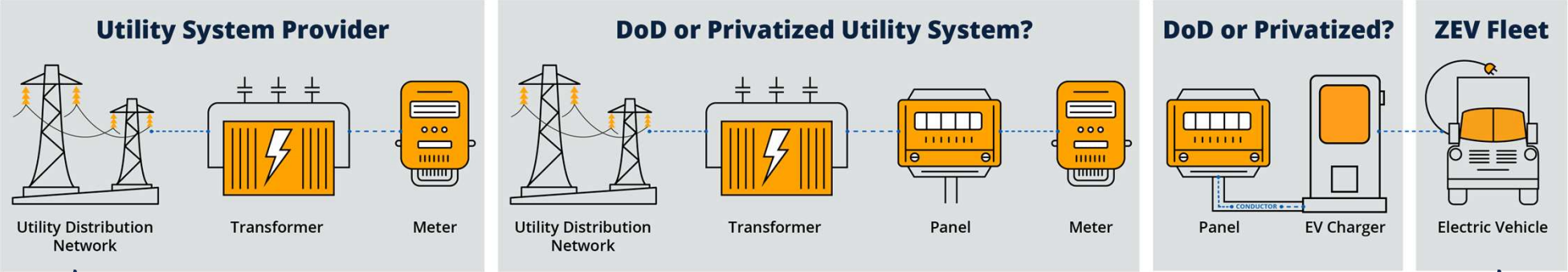
### Acquisition Review

- Appropriated: MILCON, ERCIP
- Charging as a Service
- EUL
- ESPC/ UESC
- USC MOD (excess facilities)



# FLEET ELECTRIFICATION FOR THE DoD

## Defining ownership and operation



Where will the meters be located and who pays?

Ownership structure will drive  
**TECHNOLOGY, CONTRACTING AND OPERATIONS**

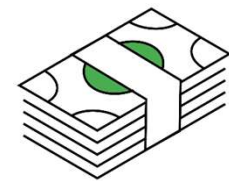
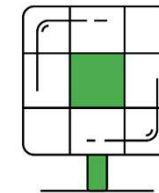
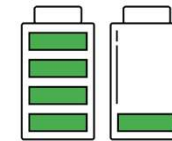
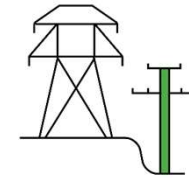
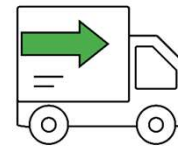


# STAKEHOLDER ALIGNMENT & PROJECT GOALS

- Defining mission requirements
  - Resilience now dependent on electricity
  - Parallel project opportunities (e.g., dig once)
- 

- Building Load Integration
  - Cost of Energy
  - Resilience; Sustainability
  - Future Proofing Infrastructure
- 

- Project Timeline
- Project Budget
- Total Cost of Operation



**Agencies & Fleets, Utilities, Cities, Vehicle OEMs, Clean Energy, Community Interests, Project Execution Team, Funding & ROI**

# FLEET ELECTRIFICATION FOR THE DoD

## Perform engineering studies to validate project feasibility and establish budgetary costs

### Key Steps

- Electricity metering
- Vehicle battery size
- Charging speed
- Software to optimize charging
- Distributed energy resources & microgrids
- Budgetary cost



### Lessons Learned

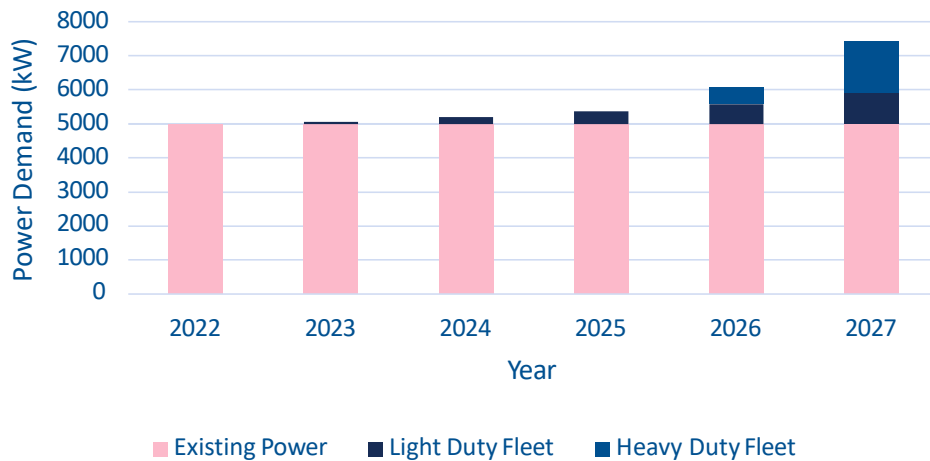
- Know your requirements
- Let mission drive vendor requirements
- Service availability [typically insufficient]
- Level 2 vs DC Fast Charging
- Define inclusion of DER



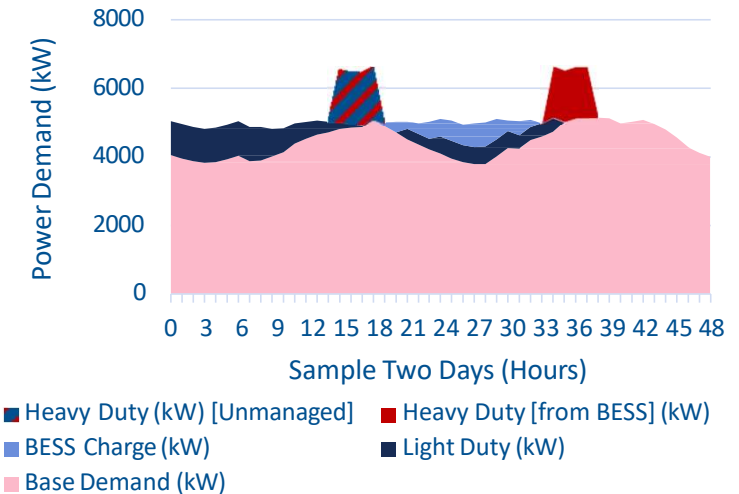
# FLEET ELECTRIFICATION FOR THE DoD

## EVSE drives electricity load growth

Forecasted Load Growth: Impact from Electric Vehicles



Benefits of Managed Charging (kW)



*Holistic planning requires management of all power and energy assets.*

# FLEET ELECTRIFICATION FOR THE DoD

## Perform charrettes to capture stakeholder input and finalize requirements

- What are the power requirements?
- Are grid upgrades necessary?
- What are the capital costs and sustainment costs?
- Can a microgrid offset energy costs?
- What other projects impact EVSE implementation?
- What are the cybersecurity requirements?



# FLEET ELECTRIFICATION FOR THE DoD

## Distribution grid upgrades drive project cost

New charging loads could require:

- Upgraded or new utility feeders
- Substation modernization
- New substations



Schedules with complex grid updates can take 48 months or more

# FLEET ELECTRIFICATION FOR THE DoD

## Design, Procure, Construct

### Key Steps

- Select vendor technology
- Coordinate with local utility
- Technology integrator can accelerate utility design and service delivery
- File applicable permitting
- Future-proof design for growth



### Lessons Learned

- Proper vendor technology selection is required to effectively execute the project without cost overruns.
- Engage local utilities to support project execution. Construction drawings required to initiate utility service agreements.
- Permit cycles are critical path and need to be executed carefully to succeed.
- Plan for long term mission requirements to reduce capital improvement costs and increase useful life -> Dig Once.



# FLEET ELECTRIFICATION FOR THE DoD

## Operate, maintain, repair

### Keys to Success

- Contract types
- Predictive & preventative
- Software and hardware considerations
- Lifespan



### Lessons Learned

- Define OM&R requirements
- Work with vendors
- Train workforce



# ELECTRIC VEHICLE INFRASTRUCTURE: LESSONS LEARNED



## MANAGE PROCESS, PERMISSIONS & BUY-IN

- Start early on EVERYTHING
- Interagency agreements and approvals
- State environmental impact filings
- Sort applicable terms and conditions
- Differences between vehicles, infrastructure and deployment services
- Define inclusion of DER at beginning
- Engage local utilities: loads, right of way, and service agreements
- Let mission drive vendor requirements
- DOT and city approvals, special permits
- Building and electrical permits (can expire!)
- Facility & Energy Managers

*DoD implementation of fleet electrification requires holistic energy planning and cooperation with all stakeholders*



# ELECTRIC VEHICLE INFRASTRUCTURE: CONTROLLING PROJECT COSTS

## Change and risk are expensive

- Quality information drives design certainty
- Design certainty drives deployment cost certainty
- Develop execution strategies to reduce risk
- Plan for unknowns

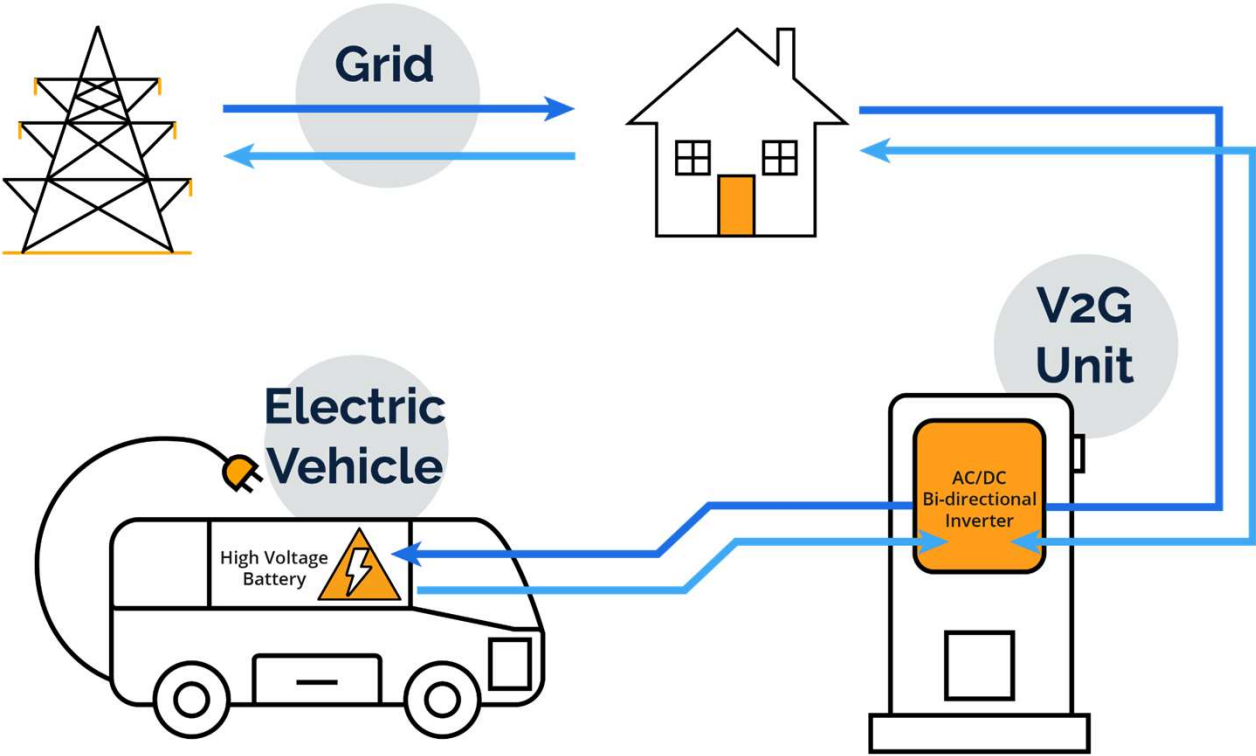
## Project delays are expensive, vehicles that can't charge and expedited construction are more expensive!

- Power delivery per facility
- Understand and manage entire supply chain
- Understand all required approvals (internal/external)
- Understand and plan for contracts and legal process



# THE FUTURE OF EV: VEHICLE-TO-GRID

Electric Vehicles Integrate with a Smart Power Electricity Network





**THANK YOU!  
QUESTIONS?**

