Electrifying a Sustainable Future

Powering the Future of Cold Chains: Unlocking the Potential of eTRUs

eTRUconnect® & eTRUcharge

July 8th, 2025

Introduction

- **Presenter:**

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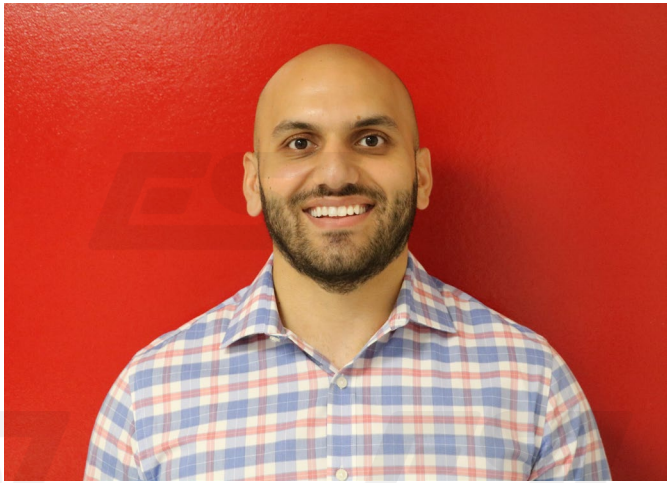
- **Date and Time:**

July 8, 2025
11:00 AM – 12:00 PM (PST)



Agenda

- The Cold Chain Challenge
- What are eTRUconnects and why do they matter?
- TRU Power: The Current and Future Landscape
- Where is the Future Heading? – AC Charging Trends
- Diesel Savings & Cost Efficiency
- Smart Capabilities: Yard Power Monitoring, Remote Control & More
- Fleet Integration: Transition Strategies Using Existing Infrastructure
- Live Q&A / Open Discussion

The Cold Chain Challenge

- TRU's rely heavily on diesel for running and maintaining temperature
- Require 480VAC and consume:
  - 15-17kW for pulling down temp (45-60min)
  - Require 8-12kW to maintain temperature
- Idling is expensive
  - Diesel Costs are always going up, national average is $3.9/gal
  - Commercial Electricity Costs $0.13/kWh
- Diesel usage has negative impact
  - Health Risks
  - Excessive noise pollution
  - Regulatory compliance issues
  - Operational Costs
  - Waisted opportunities for local incentives

eTRUconnects

Solution to Sustainably, Safely and Economically electrify your TRU's

eTRUconnects

Solution to Sustainably, Safely and Economically electrify your TRU's

- 🔌 **Code-Compliant Shore Power**: Provides UL compliant power connections for electric standby TRUs connecting them to the grid.
- 🧱 **Rugged & Weatherproof**: Designed for outdoor warehouse docks and truck stops with durable 3R enclosures.
- ⚙️ **Simple Installation**: Available in pedestal or wall-mount configurations with straightforward electrical integration.
- 🔒 **Safe Disconnect Design**: Safety Interlocking mechanisms ensure operator safety when plugging/unplugging, along with dual drive-off features.
- 🌎 **Emissions Reduction**: Enables TRUs to run on electric power instead of diesel, cutting NOx and PM emissions.
- 💰 **Fuel & Maintenance Savings**: Reduces diesel consumption, idle time, and engine wear.
- 🧩 **Infrastructure-Ready**: Easily scalable and compatible with existing dock layouts and fleet equipment.

TRU Power: The Current and Future Landscape

Where We are Today

- **Diesel Dominance:** Most Transport Refrigeration Units (TRUs) Still rely fully on diesel engines.
- **Shore Power Requirements:** TRUs require 30Amp 480VAC to operate.
- **Lack of Awareness:** Many companies are unaware of shore power and the benefits.
- **Lack of Usage:** Several large companies own electric standby capable units however they do not use shore power to power the TRUs.
- **Environmental burden:** High emissions of Nox, CO2 and GHGs from Diesel-powered TRU's.
  - **AQMD:** Implementing rules and Regulations to reduce emissions.
  - **CARB:** Implementing rules and Regulations to reduce idle times and emissions.
  - **LCFS Program**: Low Carbon Fuel Standard Program that offers monetary incentives for adopting electric solutions and reducing emissions. **CHECK TO SEE IF YOUR STATE OFFERS THE PROGRAM**
- **Adopters:** Early adopters benefit the most out of it.
  - **Long Term Savings**
  - **Competitive advantage – Higher Margins**

TRU Power: The Current and Future Landscape

eTRUcharge!

- **Shift to eTRUs:** Introduction of Battery electric TRUs
- **Power Requirements:** 63Amps 480VAC for both powering the TRU and charging the battery
- **Early Adopters:** Will benefit from their futureproofing and benefit from shore power infrastructure to install charging stations for both hybrid and electric TRUs
- **New Adopters:** Have the ability to setup their yards to meet both the shore power requirements and electric TRUs
- **Capabilities:** Communication capable and complete vision and control of yard operations and power
- **Configurations:** Utilizing a universal AC socket outlet for any AC charging application and TRU shore power
- **Savings:** Battery electric TRUs have a shorter payback period than conventional hybrid trailers, especially due to integrated technologies to assist with on road energy recovery systems.
- **eTRUcharge introduces an AC powered universal, future-ready solution designed to support all hybrid and electric TRUs across docking stations, yards, and warehouses.**

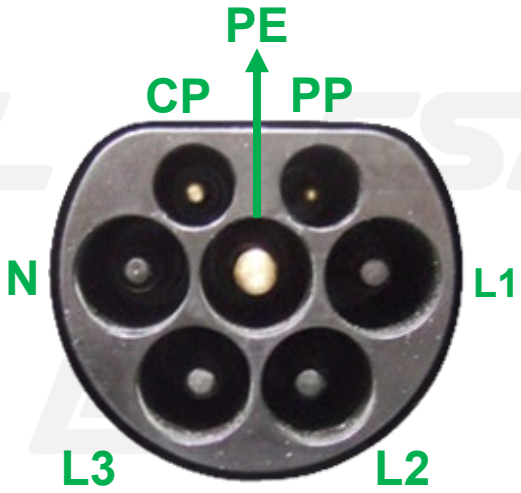
Where is the Future Heading? – AC Charging Trends

Using an existing European Type 2 EV connector

- IEC 62196 Type 2 Standard
- Voltage ranges from 208VAC --> 600VAC
- Current up to 63amps – Already UL Listed under:
  UL2251 - connector, plug, sockets
  UL2594 - overall charging station

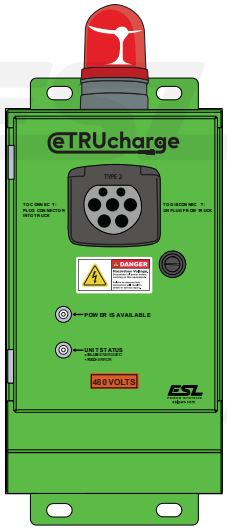
Plug Specifications:

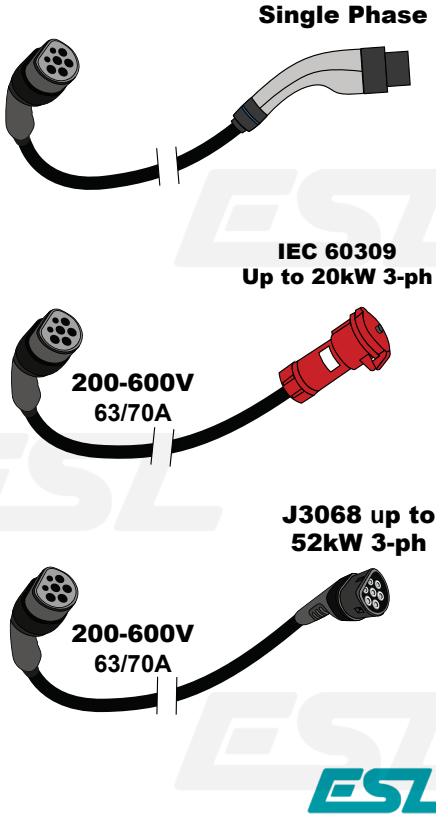
- **L1 – L2 – L3**: Three-Phase AC power connections
- **Neutral**: Can be used for single phase charging
- **Ground:** Directing any fault current safely to the ground
- **Control Pilot (CP):** Communicates charging readiness and capacity
- **Proximity Pilot (PP)**: Detects plug connections and limits overcurrent
  - Interlock required to prevent connector removal during charging
- **Conventional contacts** ~ 63A* Already UL Listed under UL2251
- **Cable Size**: 6awg



Carry-Along TRU Charging Cable Assembly
with Preferred Connector

- Very wide AC range of application.
- Provides versatility with connection configurations to support any AC charging connector up to 52kW.
- Eliminates the need for AC adapters
- Eliminates unused cables while not charging
- All components readily available worldwide
- Drive-Off Capable.
- Significantly Reduces maintenance and operating costs
  - Snowy areas
  - Theft/vandalism
  - Driving accidents
- NEC and UL compliant
- Capability to adapt to a single phase charging system such for EVSEs.





Connection Configurations

Same Grid Input Provides both Charging and Shore Power Capabilities.

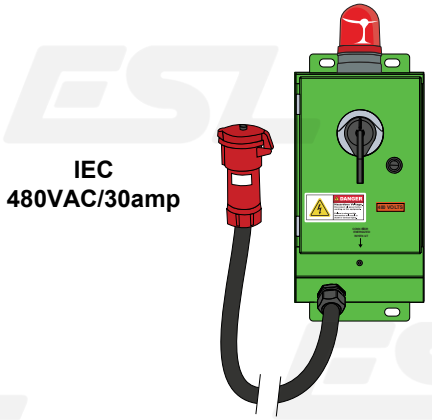
Charging Station Provides additional Connections Using Carry-along Cables

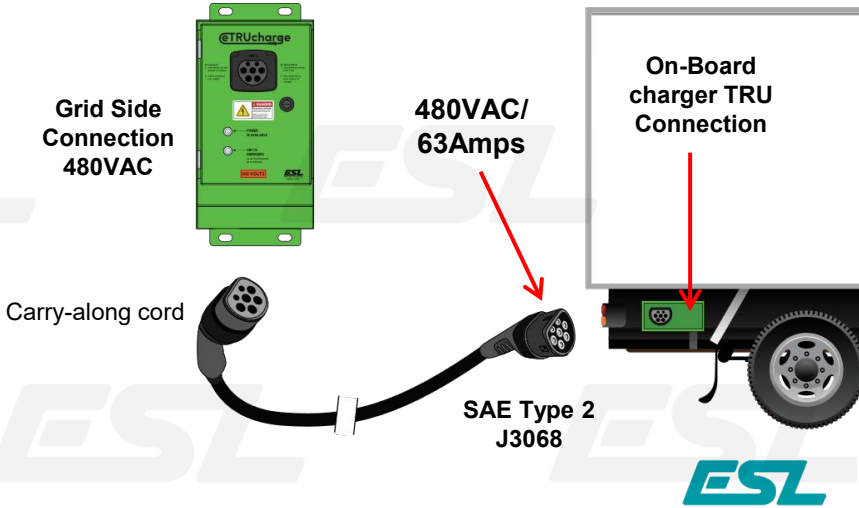
- **Standard IEC 60309 4 Pin Connector**
- **IEC 62196-2 7 Pin Connector (J3068)**
- **NACS Single Phase Connector**
- **J1772 Single Phase Connector**

Provides Additional Communication Features:

- **Data Monitoring**
- **Remote Control**
- **Live Status**
- **Power Metering**
- **Power Management**
- **Live View of Usage**

Drive-Off Capabilities – Easy Pull-away Feature at Socket





Sustainability Impact - Diesel Savings & Cost Efficiency

Two main points of impact:

- **Sustainability impact:**
  - Each gallon of diesel burnt is 22.38lbs of CO_2 emitted.
  - Reduction in noise levels by not using diesel engines
  - Increasing the lifetime of the diesel engines by about 20-30%
- **Diesel and Cost Savings**
  - Diesel is more expensive most of the times and in most states
  - Utilizing Shore power can save up to 60% on diesel costs
  - Maintenance on diesel engines is decreased with electrifying TRU's
  - Labor is decreased by electrifying TRU's (ex: refueling diesel engine, mainly for larger fleets…)
  - ROI for eTRUconnect and eTRUcharge is 1-1.5 years.

https://eslpwr.com/calculator/

Fleet Integration: Transition Strategies Using Existing Infrastructure

- **Todays Lanscape:** 30Amp 480VAC for current shore power requirements.
- **The Coming Shift:** Electric TRU's will require charging of up to 63Amps 480VAC.
- **Transition Strategy:**
  - **Case 1: Not yet adopted shore power**
    - Plan for installing 63Amp Circuits today
    - Upgrade breakers and stations when charging stations are ready for use.
  - **Case 2: Already has existing shore power infrastructure**
    - Leverage existing 30A systems for shore power in the short term
    - Plan the retrofit! The sooner the better. Labor, rework, permitting and materials do not get cheaper.
- **Avoid Double Spending:** Retrofitting later can cost 30-50% more due to labor, permitting and materials.

Option	Initial Cost	Future Cost	Total
30A Now, 63A Later	Low	High	$$$$
63A Future-Proofed Now	Medium	Minimal	$$

Thank You!

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