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Electric Vehicles and Utility Coordination

11/03/2022

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Agenda

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2 About ENERCON

3 Site Evaluations

4 Detailed Design

5 Utility Considerations

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Introductions

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About ENERCON

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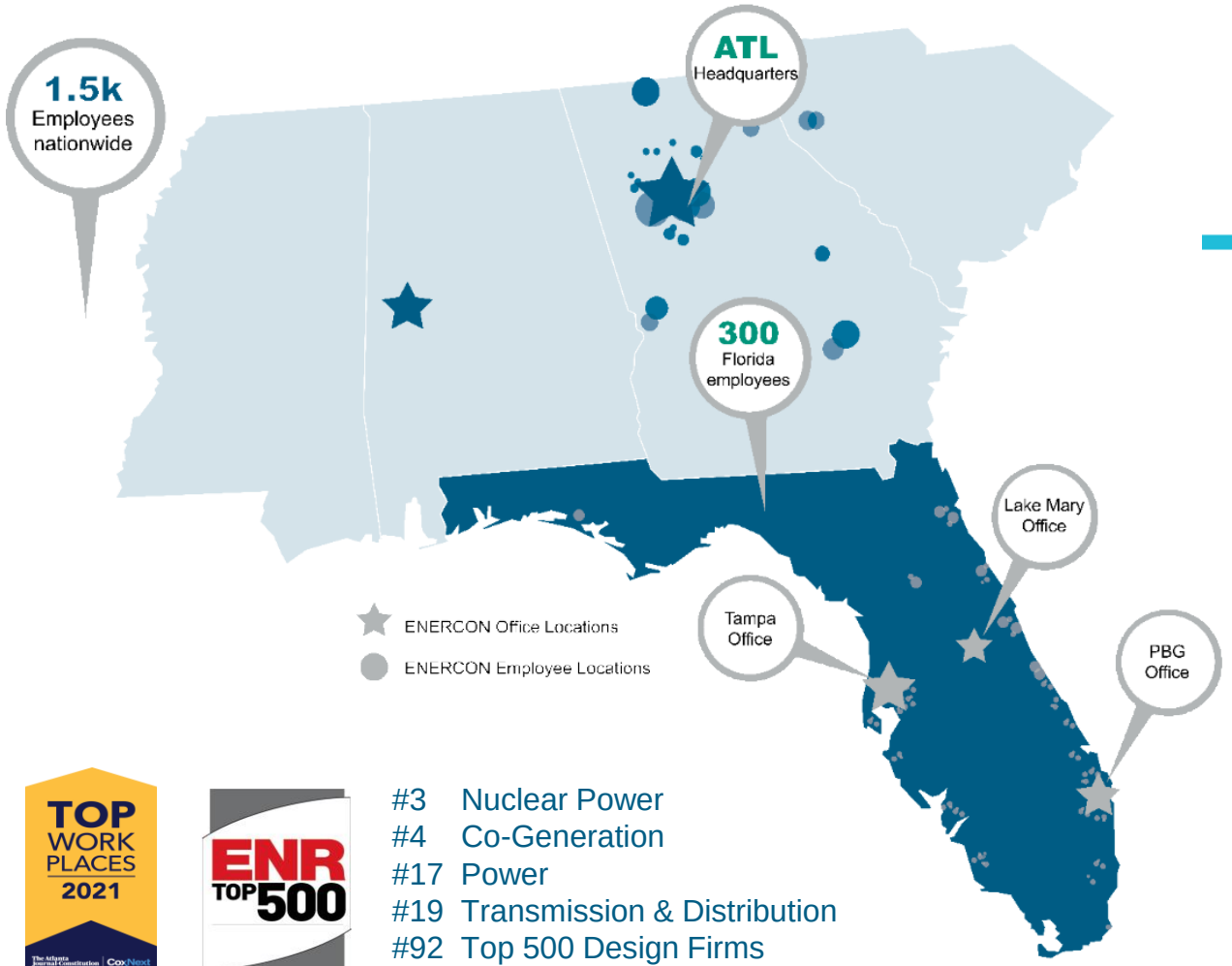
ENGINEERING | ENVIRONMENTAL | PROJECT/CONSTRUCTION MANAGEMENT



Powerful People. Powerful Solutions.

Power Delivery

Power Generation

Environmental Services

TOP WORK PLACES 2021

ENR TOP 500

#3 Nuclear Power
#4 Co-Generation
#17 Power
#19 Transmission & Distribution
#92 Top 500 Design Firms

About ENERCON

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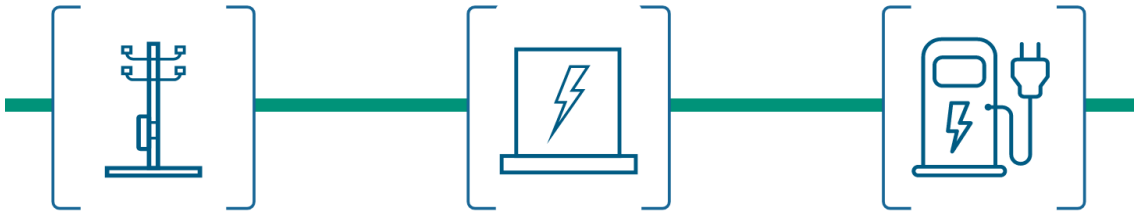
Our EV Charging Services:

- Customer Outreach & Site Evaluations
- Easement Acquisitions
- Utility Coordination
- Detailed Engineering & Permitting Services
- Construction Management Services



Typical Customer Site Locations Include:

- Warehouse and fleet distribution centers
- Public and retail buildings
- Multi-unit housing facilities
- Workplaces
- Local, state, and federal right-of-way

Site Evaluations and Customer Communications

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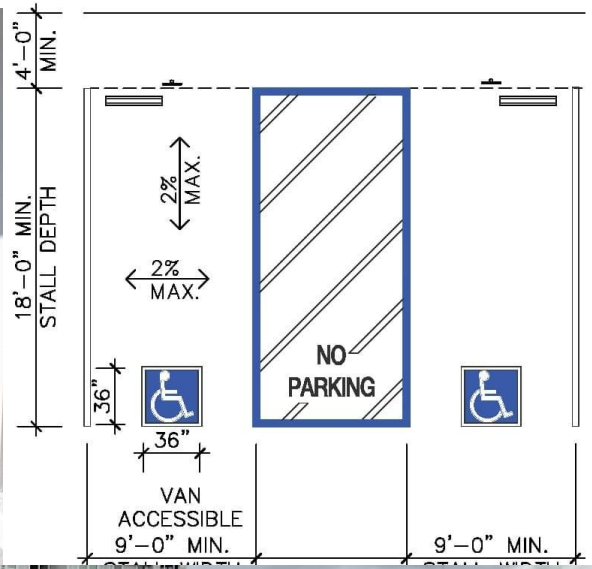
1. Site Evaluations:

- Cellular strength and network testing
- Proximity to existing utility service
- Parking proximity for future expansion opportunities
- Public visibility, accessibility, and site lighting
- Environmental site assessments, permitting, and compliance evaluations



2. Customer and Utility Communication:

- Door knocking, HOA meetings, phone calls, digital communications, and marketing collateral development
- Project lifecycle communication
- Easement acquisition
- Evaluation of on-site power and load requirements

Detailed Design

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1. Engineering Design:

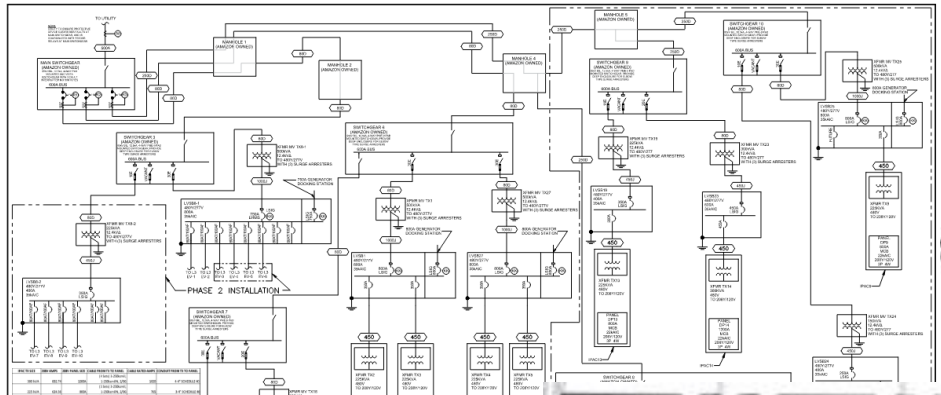
- Equipment location plans (EV Chargers, switchgear, transformers, conduit and cable, etc.)
- Single line drawings, panel schedule, and equipment selection
- Foundation and equipment anchoring details
- Full BOM

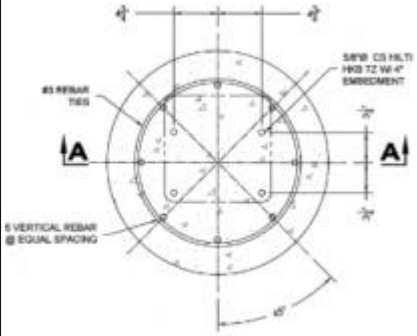
2. Electrical Analysis:

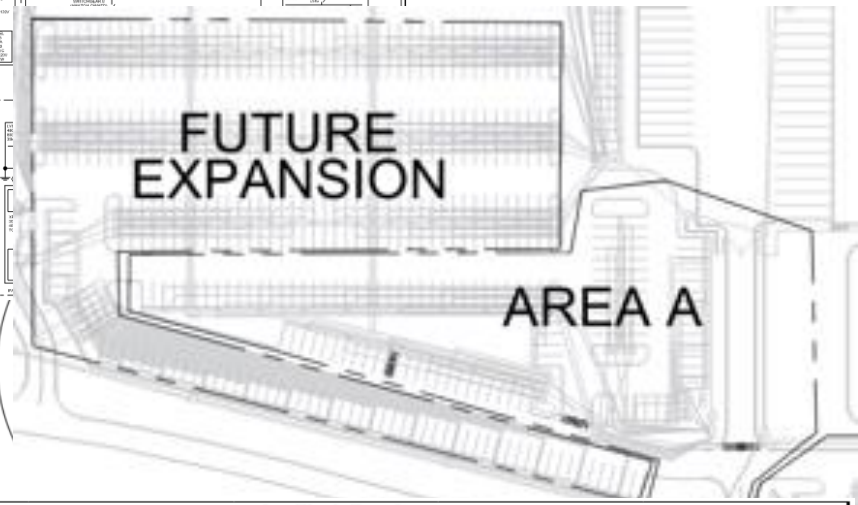
- Arc flash analysis – from medium voltage switchgear to chargers
- Short circuit analysis – Utilizes the utility SC information and component impedances to evaluate faults
- Coordination for all designed circuit protection, up to and including the first utility protective device

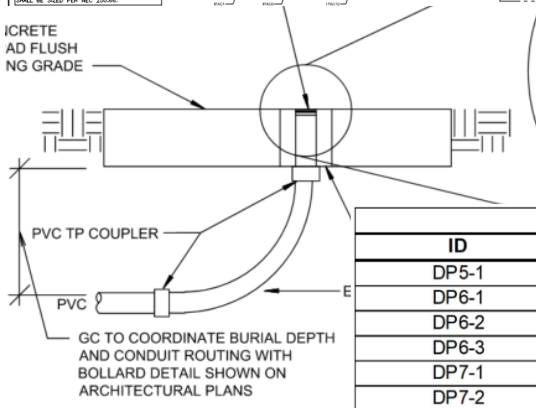
3. Utility Design

- Overhead and underground MV design from takeoff to meter









Arc Flash Results				
ID	kV (kV)	Total Energy (cal/cm²)	AFB (ft-in)	Energy Levels
DP5-1	0.208	9.31	5'5"	Level D
DP6-1	0.208	1.97	2'1"	Level A
DP6-2	0.208	2.23	2'2"	Level B
DP6-3	0.208	2.23	2'2"	Level B
DP7-1	0.208	1.96	2'0"	Level A
DP7-2	0.208	1.79	1'11"	Level A
DP7-3	0.208	2.22	2'2"	Level B
DP8-1	0.208	1.96	2'0"	Level A

Utility Considerations

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- **Level 1:** 120v
- **Level 2:** 208v or 240v
- **Level 3:** 480v
- **Primary Metering - 5kV-36kV:** Utility driven primary voltage and usage is measured from a cabinet and meter. Everything MV “downstream” of the cabinet is customer owned – which can lead to lower rates, but more customer responsibility. – Preferred method for over 1.5MW of usage.
- **Secondary/CT Metering - 208v-600v:** Utility owned MV transformer(s). Current transformers are setup on each phase of the transformer secondary taps to record the usage. Service runs from secondary panel/breaker to the EV chargers. – Preferred method for less than 1.5MW or when coordinating with the utility for loop configuration.
- **System configurations:** Radial systems vs. Loop or “Ring” configurations. Loop is almost always preferred
- **Electrical Analysis:** Arc flash analysis, breaker set points for MV & LV equipment, and short circuit analysis.
- **Communications:** Dependent on the model of EV charger. Most can be connected via ethernet, Wi-Fi, or cellular signal.

Utility Considerations

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- **EV Charging Space Allocations:** Cities and states are beginning to require a “minimum” number of spaces allocated to EV charging for new residential and commercial builds. City of Miami requires that 20% of parking spaces can accommodate EV chargers. This new load profile per customer needs to be accounted for by the utility.
- **Early Utility Engagement:** Driving the conversation to understand the need of the customer and utility. Understanding the current and future load requirements avoids multiple revisions of utility applications and acceptance.
    - The trend will shift from L1/L2 charging to larger DC Fast Chargers
- **Increased Distributed Generation:** Microgrids will become common setups for commercial and fleet electrification.
    - Connecting solar PV, BESS, and generators into one system.

Utility Considerations Summary

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- Process Driven
- Application Process
- Timelines (Developer and Utility)
- Services – Primary vs. Sec.
- Rates
- Design / Capacity
- Easements
- Broad communication

FMEA
FLORIDA MUNICIPAL ELECTRIC ASSOCIATION

Example Scenario 1

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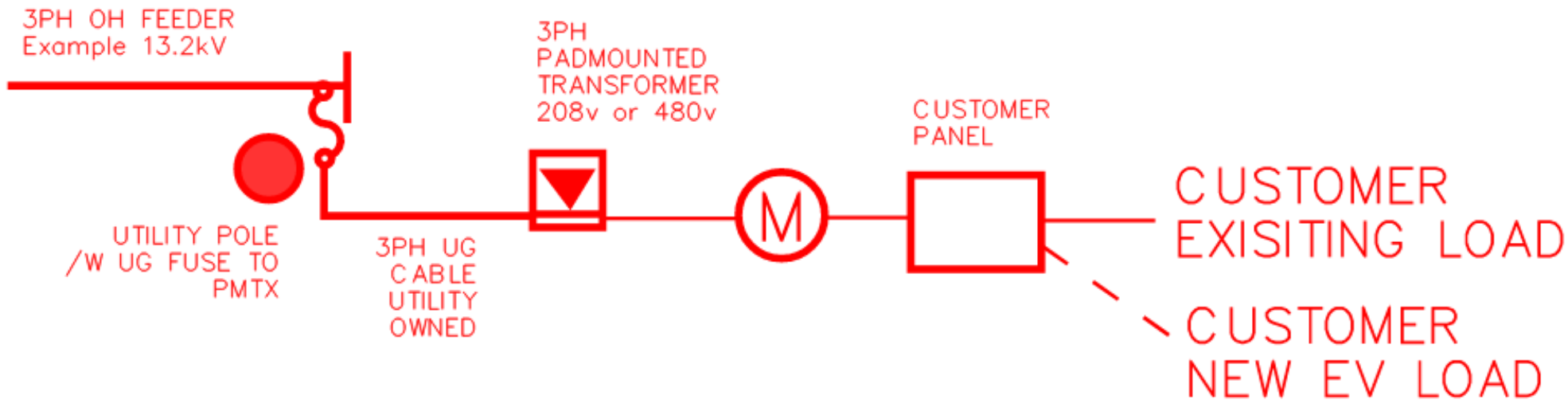
Scenario 1 - an existing utility service for a property or customer could potentially be re-worked to include the new EV loads. In the example below, a customer having 4000A panel and only using 1600A for day-to-day operations could add 800A or 1200A of EV load – The existing utility transformer depending on how it was sized at the time of installation should have calculated for the whole panel to be used and should be fine to take on the EV load. All this load would be under one meter for the property.



Example Scenario 2

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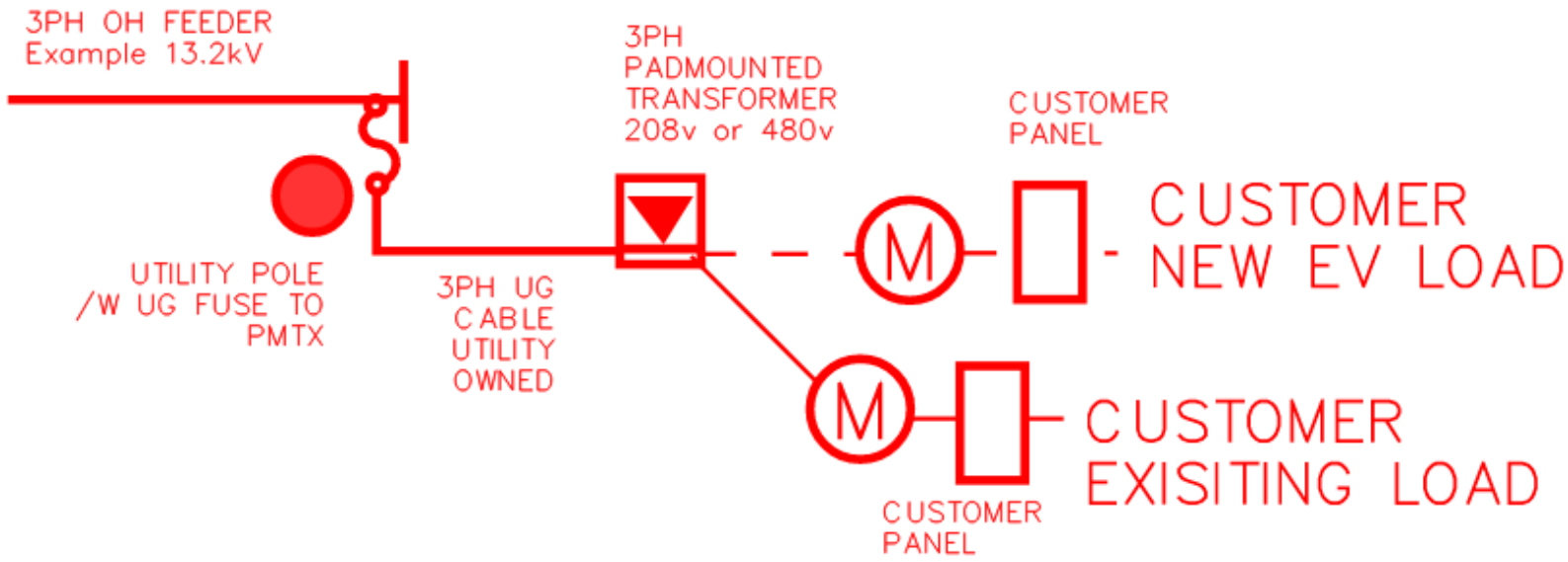
Scenario 2 – an existing utility service for a customer with a 1200A panel is using the full potential of the panel, with no additional room for growth. The customer can have a new panel installed and a new service cable run to the new panel from an existing utility owned transformer, which might need a separate utility meter depending on EV loads.



Example Scenario 3

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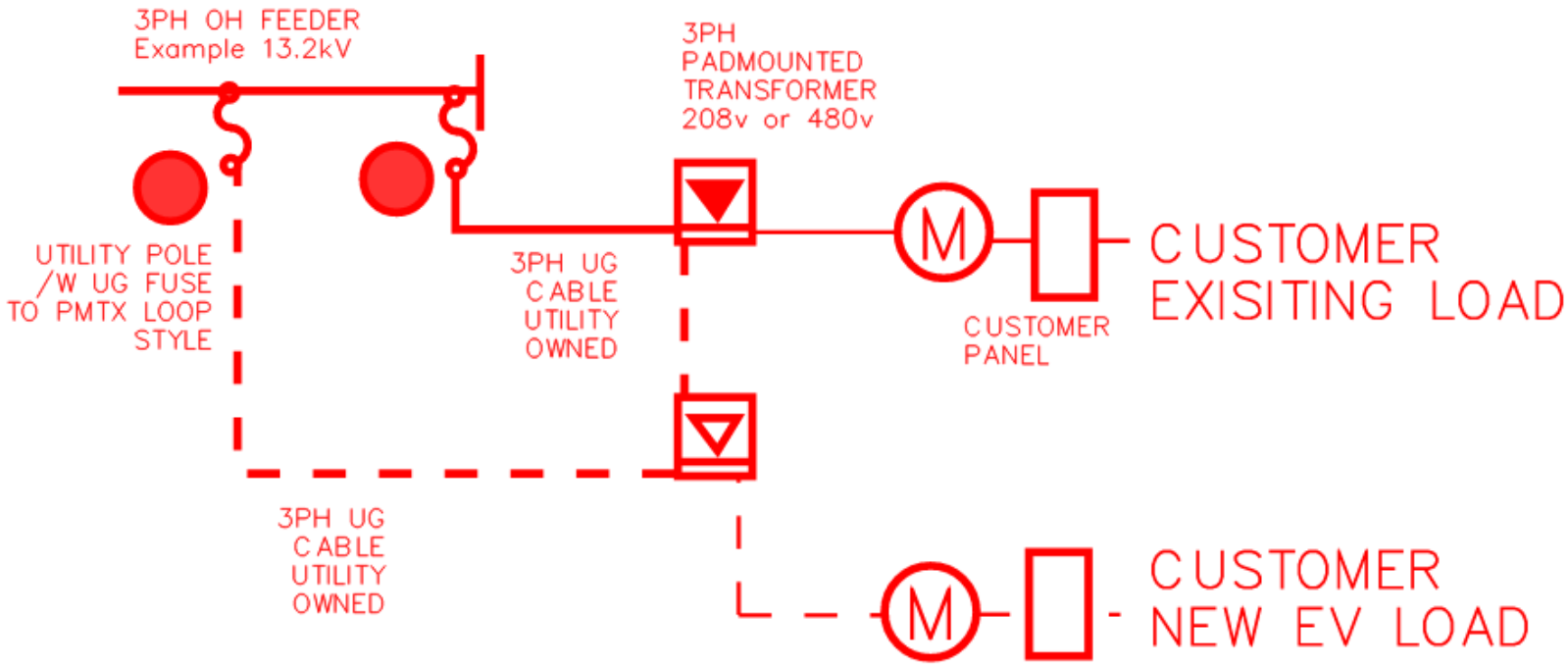
Scenario 3 – an existing utility service for a customer and proposing an additional PMTX, panel, and meter for new a EV load, leaving the existing service on its own PMTX. This would be best on a loop style transformer to ensure reliability. You can install a radial feed with two transformers but would not recommend this configuration.



Example Project Spotlight

New High-Rise Condominium, Miami, FL

Engineering Services

- Planning and engineering for building commercial, residential and EV charging station loads.
  - 391 condominium residences with over 8500 kVA
  - 6000 amperes to support 156x L2 charging ports
  - 1.6MW at 120/208V fed from building electrical vault
  - **Proposed 2x 1000 kVA 120/208V vault transformers**
  - Utility and project management coordination
  - Local permitting coordination

Considerations Required

- ENERCON designed the medium voltage vault system to accommodate existing EV loads and future EV adoption, while still considering long-term transformer heating issues.

Panel Discussion

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QUESTIONS?

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