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INCUBATENERGY LABS
2023
Demo Days

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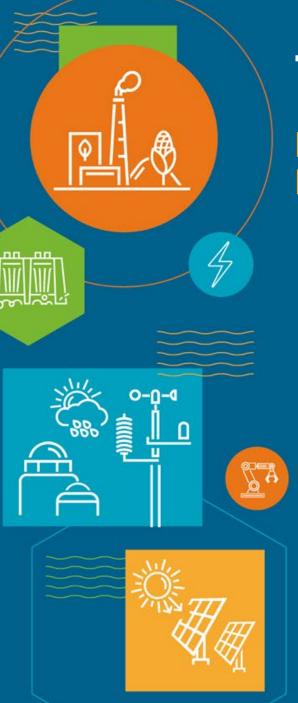November 1-2
Vancouver, BC
Canada
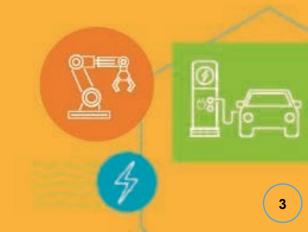
EPRI

TVA / KUB / EPRI Project

Providing Knoxville Utilities Board (KUB) with advanced EV, smart meter and transformer analytics

Rhythmos' mission is to **drive intelligent energy delivery and** use for a world that moves on electricity with modern analytics.
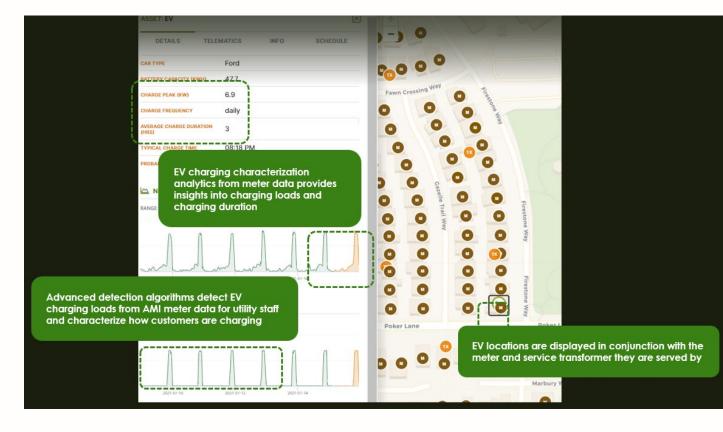
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The Pilot

Pilot Overview

Key Objective: Test and demonstrate our first three modules (EV Detection, EV Charging Disaggregation and Characterization, and Transformer Loading) using KUB's AMI and GIS data

Key Deliverables:

- Weekly operational EV Detection and Charging Characterization reports

- Weekly Transformer Loading reports for majority of service territory

- Utility dashboard showing service transformer loading, detected EV locations, EV charging history

- EPRI evaluation to assess algorithm performance for EV Charging Disaggregation and Characterization - pending

- Rate impact assessment report - pending

Utilities are facing a $2 Trillion Problem

Supply challenges	Fragile Infrastructure	Labor Issues	Evolving Regulations

Electrifying transportation along with goal to electrify everything could increase power demand by 65% by 2050.

Typical utility will need to invest between $1,700 and $5,800 in grid upgrades per EV through 2030 (*source: Boston Consulting Group*)

- Transformer backlogs, long lead-times and price escalation
- Insufficient distribution capacity
- Utility line crew labor shortages
- Limited regulatory approval to rate-case grid expansion costs

Results and Learnings

Results & Learnings

Overview

- Approx 3.5 years of historical AMI data ingested, with weekly ingestion beginning August 2023

- Dataset includes over 200k meters and over 80k service transformers

- All core algorithms running on a weekly basis: EV Identification, Characterization, Disaggregation, Transformer Loading and Forecasting

Results

- The EV Identification algorithms has initially identified meters exhibiting L2 EV charging behavior - additional analysis is underway

- EV Disaggregation and Characterization being run on identified meters

- Underlying weekly report format now approved and will begin providing in coming weeks
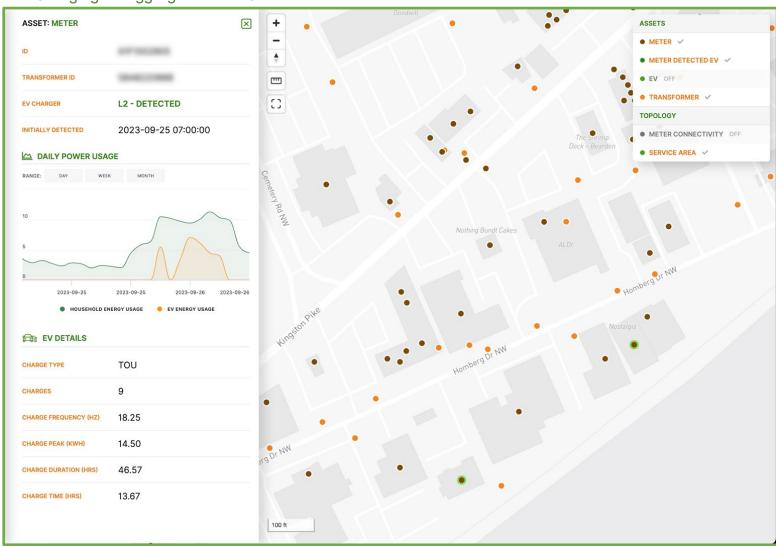
Utility Dashboard

AMI Meters Displayed In Service Territory

Detected EVs Displayed

EV Charging Disaggregation and Characterization

ASSET: METER

ID	
TRANSFORMER ID	
EV CHARGER	**L2 - DETECTED**
INITIALLY DETECTED	2023-09-25 07:00:00

DAILY POWER USAGE

RANGE: DAY WEEK MONTH

● HOUSEHOLD ENERGY USAGE ● EV ENERGY USAGE

EV DETAILS

CHARGE TYPE	TOU
CHARGES	9
CHARGE FREQUENCY (HZ)	18.25
CHARGE PEAK (KWH)	14.50
CHARGE DURATION (HRS)	46.57
CHARGE TIME (HRS)	13.67

What's Next

Next Steps

- M&V phase led by EPRI, sub-metered EV's in process of being installed in Q4 2023 to validate EV algorithm results in Q1 2024

- Service transformer loading and forecasting

- Deeper analysis of detected EV's to quantify impacts on associated service transformers and upstream assets

- Rate impact assessment to quantify benefits of optimized managed charging

Our Team

Thank you to our project partners!

Utility Representatives:

James Linder, Program Manager, Innovation Scouting, TVA - Project Champion

Ryan Stanton, Sr. Project Manager, EV Evolution, TVA - Project Champion

Caroline Cate, Project Manager, EV Evolution, TVA - Project Champion

Mathew Stinnett, Manager Electric Engineering, KUB - Project Sponsor

Startup Representative:

Mark Rawson, SVP Partnerships and Strategy, Rhythmos - Project Lead

EPRI Representative:

Shelly Meintzer, Project Operations Coordinator, EPRI

Krish Gomatom, Technical Leader III, EPRI

ENERGY PROVIDERS