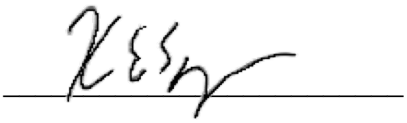
FOREWORD

The purpose of this document is to outline the Electric Vehicle Charger load projection process.

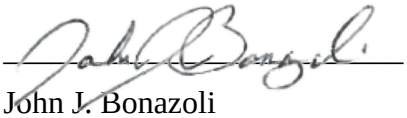
Any questions or inquiries regarding information provided in this document should be referred to the Manager, Distribution Engineering.



11/8/2022

Kevin E. Sprague
Vice President, Engineering

Date



Nov. 7, 2022

John J. Bonazoli
Manager, Distribution Engineering

Date

REVISION HISTORY

Revision #	Date	Description of Changes
0	7/1/2021	Initial Issue
1	10/28/2022	Updated to utilize ISO-NE EV Adoption Forecasts as Basis for Projections

Table of Contents

1.0 Introduction

1.1 Purpose

The intent of this document is to provide a guideline to assist Distribution Engineering personnel in the process of projecting the ten year load contribution of electric vehicle charging for each operating system.

The results of the projections should not be used as the sole justification for system upgrades, instead they are intended to be used as a tool to assist in determining when system upgrades could be needed.

This guideline is not intended to be an all-inclusive, step-by-step procedure and should not replace sound engineering judgment.

1.2 Applicability

This document applies to the projection of electric vehicle charging load on the Unitil electric systems that will be utilized when assessing the overall performance of the electric system at forecasted future load levels. This procedure is not applicable for forecasting individual distribution circuit of distribution substation transformer electric vehicle charging load.

1.3 Responsibilities

This procedure is written and maintained by the Distribution Engineering Department to whom any questions relating to its content or application should be addressed.

1.4 Availability

Current copies of this procedure can be found on the Engineering Department Only Drive. Hard copies are not version controlled.

NOTE: Only up-to-date versions of the documents are posted on the Engineering Department Only Drive. All other revisions (both electronic and hardcopy) should not be referenced.

2.0 General Information

2.1 Abbreviations and Acronyms

DCFC	DC Fact Chargers (Level 3 chargers)
DMV	Department of Motor Vehicles
EEI	Edison Electric Institute
EV	Electric Vehicle(s)

EVC Electric Vehicle Charger(s)

ISO-NE Independent System Operators – New England

3.0 Scope

To support the need for system upgrades due to EV penetration, ten year EVC load forecasts shall be developed annually for each distribution operating company.

The process for forecasting EVC load requires the development of ten year registered EV projections and the number of Level 1 and Level 2 EVC. Along with assumed utilization profiles these projections are then used to forecast the contribution of EVC load for each hour of the day. DCFC facilities are included in the forecasts as "step adders" that get added to the Level 1 and Level 2 EVC forecasts.

Unitil has elected to utilize the ISO-NE EV Adoption Forecasts as the basis for its EV load projections. The EEI estimates on the percentage of installed charger types and locations were utilized in determining the number of each type of charger projected to be installed.

Two EV forecasts are created for each operating company, a Baseline Rate and a High Rate. The Baseline Rate is assumed to be 67% of the ISO-NE EV Adoption Forecasts and represents the amount of EVC load that could be realized based on general EV adoption. The High Rate uses 100% of the ISO-NE EV Adoption Forecasts and represents the forecasted amount of EVC load that could be realized with the implementation of EV make-ready, time-of-use rates and/or other incentive programs to promote EV adoption.

All assumptions, including the use of EEI data described above shall be reviewed on a regular basis to determine if and when any changes are needed.

It is important to note that these projections are utilized for planning purposes to assist in the direction of system improvements and are not a "prediction" of specific EV load contributions that will ultimately be experienced.

4.0 Forecasting Methodology

It is understood that the EVC load forecasting methodology described could be conservative. In the event that the inclusion of these projections indicate the need for system improvements, additional analysis shall be performed and/or field measurements (application of load loggers, installation of additional metering, etc.) taken to determine the severity of the identified concern.

4.1 Forecasting the Number of EV

The first step in forecasting EVC load is forecasting the number of EV in Unitil's service territories. This starts with estimating the number of existing registered EV.

The number of current registered EV in each of Unitil's service territories is estimated based on ISO-NE EV stock (registered vehicle) data and/or available DMV data. The ISO-NE EV Adoption Forecasts are then utilized to calculate ten year forecasts of the estimated number of

EV. One-hundred percent of the ISO-NE EV Adoption Forecasts is used to calculate the High Rate and sixty-seven percent of the ISO-NE EV Adoption Forecasts is used to calculate the Baseline Rate.

4.2 "Nameplate" EVC Load Forecasts

Engineering judgement regarding the number and type of residential chargers per registered EV and EEI estimates regarding the percentage of each type charger (home, public, workplace) is used to forecast the number of each type of charger.

Typical "nameplate" loads of EVC are applied to the forecasted Level 1 and Level 2 chargers for each year. Due to the limited number of DCFC facilities Unitil has elected to treat these facilities as "step adders". These "step adders" get added to the Level 1 and Level 2 EVC nameplate load forecasts to create both Baseline Rate and High Rate "nameplate" EVC load forecasts.

4.3 Hourly EVC Load Forecasts

Engineering judgement is used to develop hourly utilization percentages for home, public and workplace EVC. These utilization percentages are applied to the "nameplate" EVC load forecasts for each hour of the day to calculate Baseline Rate and High Rate hourly EVC forecasts.

5.0 EVC Load Forecast Publications

A publications shall be issued annually that documents the EVC load forecasts for each operating company. This publication should include the final system EVC forecasts (at the historical system peak hour and the assumed peak EV charging hour), assumptions used in developing the forecasts, and the projected number of registered EV for each operating company.