Orange & Rockland
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INVERTER-BASED RESOURCES PERFORMANCE REQUIREMENTS

Transmission and Substation Engineering Department
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Revision History

Version	Date	Document Revision
0	2/1/2020	New

TABLE OF CONTENTS

I. INTRODUCTION

In September 2018, North American Electric Reliability Corporation (NERC) issued a Reliability Guideline on BPS-Connected Inverter Based Resource Performance. In that document, NERC mentioned that the North American bulk electric system and underlying electric grids are undergoing rapid changes in generation mix with increasing amounts of renewable generation such as wind, solar and energy storage power plants. These resources are asynchronously connected to the electric grid and are either completely or partially interfaced with the BPS through power electronics, hence referred to as "Inverter-Based Resources (IBRs)."

Like any other utility, Orange and Rockland Utilities/Rockland Electric Company ("ORU/RECO") has experienced an influx of these IBRs in recent years. This document describes ORU/RECO general performance requirements for these types of resources connecting to 69 kV and above transmission system. It should be noted that only the general performance guidelines for the ORU/RECO system are included. For specific requirements, the developer and/or requesting party should utilize NERC's Reliability Guideline document as a reference.

II. APPLICABILITY

This document focuses on IBRs directly connected to the ORU/RECO transmission system only (i.e. 69 kV and above). Resources connected to the distribution system (i.e. 34.5 kV and below), also referred to as Distributed Energy Resources (DERs) should follow the recommendations of the IEEE Standard 1547-2018.

III. MOMENTARY CESSATION

Momentary cessation, also referred to as “blocking”, is when no current is injected into the grid by the IBRs during low or high voltage conditions outside the continuous operating range. This occurs because the power electronic firing commands are blocked, and the inverter does not produce active or reactive current (and therefore no active or reactive power).

IBRs connected to the ORU/RECO transmission system are expected to continue to inject current inside the “No Trip” zone of the frequency and voltage ride through curves of PRC-024-2 (see **Figure 1** and **Figure 2** below). Existing and newly interconnected IBRs should eliminate the use of momentary cessation to the possible extent.

IV. FREQUENCY CONTROL

IBRs connected to the ORU/RECO transmission system should ensure that the frequency measurement and protection settings are set such that these resources are able to ride-through and not trip for grid disturbances and should be within the frequency ride-through capability curve (see **Figure 2**). FERC Order No. 842 recommends that new generation is expected to adjust its output to follow its droop of 5% whenever the frequency is at least outside of $\pm$ 0.36 Hz.

V. VOLTAGE CONTROL

IBRs connected to the ORU/RECO transmission system should operate in automatic voltage control mode at all times in order to support voltage regulation and voltage stability. The automatic voltage control shall be continuously enabled to control reactive power injection in all expected operating conditions. IBRs should be designed to provide reactive power 0.85 lagging to 0.95 leading at all active power outputs at the Point of Interconnection (POI).

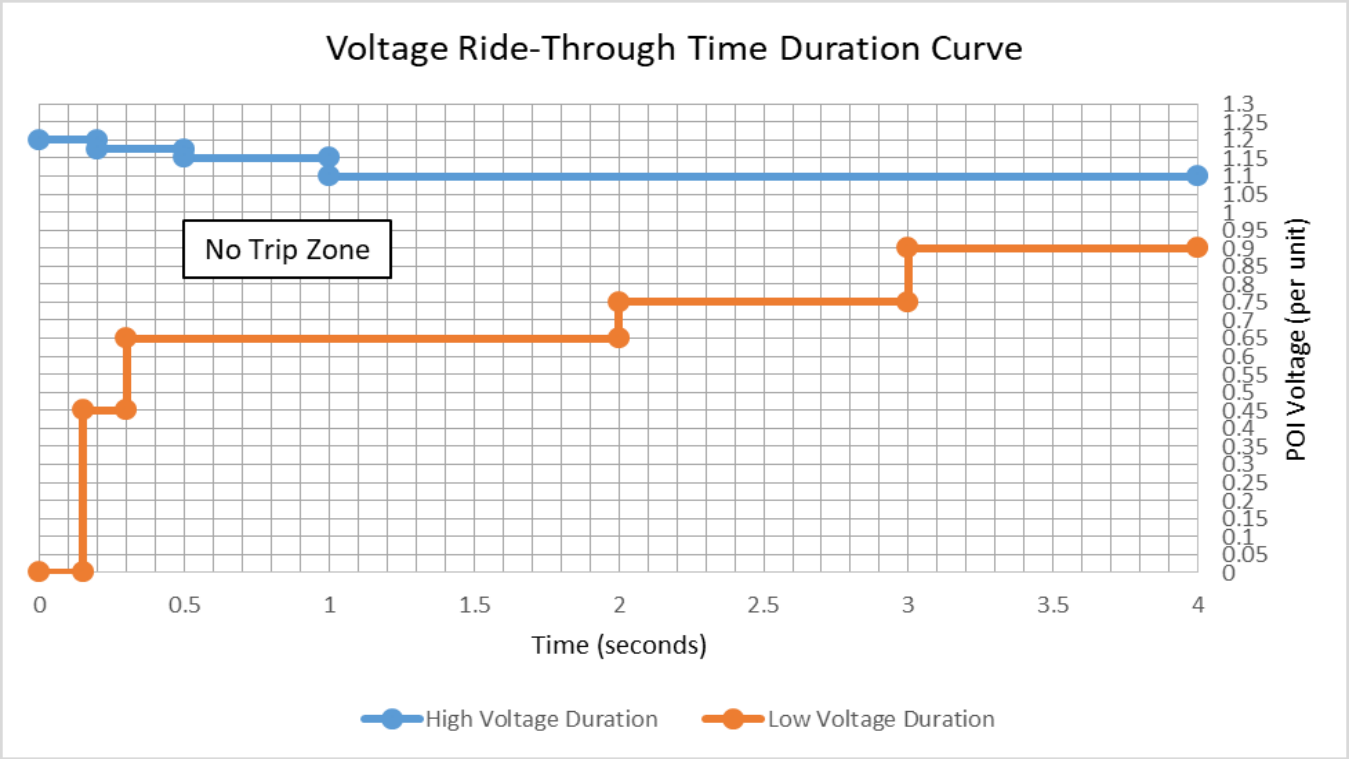

Figure 1: NERC Standard PRC-024 Voltage Ride-Through Duration Curve

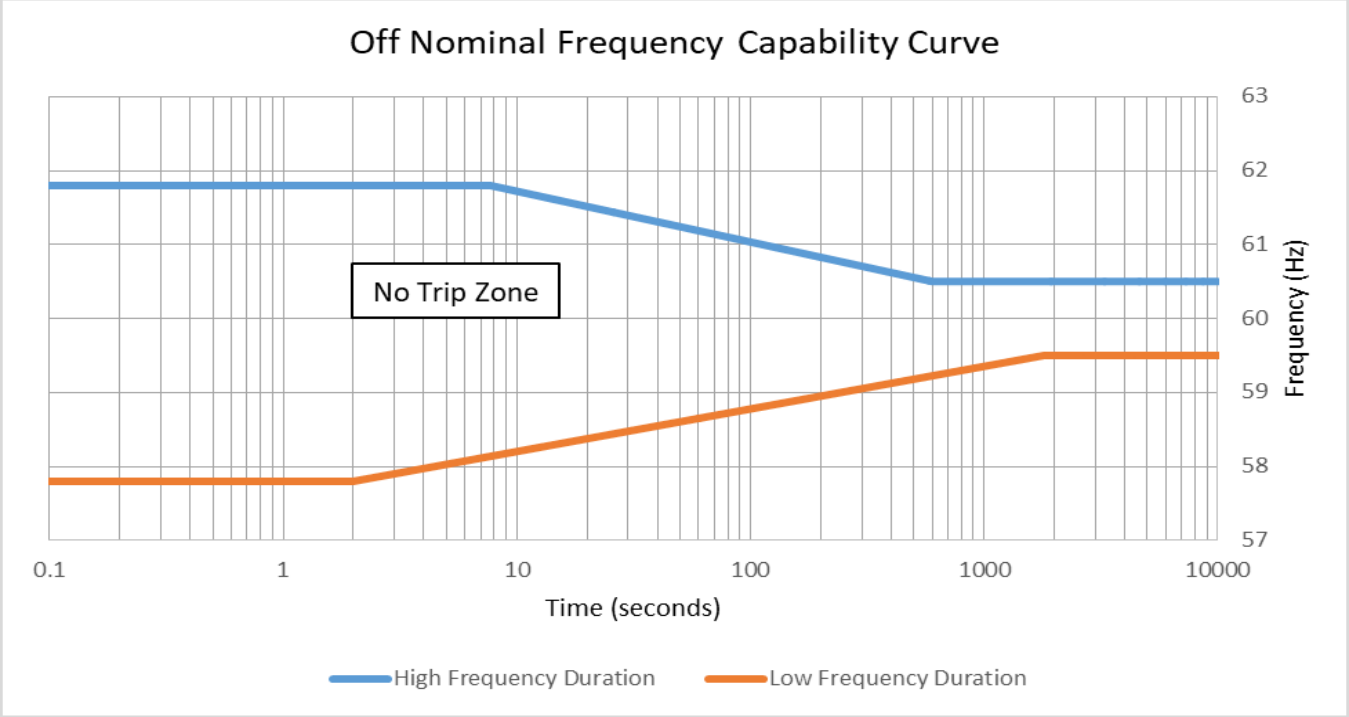

Figure 2: NERC Standard PRC-024 Frequency Ride-Through Capability Curve

VI. REFERENCE

1. NERC's Reliability Guideline on BPS-Connected Inverter Based Resource Performance (September 2018)