

# Stepwise Approach to Investigate the Impact of Energy Transition on Voltage Dips in the Dutch Electricity Grid

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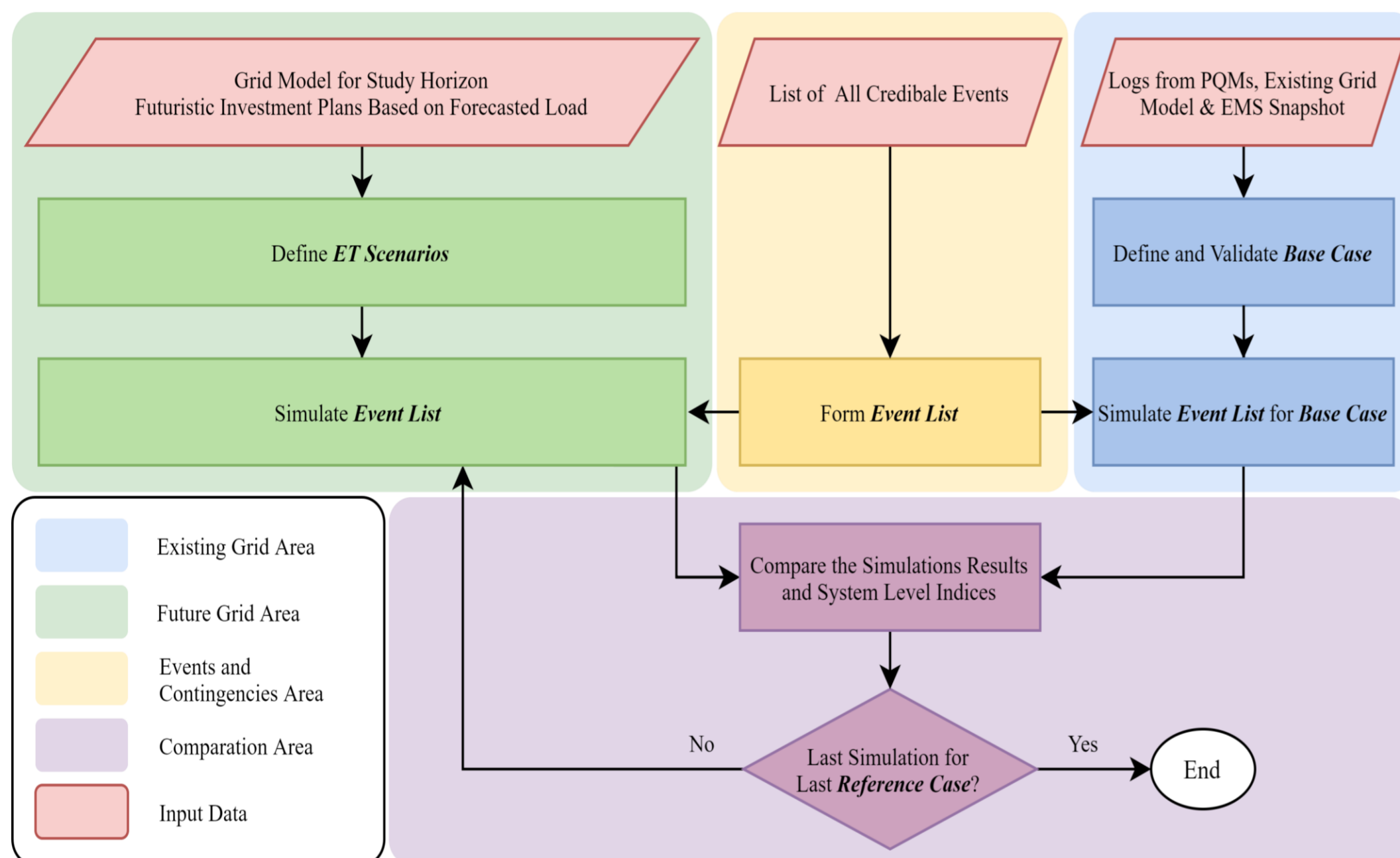
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## Introduction

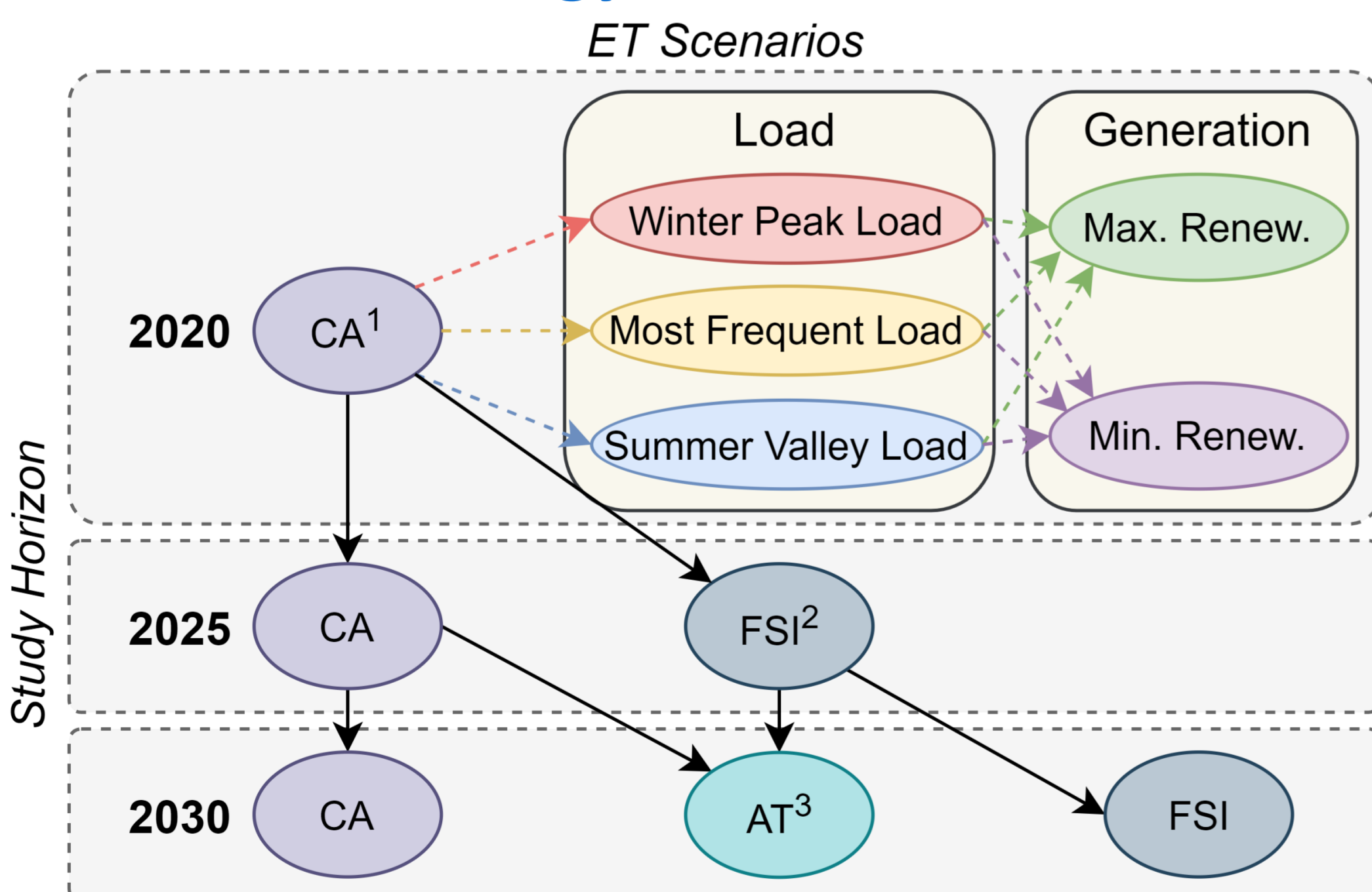
The generation shift from conventional centralized synchronous generation to non-synchronous RESs within the concept of energy transition (ET) would impact the frequency response of the power system, as well as, the short-circuit levels of the system. The former has been considered in many research and regulations, to minimize the impacts on the inertial response of the system. However, there are limited number of works focusing on the latter. The changes in the short-circuit level of the system due to reduction in the share of synchronous generation in the total generation would influence the propagation of voltage dips through the grid, which may affect more connected-parties.

This paper proposes an approach for conducting this impact analysis. Moreover, the registered events by power quality meters (PQMs) in the Dutch EHV, HV and MV grids for the past three years are analyzed as a part of this research.

## Proposed Approach



## Definition of Energy Transition Cases



<sup>1</sup> Climate Agreement: The most probable grid evolution with moderated installed capacity of RES.

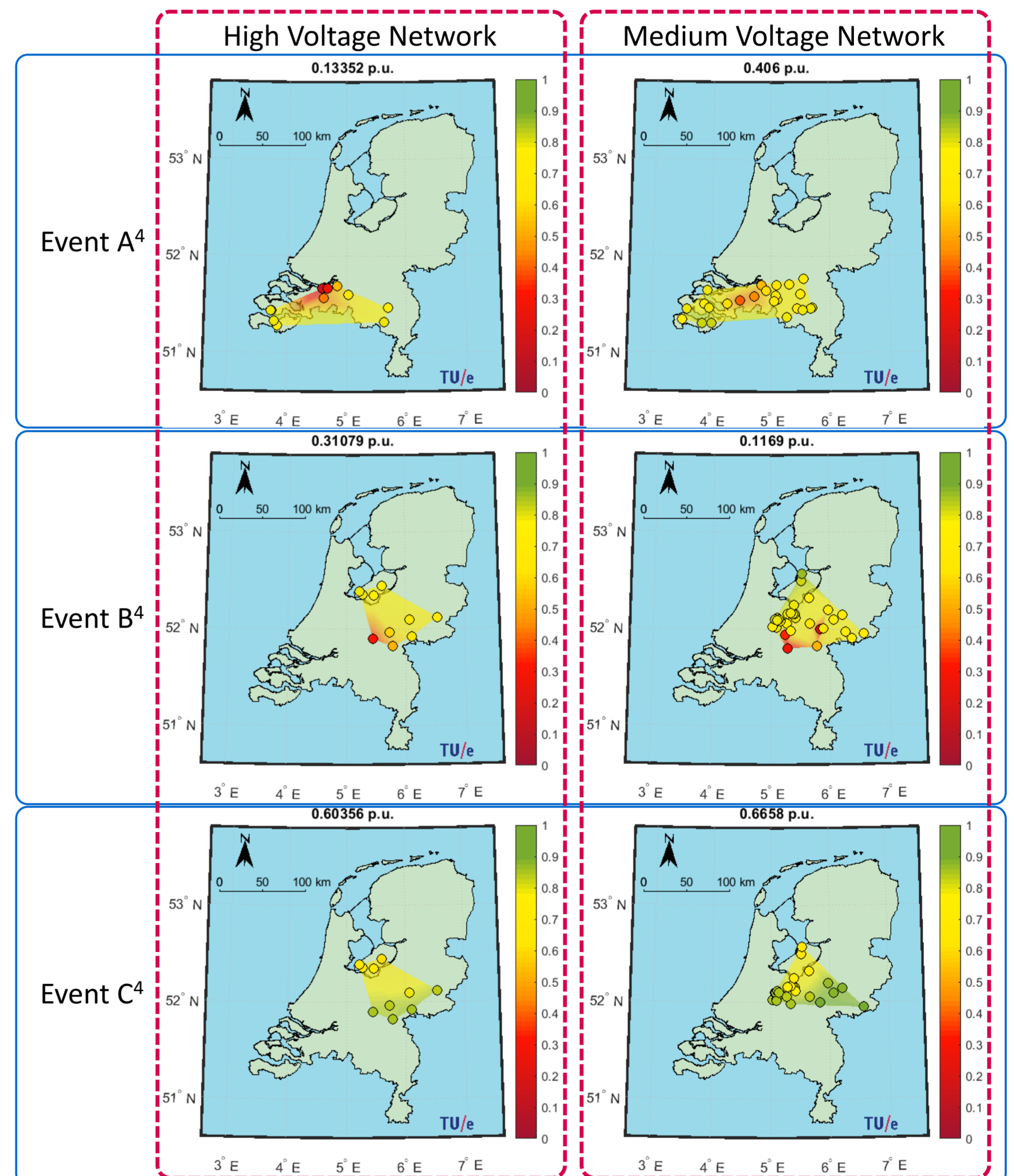
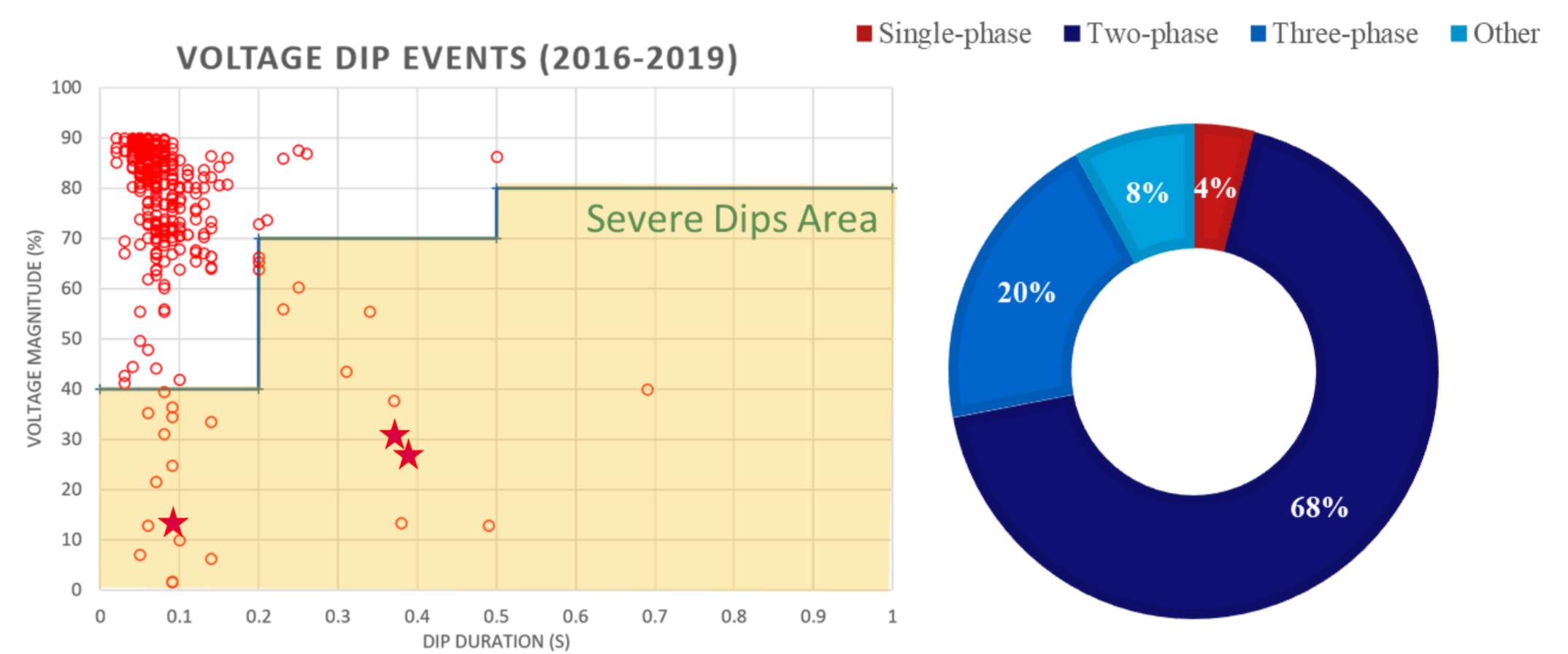
<sup>2</sup> Fundamentals for System Integration: The grid evolution with highest installed capacity of RES

<sup>3</sup> Alternative Transition: The energy grid evolution with most green gas and hybrid heat-pumps.

<sup>4</sup> Event A, B and C are mentioned as Event 2, 3 and 4 in the paper, respectively.

## Analysis of Events Logged by PQMs

Below figures show all registered voltage dip events for three consecutive years (from 01-07-2016 to 01-07-2019).



## Conclusion and Future Works

The introduced step-wise approach considers various aspects for analyzing the impacts of generation shift from centralized large-scale synchronous generation to RESs in the Dutch electricity grids by concentrating on the voltage dips. Moreover, the existing grid status from voltage dip perspective is investigated using PQMs data.

The next steps of this research for identifying the probable impacts of ET on the voltage dips in the Dutch electricity network are identification of ET scenarios, building the simulation setup and doing the sensitivity analysis.

