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## INTRODUCTION

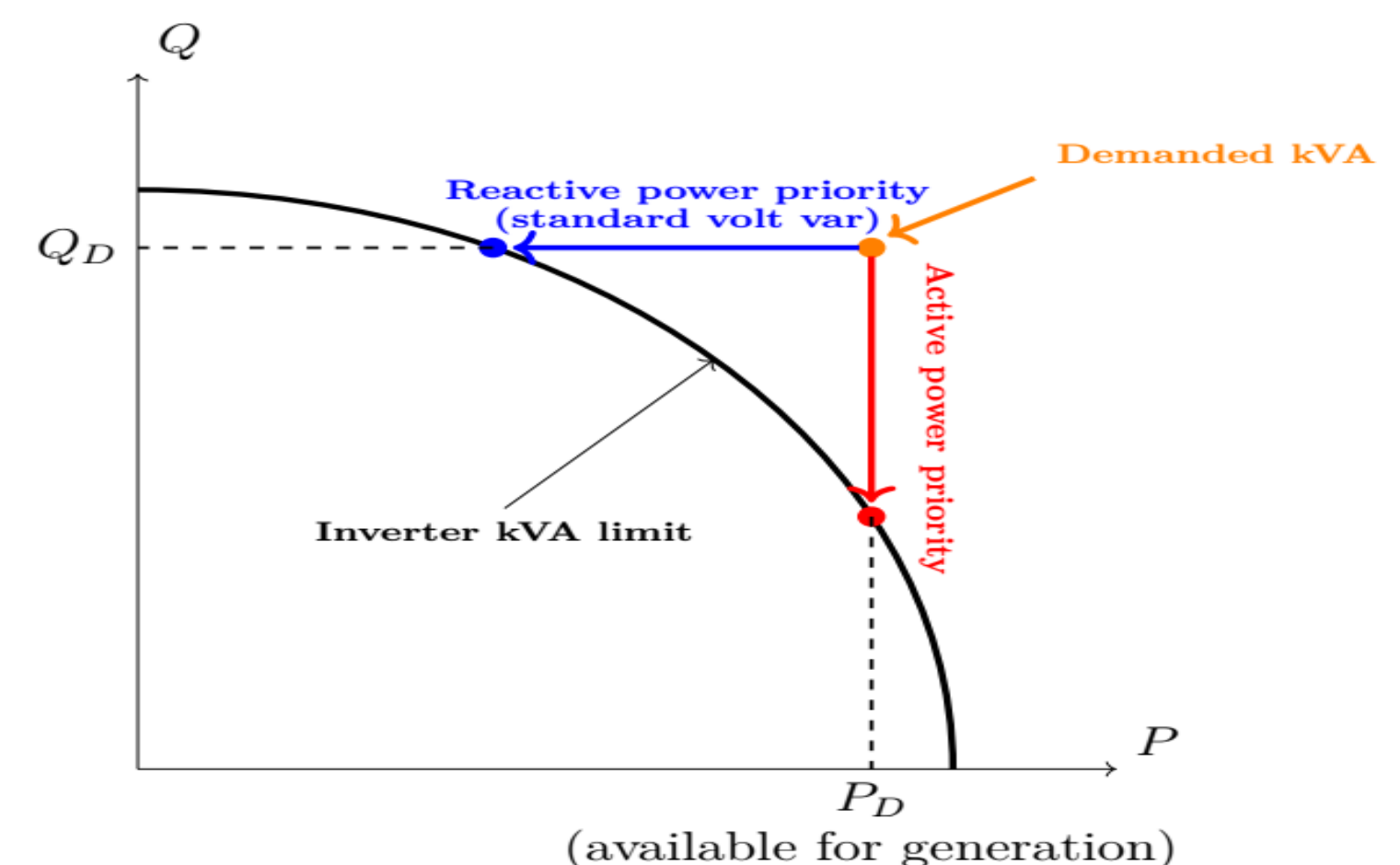
- IEEE 1547 standard requires distributed energy resources (DERs) inverters the capability to operate in different modes to provide support for the electric power system (EPS).
- Voltage-reactive power, also known as Volt-Var control, is one of the most popular requirements. Prioritization of reactive power by the algorithm, as demanded by the standard, however, may result in substantial loss of opportunity of active power injection by the DERs, i.e, lower energy generation.
- The analysis of such impact has not been addressed yet in the literature of any type of DER.
- The impact of this requirement of the 1547 standard on photovoltaic systems (PVs) energy generation is investigated in this work.

## OBJECTIVES

- Evaluate the economic impact of Volt-Var algorithm adoption on PVs energy generation for different levels of penetration in a feeder.
- Analyze the cost-benefit of different alternatives for consumer contribution in voltage regulation.

## METHODOLOGY

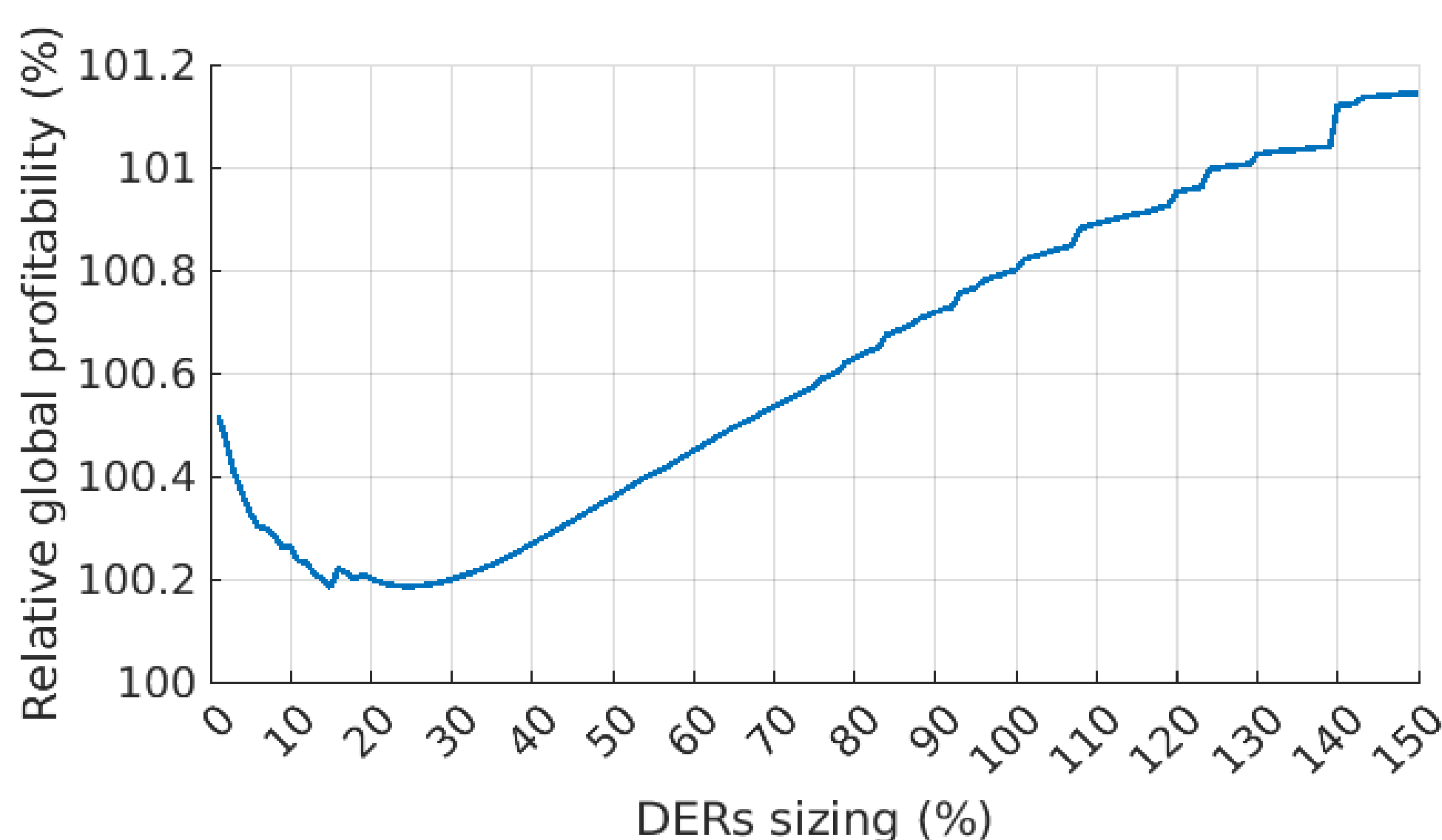
- Populate a feeder with photovoltaic systems.
- Increase the PVs capacity according to their penetration level in a system.
- Analyze the difference in energy production caused by curtailment in active power injection due to reactive power prioritization (see fig. 1).
- Analyze sensitivity of the difference relative to feeder characteristics.



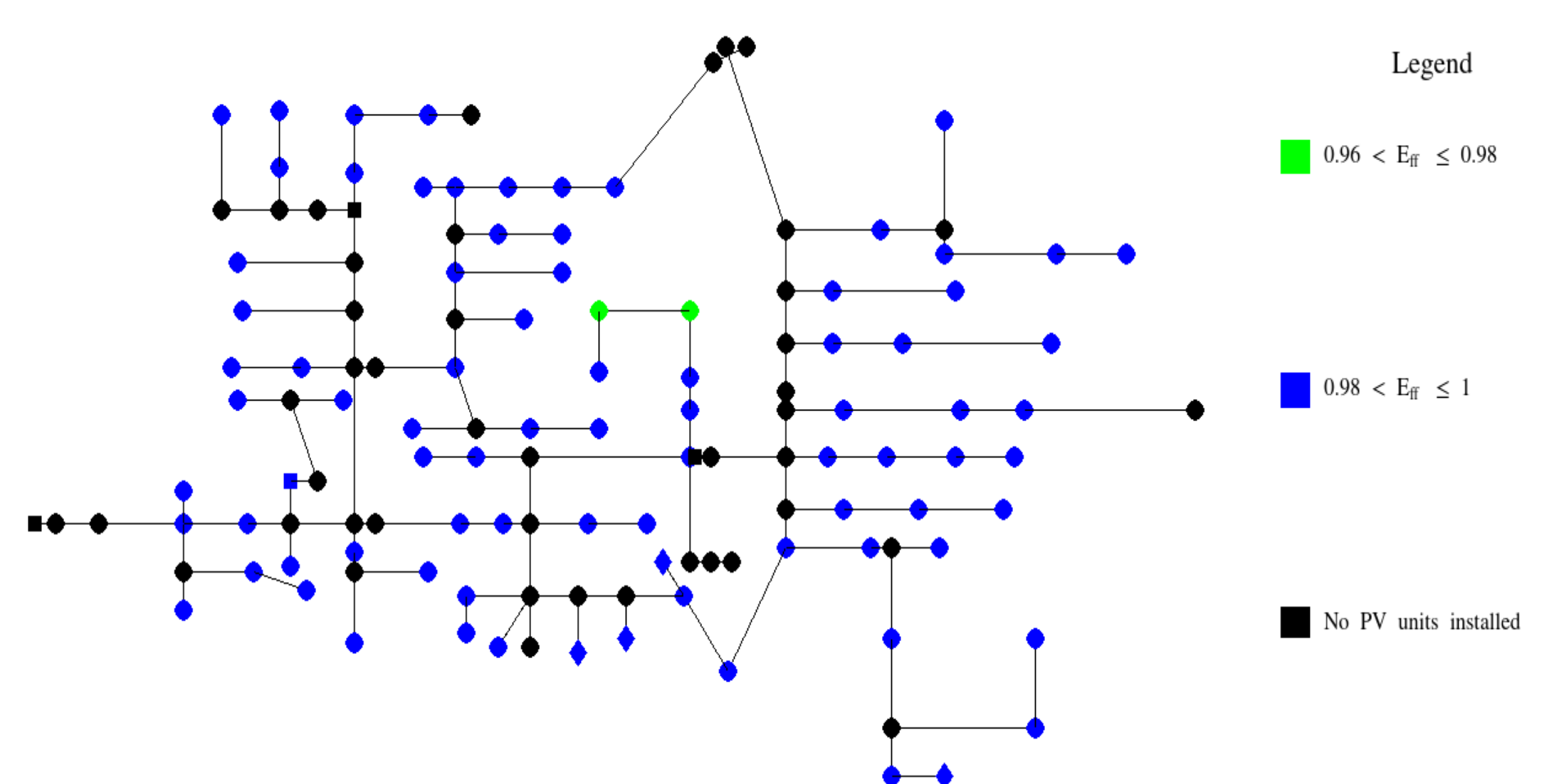
**Fig. 1.** Proposed modification of PVs inverters prioritization algorithm for evaluation of simulations

## RESULTS

- Preliminary analysis (time period of one day) on IEEE 123 Bus test case.
- The difference in energy production was calculated globally (fig. 2) as well as individually (fig. 3).



**Fig. 2.** Global relative profitability for IEEE 123 Bus.



**Fig. 3.** Relative energy production map for test feeder.

## CONCLUSIONS

- Loss of generation due to voltage-reactive power control set by the IEEE 1547 standard may not be negligible, albeit more detailed simulations should be considered.
- The share of curtailment is unequal across units.

## FUTURE WORK

- Execute simulations with different feeders and on a full-year scenario.
- Assess different strategies for photovoltaic systems owners to contribute to voltage regulation.

