

Determinação de Curva Volt-Var Ótima por Busca Exaustiva

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SOLAR PHOTOVOLTAIC
ON GRID SYSTEM

SOLAR PANEL



DC
OUTPUT
FROM
PANEL



Smart Inverter



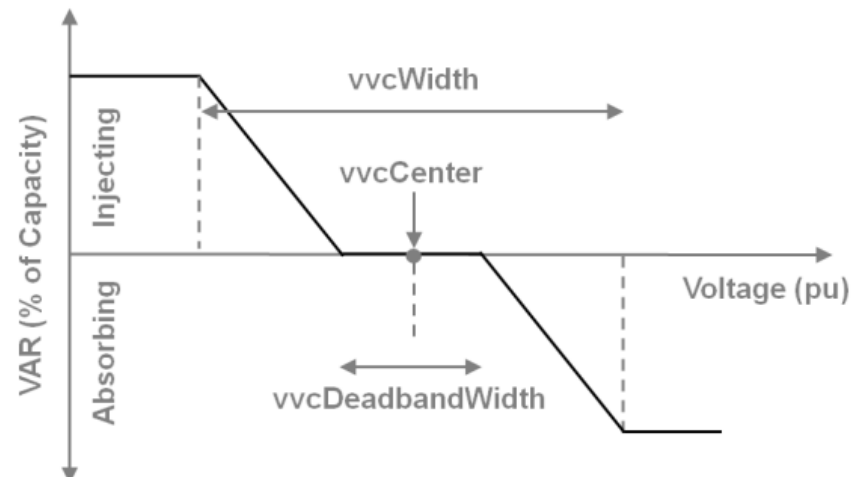
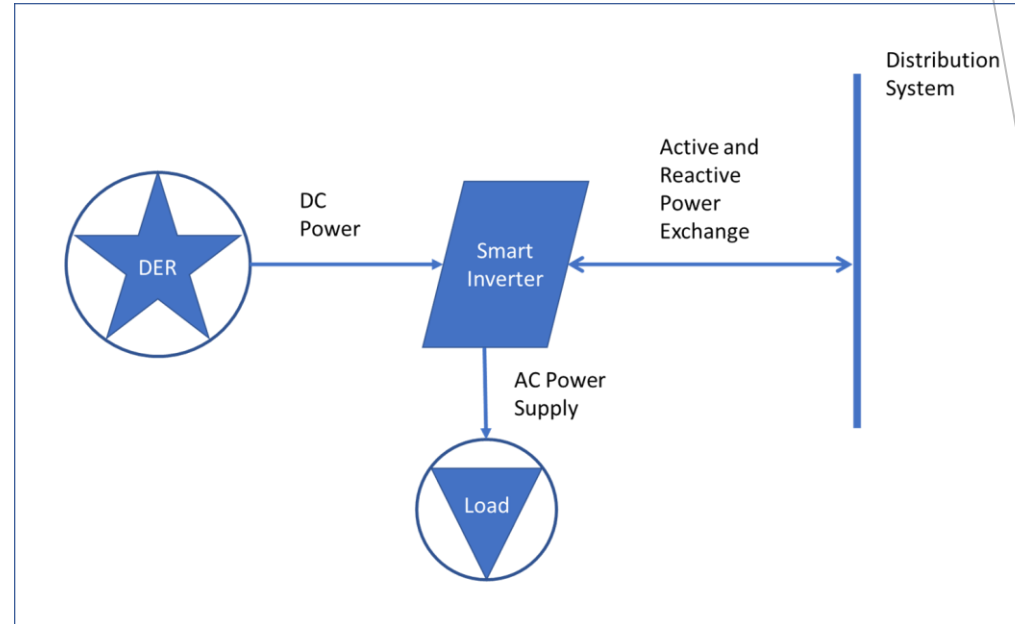
A/C
SUPPLY
FROM
GRID



A/C SUPPLY to
HOUSE

Motivation

- Voltage-related issues are among the most limiting issues regarding the integration of high penetration of distributed energy resources (DER).
- Smart inverter can also supply or absorb reactive power based on Volt-Var curve.
- Hence, Volt-Var curve:
 - Affects the voltage levels and reactive power (VAR).
 - Can be employed to improve voltage profiles for end-use customers and reduce power losses and voltage deviation.

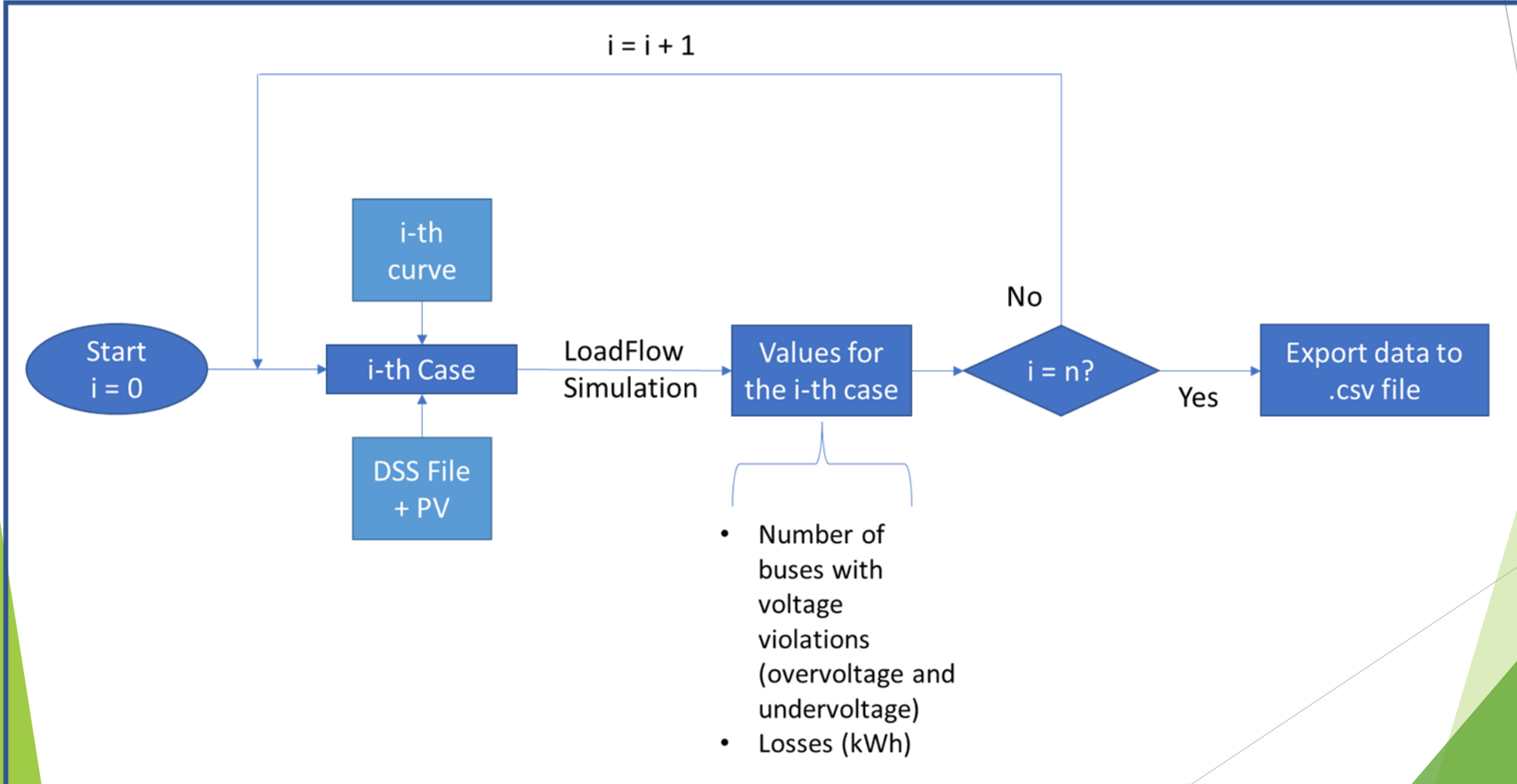


Program

- Given this, an object-oriented program was developed to determine the best volt-var curve within various curves
- The code is generic enough to be used with any distribution grid containing all the common elements such as voltage regulators, capacitor banks, other DER, etc
- This solution can be used in connection studies to minimize the negative impact of PV generators
- The minimization of power/energy losses of entire circuit under normal voltage operation is the selection criteria that will be used.

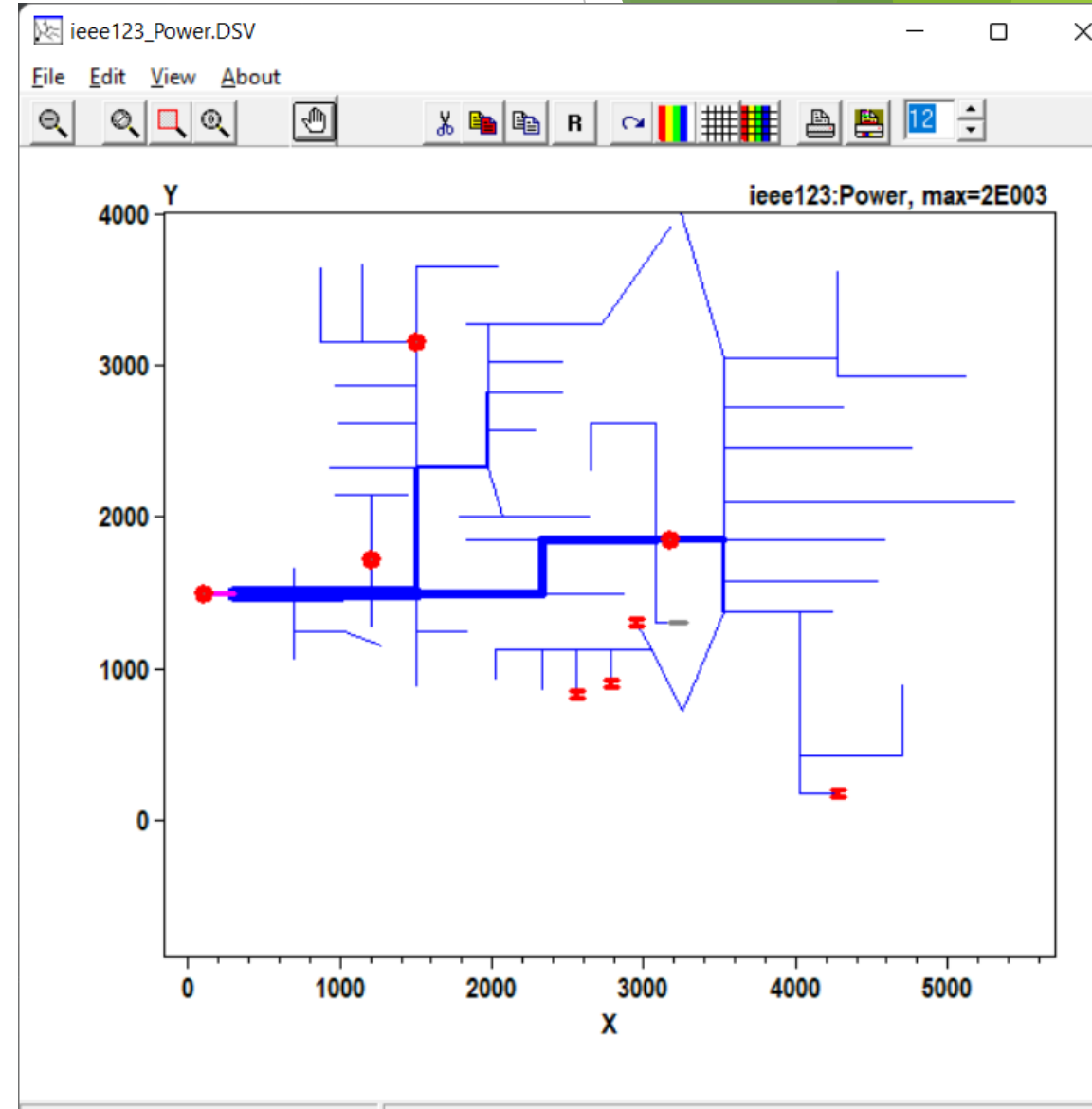
Methodology

Execution



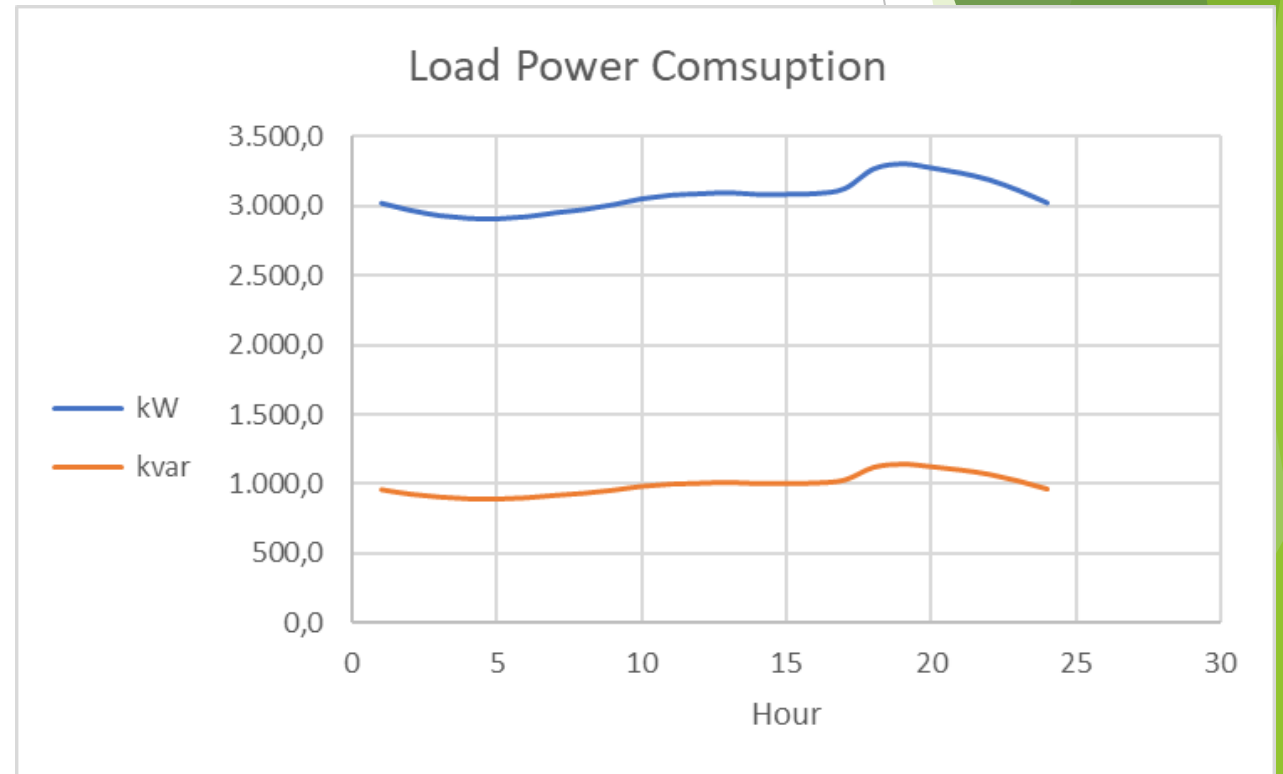
Case Study

- The IEEE 123-bus system in OpenDSS is used for perform this study.
- Nominal voltage of 4.16 kV.
- This circuit is characterized by overhead and underground lines, unbalanced loading with constant current, impedance, and power, four voltage regulators, shunt capacitor banks, and multiple switches.



Case Study

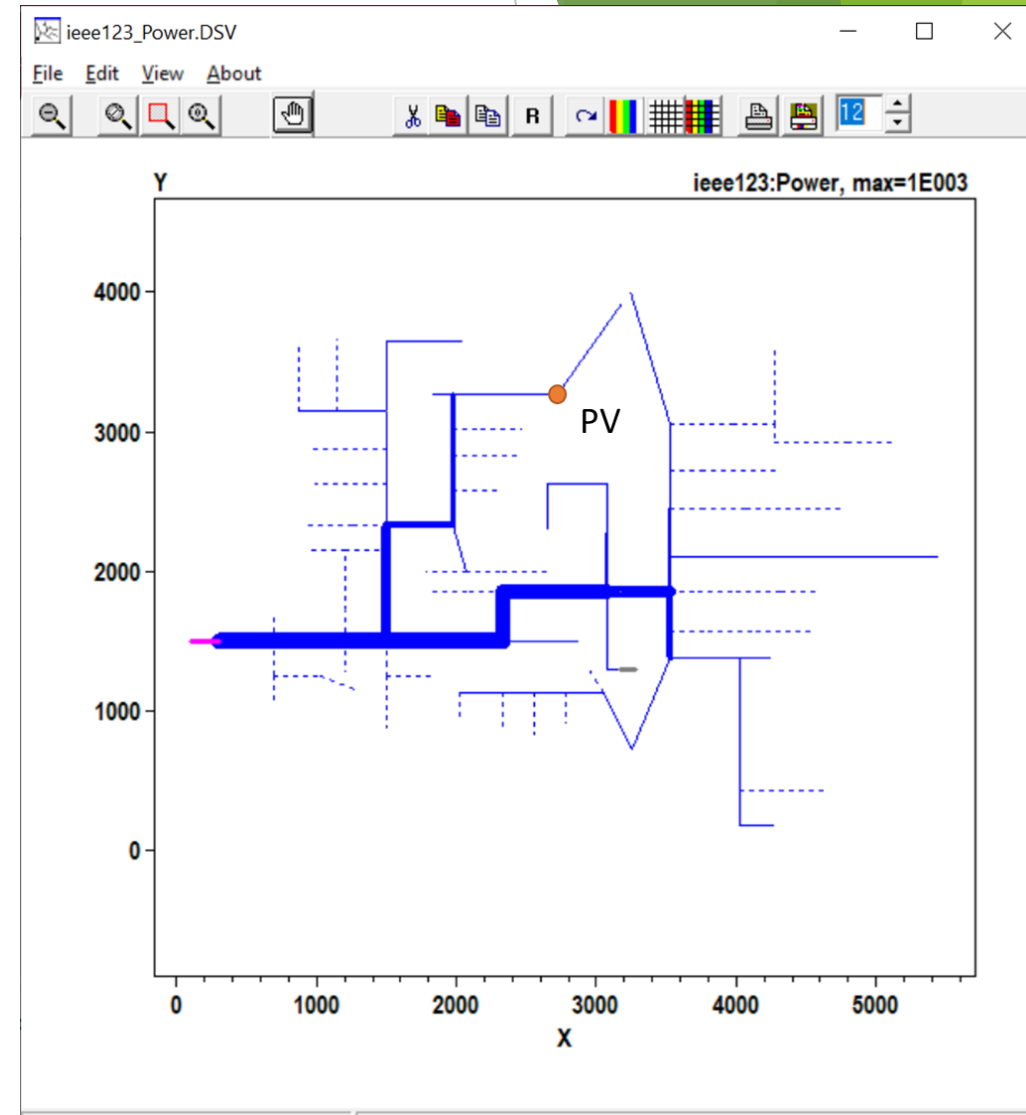
- The power consumption of the loads in the IEEE 123-bus system was altered so that we could analyze the system throughout the day



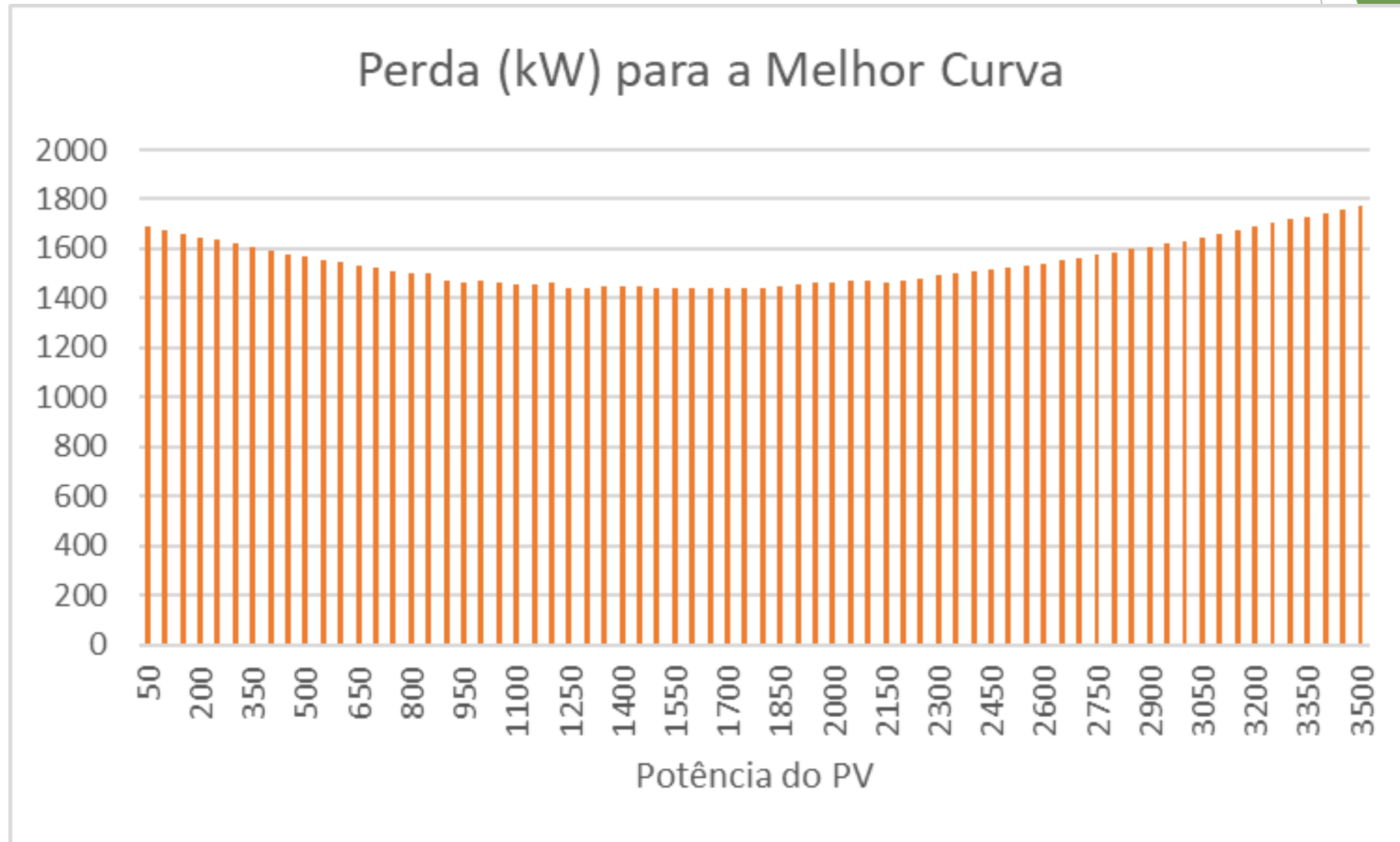
Case Study

- For the case study a PV generator was positioned on the bus 51, far from the substation
- For the case study the power of the PV will gradually increase from 50 kW to 3000 kW

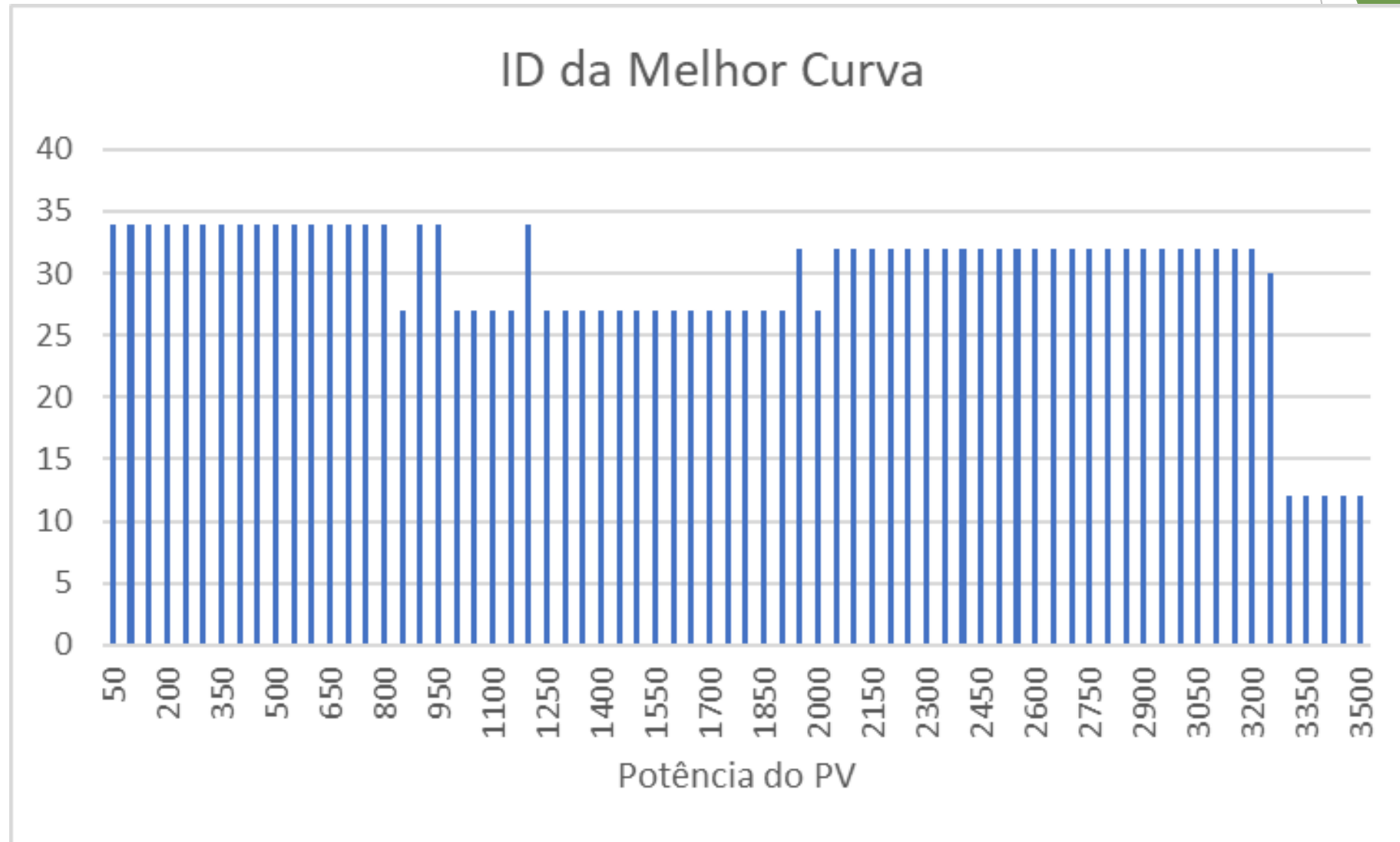
```
New PVSystem.PV phases = 3 bus1 = 51 Pmpp = 500 kV = 4.160  
~ kVA = 500 conn = wye effcurve = Eff  
~ P-TCurve = FatorPvsT %Pmpp = 100 irradiance = 1  
~ daily = Irrad Tdaily = Temperature
```



Numerical Results

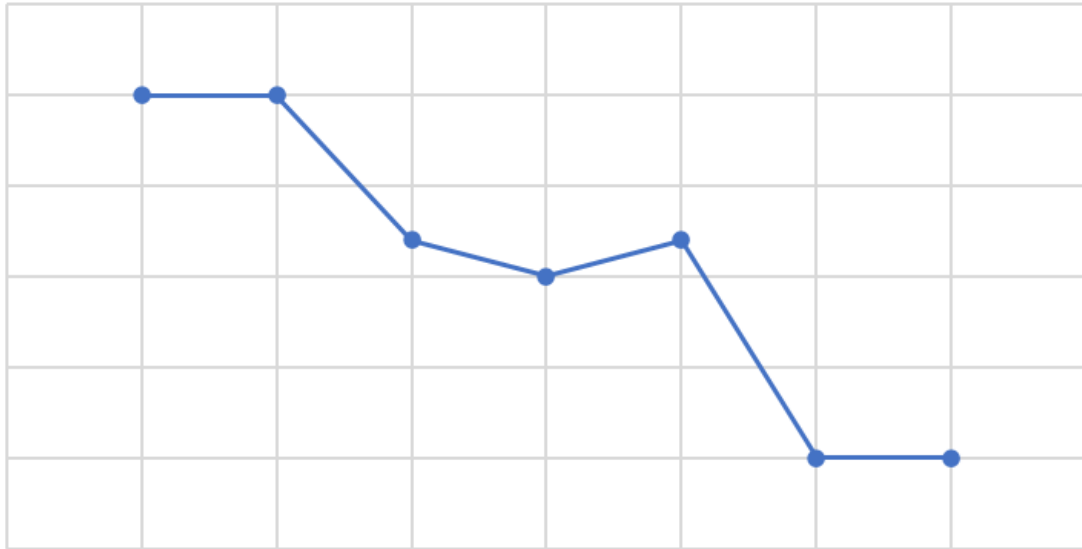


Numerical Results

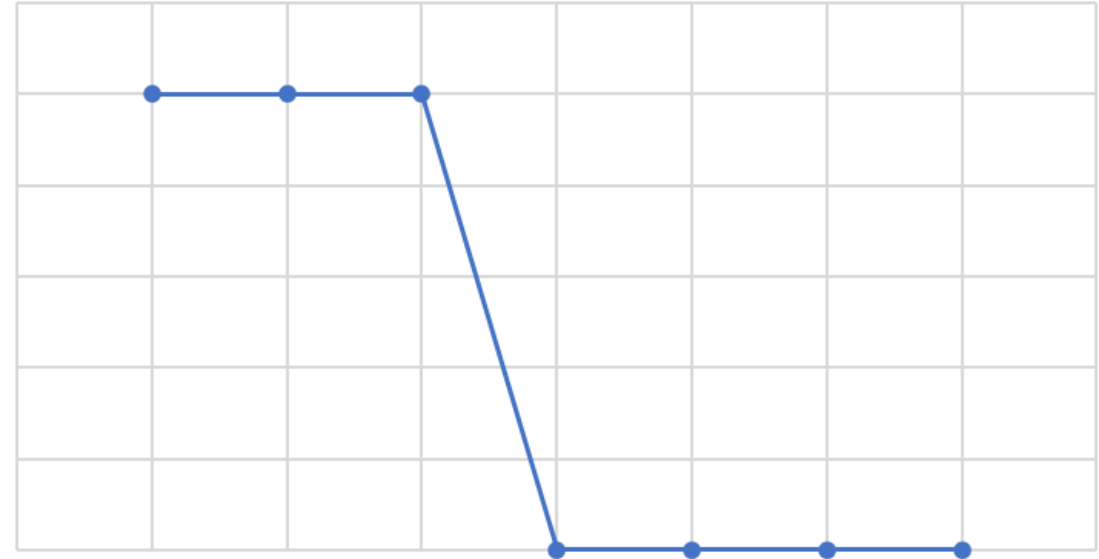


Numerical Results

ID 30



ID 12



Discussion - Benefits of using the py-dss-interface

- ▶ Facility to control OpenDSS in a loop
- ▶ Ability to write a object oriented program, facilitating the manutence and aprimoration of the code
- ▶ Usage of consolidated libraries in Python, such as Pandas
- ▶ Possibility to use more modern IDE with better debuggers, such as PyCharm

Thank
you