EFFECTIVE DISTRIBUTION GENERATION MANAGEMENT

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Abstract : The most favorable distribution generation(DG) like PV generation and wind turbine generation are connected to the distribution network to manage the load demand effectively. These two DGs are modeled and simulated using MATLAB/Simulink. The DGs are connected to the 33 bus SLV real time system .

***Index Terms* – Distribution Generation, SLV System, Generation Management**

I. INTRODUCTION

The potential impact of conventional source of the electrical power generation in power system network is reducing due its various drawbacks. Thus alternate sources like solar, wind , biomass and many more are gaining their importance in power system network as distribution generation and are able to meet the load demand effectively. These DGs are managed smartly to meet the load demand.

II. PROPOSED PV MODEL

The sun's energy when falls on the solar cell or array or module liberate electrons for the production of electrical power is called photovoltaic (PV) process.

This type generation is used because of the following merits.

- Pollution Free
- There is no shortage of Sun's energy
- Maintenance will be less

To increase voltage, current and power handling capacity of the solar cell, cells are connected in series, parallel combination. The solar modules, array and panel is as shown in fig 2.1

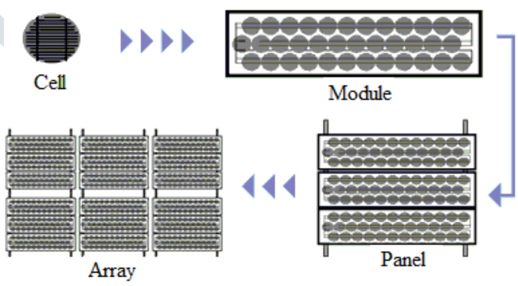

Fig 2.1: Solar Series-Parallel Combinations

It is understood that across countries PV based generation is increasing and China stands first in its generation capacity. The Rajasthan state stands first for its PV generation, even state wise PV generation is also increasing.

The PV generation is simulated using MATLAB/Simulink. The modeling data and simulation is carried out using data from solar plant at Shivnasamudra, Mandya and double diode technique respectively. The solar simulation model with DC output is as shown in fig 2.2. The respective P-V and I- V curves are as shown fig 2.3 and 2.4. The simulation is carried with open circuit voltage of 32.6 V and short circuit current of 8.2 A. The simulation of solar power plant with AC generation is as shown in fig 2.5

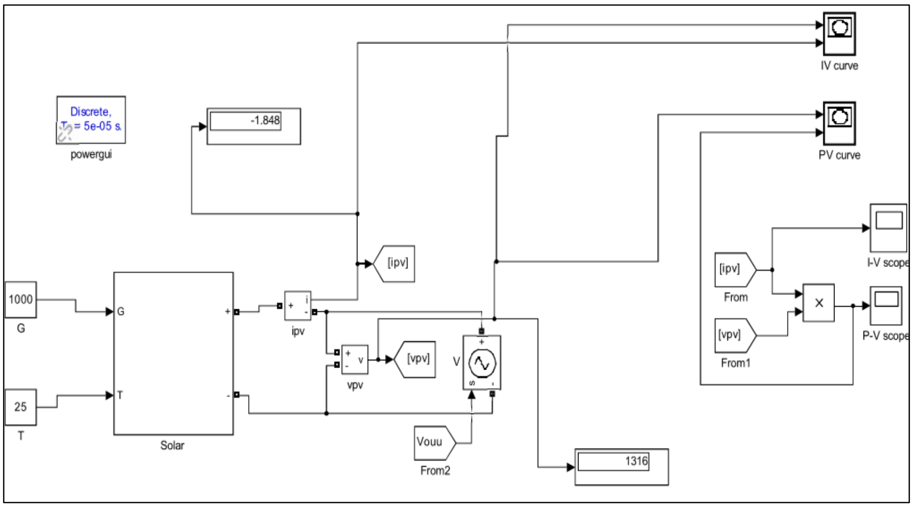

Fig 2.2: Solar Plant Simulation Model with DC Output

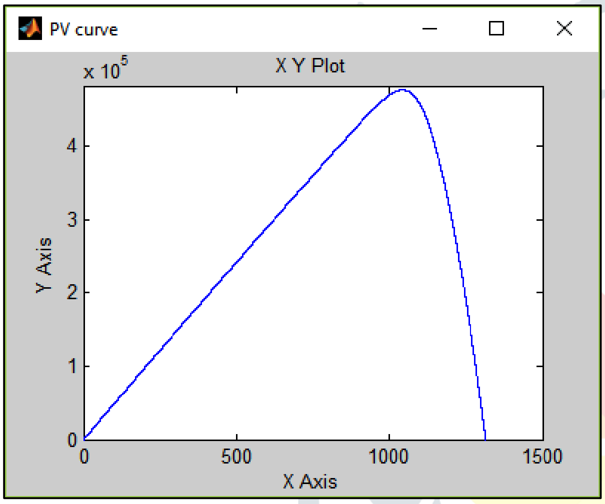

Fig 2.3: P-V Curve

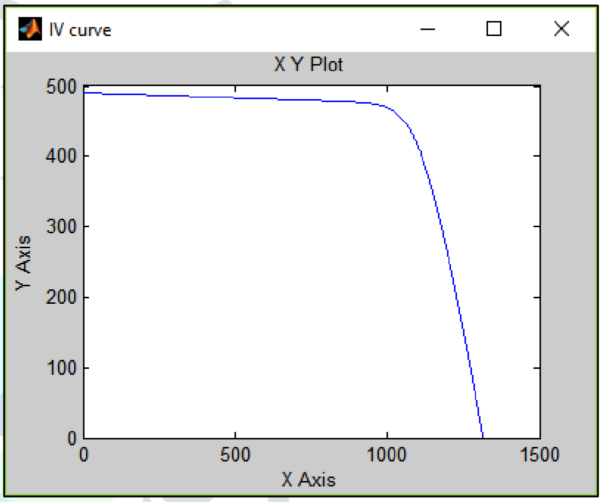

Fig 2.4: I-V Curve

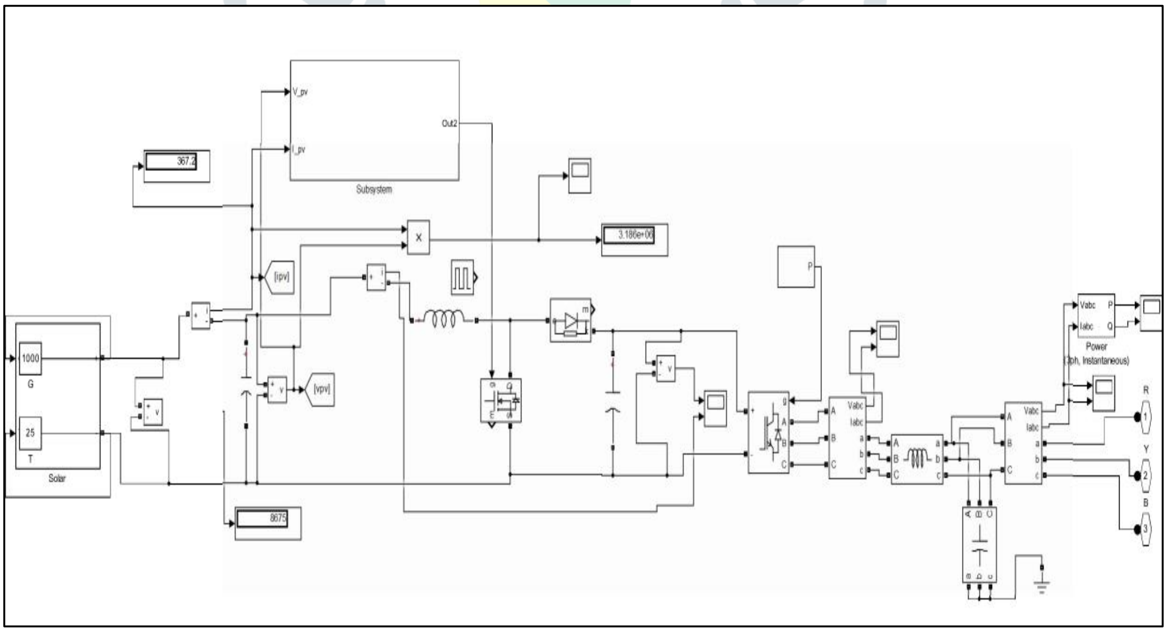

Fig 2.5: Solar Power Plant Simulation with AC Output

III. PROPOSED WIND MODEL

The other type of major distributed generation is wind based. The commonly used wind turbine is horizontal axis turbine. For large scale power generation horizontal axis is preferred. Across countries China stands first for wind generation and across state

Tamil Nadu stands first. The model data and simulation is carried out using data at Sege Gudda, Hassan Wind Plant Generation Unit and MATLAB/Simulink respectively. The wind speed is taken as 12M/Sec.

The modeling is done using Doubly Fed Induction Generator (DFIG) in stationary reference frame and Rotor Control Circuit.

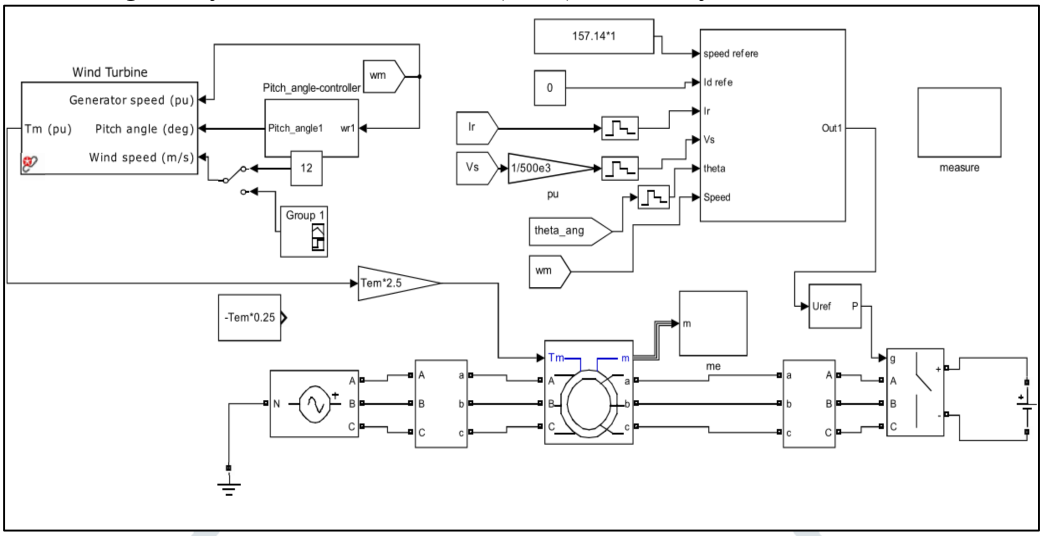

Fig 3.1: Simulink Model of Wind Generating Unit using DFIG

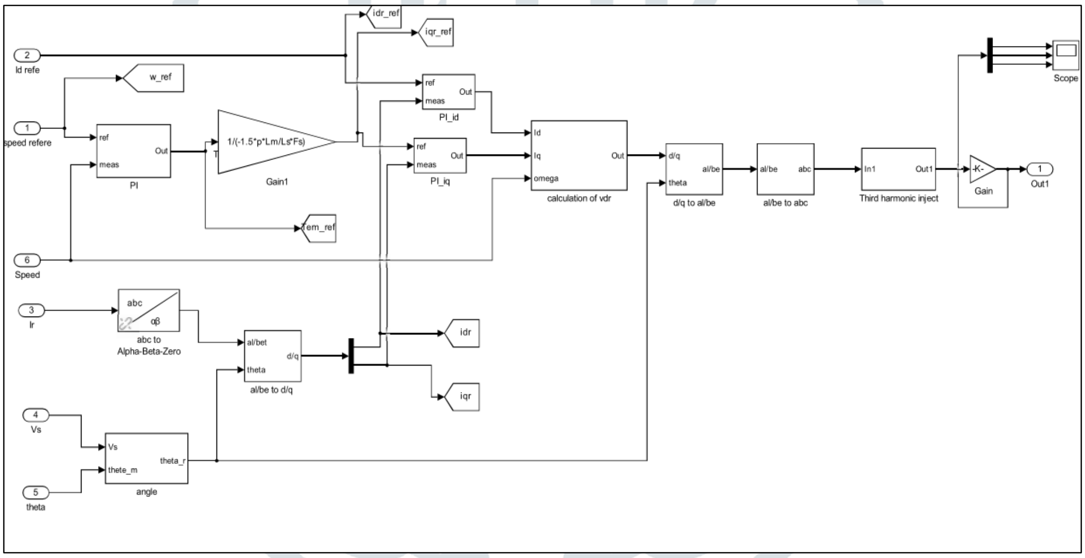

Fig 3.2: Simulink Model Rotor Control Circuit

IV. DGs CONNECTED TO REAL TIME SYSTEM

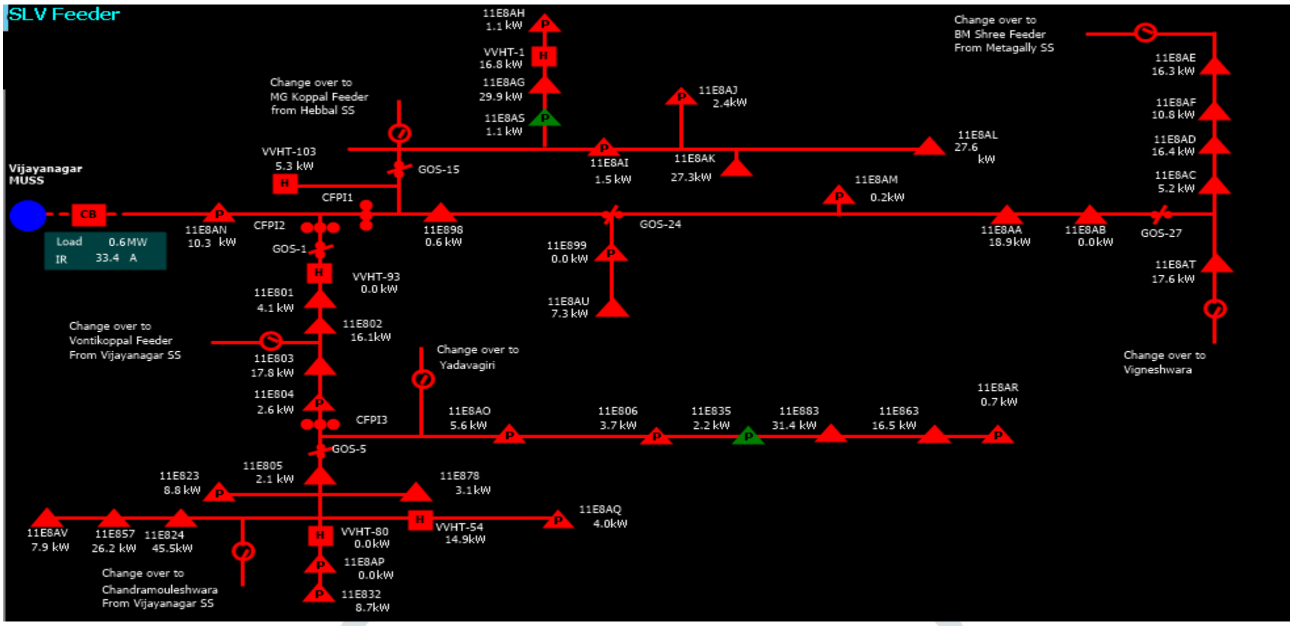

Fig 4.1 SLV Feeder System

The 33 nodes real system of SLV feeder of Mysuru city is as shown in fig 4.1 and same is simulated for analysis. The type of connected load is PQ with star connection. The power consumption details of the connected load are collected from Smart Grid Centre , Mysuru city and same is used the analysis purpose. DG is connected to first node to do the analysis.

V. RESULTS AND DISCUSSION

For the simulated model as shown in fig 2.5 the AC output is as shown in fig 5.1 with irradiance of 1000 W/M^2 and temperature of 25ºC

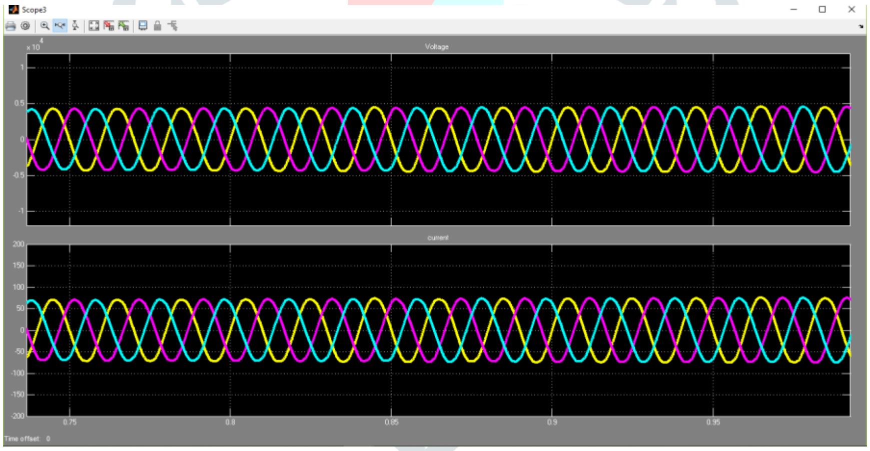

Fig 5.1: Voltage and Current Output of the AC side of the Solar System with Irradiance of $1000W/M^2$

The wind generation simulation model as shown in fig 3.1, the stator voltage, stator current and rotor current is as shown in fig 5.2

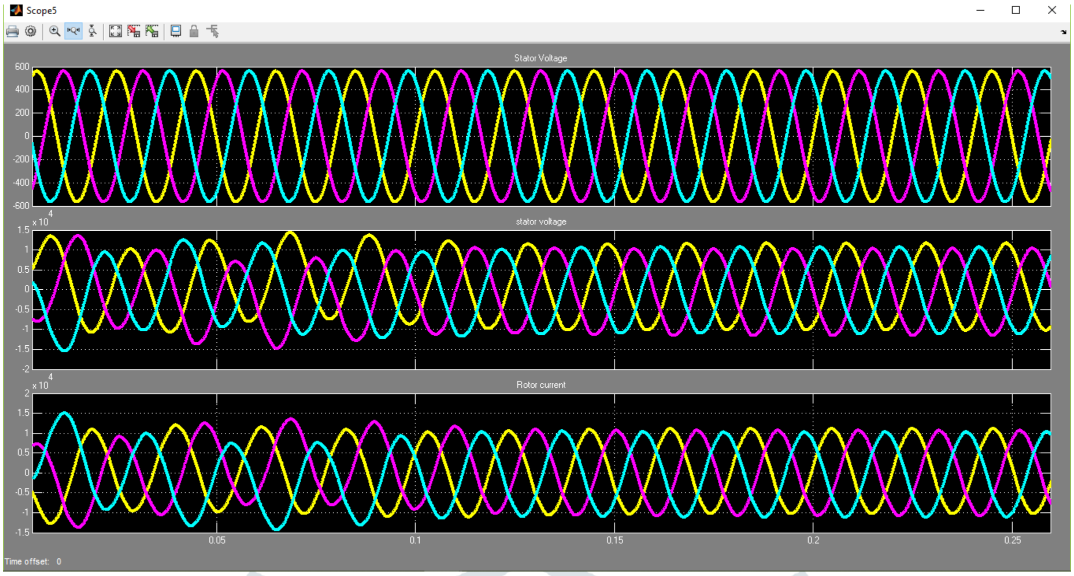

Fig 5.2: Stator Voltage, Stator Current and Rotor Current

The following fig 5.3 , fig 5.4 are the voltage and current profile at node 11E8AE of the real system as shown in fig 4.1 with solar power generating unit connection

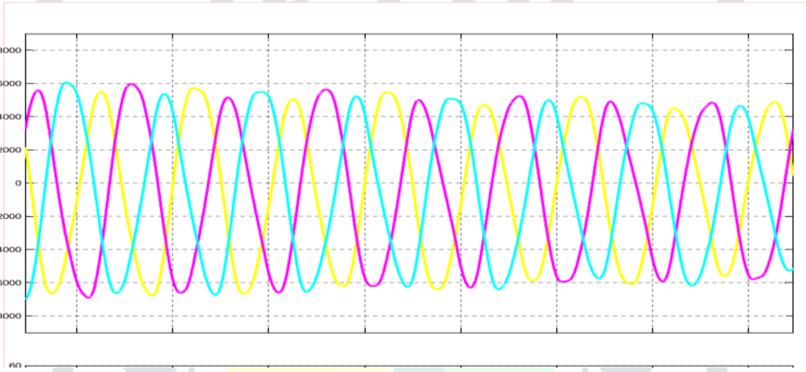

Fig 5.3: Voltage Profile at Node 11E8AE

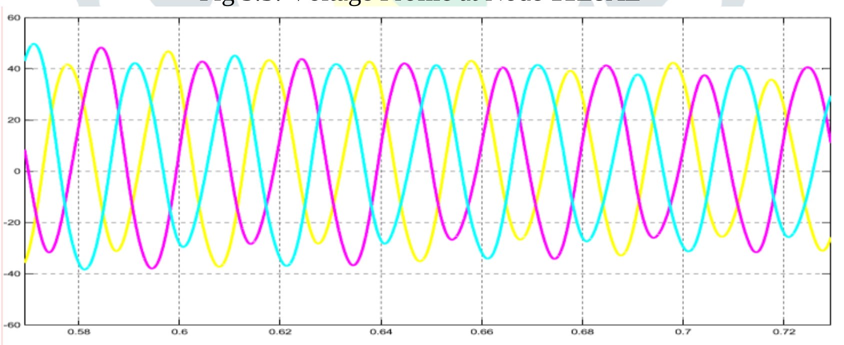

Fig 5.4: Current Profile at node 11E8AE

The following fig 5.5, fig 5.6 are the voltage and current profile at node 11E8AE of the real system as shown in fig 4.1 with wind power generating unit connection

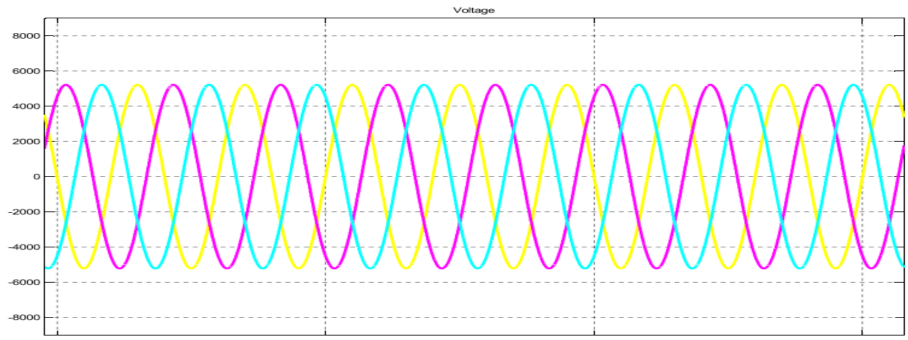

Fig 5.5: Voltage Profile at Node 11E8AE

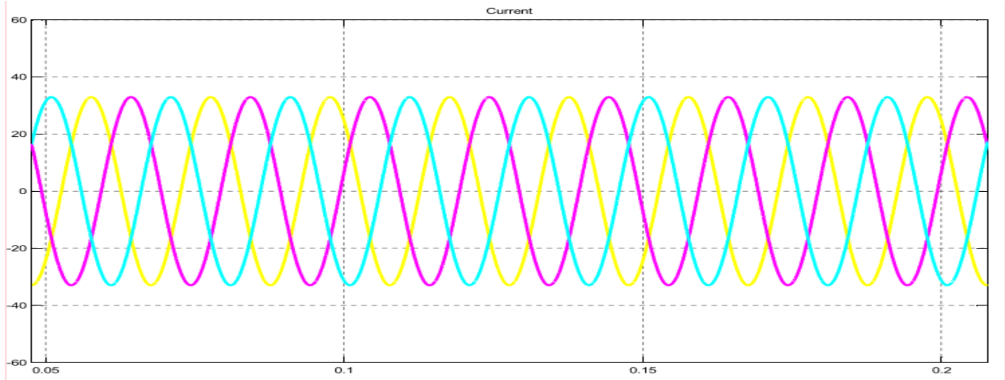

Fig 5.5: Voltage Profile at Node 11E8AE

The smart and effective management of solar and wind generating units is carried out using Fuzzy system for daily load curve.

VI. CONCLUSION

It is observed that solar and wind generating units could able supply to the load available in the 33 nodes SLV feeder system effectively.

VII. ACKNOWLEDGMENT

I thank my Parents, VVIET Mysuru, VVCE Mysuru, Friends and CESC Mysuru for supporting me to carried out the research work.

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