Illustration:

Suppose a group of four residential consumers set up a 10kW Solar plant, under VNM arrangements, as given in figure below:

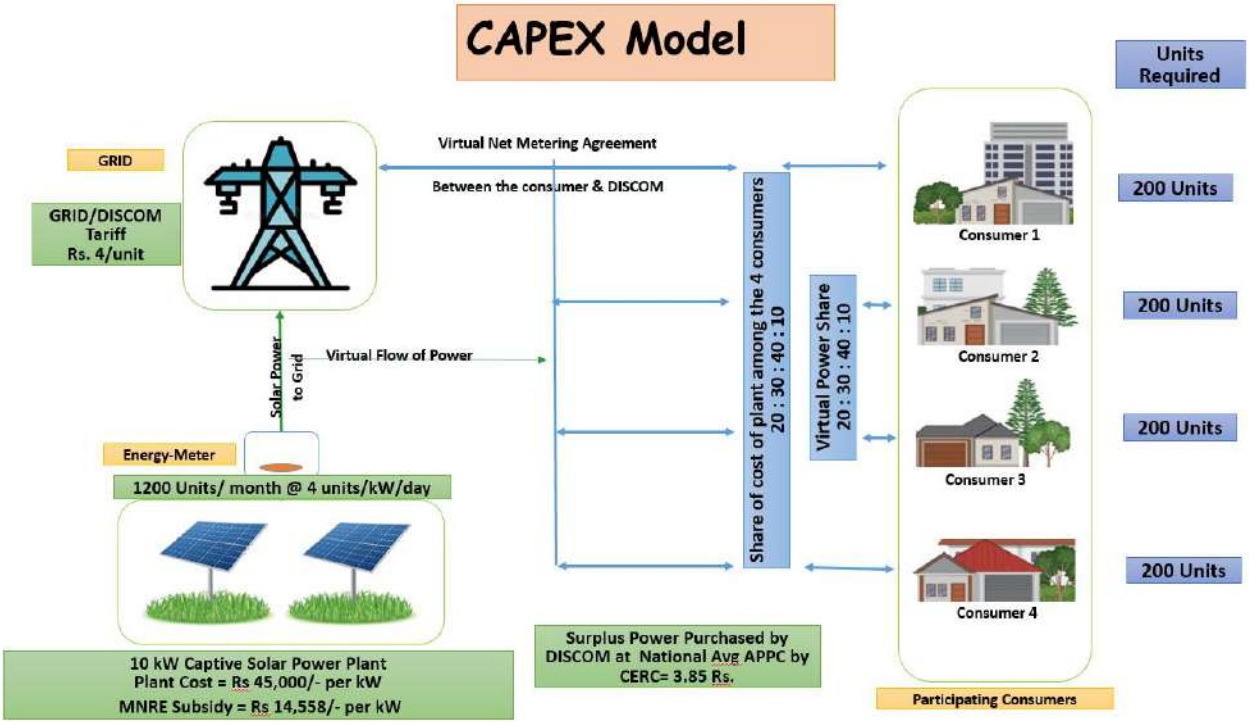

Fig. 3: VNM in CAPEX Model

Following assumption are made:

1. Cost of plant = Rs. 45,000/- per kW
2. Ratio of share of cost and virtual power among the 4 consumers = 20:30:40:10
3. MNRE subsidy = Rs. 14,558/- per kW
4. Rate at which surplus power is purchased by the DISCOM = APPC, in the illustration National Average APPC of Rs. 3.85/unit has been considered.
5. DISCOM Grid tariff = Rs 4/unit.

The electricity generated from the solar power plant is distributed to all the 4 participating consumers in the same ratios as the share of cost of plant among them. The DISCOM or Electricity department will adjust generated units in consumer's electricity bill. This will lead to either reduction in the electricity bill in case (import of electricity is more than export of electricity to the grid) or payment to the consumer by the DISCOM (in case) export of electricity is more than the import of electricity to the grid. Therefore, there will be monthly savings for the 4 consumers. It has been

calculated that payback price will be 6 years and thereafter they will be earning for next 20 years. The calculated financial details are given in the table below.

Consumer	**Consumption** (kWh)	**Cost sharing of RTS plant (%)**	**Monthly Units Share from RTS plant** (kWh)	**Monthly Import from Grid** [(-) for export (kWh)]	**Monthly Electricity bill before VNM** (RS.)	**Monthly Electricity bill after VNM** (Rs.)	**Annual saving (Rs.)**	**Share in cost of RTS plant** (Rs.)	**Payback** (in Years)
1	200	20%	240	-40	800	-154	11448	68884	6.02
2	200	30%	360	-160	800	-616	16992	103326	6.08
3	200	40%	480	-280	800	-1078	22536	137768	6.11
4	200	10%	120	80	800	320	5760	34442	5.98

4.2. MODEL- II: The RESCO Model

A RESCO developer will design, build, fund and operate the entire solar power plant (roof or ground-mounted). Consumer shall pay to the developer against assured monthly unit generation per kW. DISCOM will adjust generated units in consumer's electricity bill.

Capital Investment:

Consumer	**MNRE**	**Developer**
0%	Rs. 14,558/- per kW	Balance cost (30% - Equity, 70% - Bank Loan @ 9% IR and 10 Yrs tenure)

Plant Ownership: RESCO

Illustration:
Suppose a RESCO sets up a VNM plant of 10 kWp on a piece of land under VNM arrangement on behalf of four consumers, as shown in Fig below:

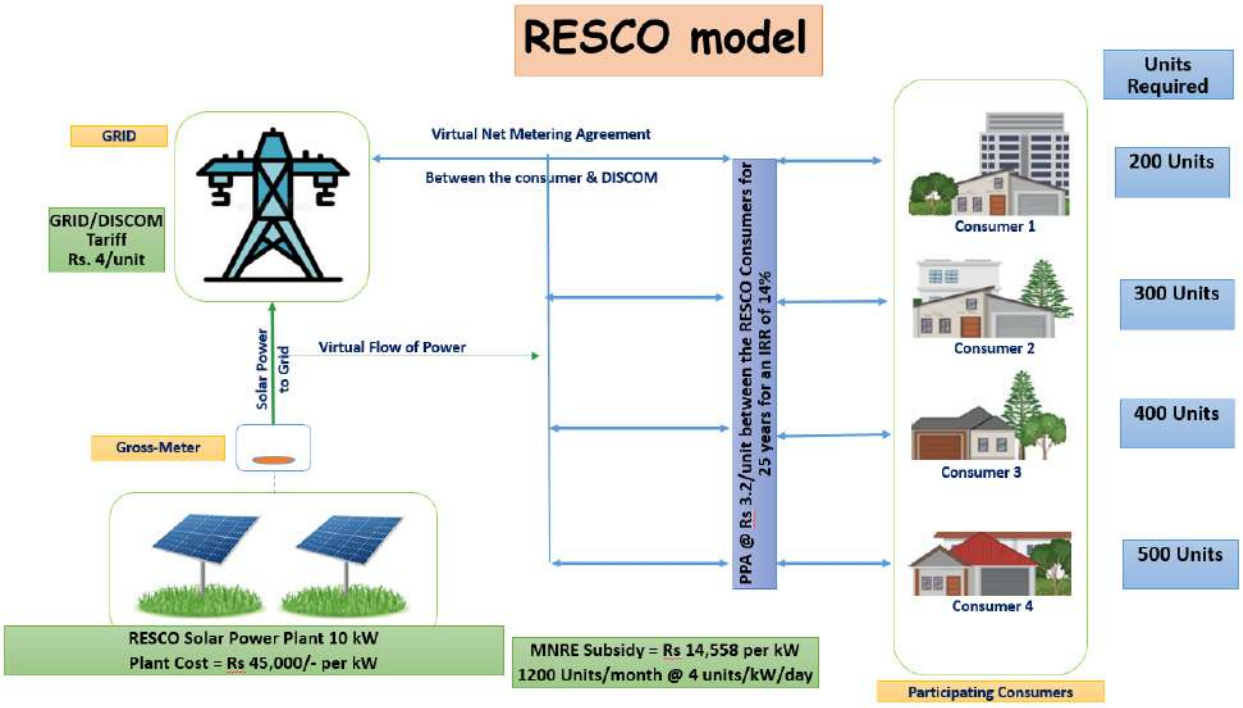

Fig. 4: VNM in RESCO Model

Following assumptions are made:

1. Cost of plant = Rs. 45,000/- per kW
2. MNRE subsidy = Rs. 14,558/- per kW
3. Rate at which surplus power is purchased by the DISCOM = APPC, in the illustration National Average APPC of Rs. 3.85/unit has been considered.
4. DISCOM Grid tariff = Rs 4/unit.
5. Electricity demand (in units) for four consumers per month is 200, 300,400 and 500 respectively.
6. The 1200 units generated per month will be supplied to the consumers as 200, 300,350 and 350 respectively.
7. The responsibility or providing vacant land to the RESCO and bearing cost, thereof, lies with the group of consumers.

The RESCO sells the electricity generated to the participating consumers to offset their consumption. It has been calculated that to get an IRR of 14% the RESCO needs a PPA of Rs 3.2 per unit for 25 years with the consumers. DISCOM will adjust generated units in consumer's electricity bill. This will lead to reduction of electricity bill and thereby, resulting in monthly savings for the four consumers. The financial details are given in table below: -

Consumer	**Consumption** (kWh)	**RESCO solar supply to consumers** (kWh)	**Import from Grid** (kWh)	**Electricity bill before VNM** (RS.)	**Payment to RESCO** (Rs.)	**Electricity bill after VNM** (Rs.)	**Annual savings to consumers** (Rs.)
1	200	200	0	800	640	640	1920
2	300	300	0	1200	960	960	2880
3	400	350	50	1600	1120	1320	3360
4	500	350	150	2000	1120	1720	3360

4.3. Model III: Utility Model – Special case of RESCO Model:

In rural areas, the electricity is generally subsidized, and realization of electricity bills is very less. Both the factors lead to loss of revenue to the utilities. The utilities can reduce this loss by setting up solar plants in rural areas. With VNM arrangement and subsidy available from central government, the cost of solar power generated from such solar plants would be around Rs 3.2 per unit as shown in Model-II above.

Generally, the APPC for the State/UTs is more than Rs 3.2 per unit. Moreover, there are around 20% technical losses till the LT side of the end beneficiary, thereby increasing the actual cost of power for the utility. The solar plant setup at tail end under VNM arrangement will not have such technical losses.

Let us take an example of a rural area in the state of Andhra Pradesh. The APPC (2020-21) for the state is Rs. 4.71/- per kWh. Considering around 20% technical losses till the LT side of the end beneficiary, the actual cost of power would be around Rs. 5.88 per kWh. With VNM and subsidy from Central Government, a solar plant can be installed in rural areas by the Utility. The cost of solar power generated from such plant would be around Rs. 3.2 per kWh. Thus, utility would save approx. around Rs. 2.68 per kWh.

Therefore, it is very advantageous for the DISCOMs to promote solar plants through virtual net metering arrangement in the rural areas.

Such local generation of power would ensure that the villagers receive reliable daytime power, improving their income through economic activities. This will lead to increase in the number of commercial/industrial consumers for the utility. Further the expenditure on network augmentation and its operation and maintenance will also reduce. It will also help the DISCOM to achieve their RPO target.