Evaluation of new voltage operating strategies for integration of distributed generation into distribution network

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Content

• Possible strategies for operating voltage constrained 11kV feeder
  • The effect of raising the voltage limit
  • The effect of increasing demand
  • The effect of non-firm connection agreement
Transforming power systems

Network Management Issues

Active Network Management
Accelerating Renewable Connections (ARC)

• Objective
  • Facilitate improved network access to the distribution network to connect renewable generation

• Project partners

![Diagram of network access](image)
Existing operating principles for 11kV network
Possible strategies for operating voltage constrained 11kV feeder

- How does the raising the point-of-connection voltage limit affect the capacity for DG?

- How much additional non-firm DG capacity can be connected when using non-firm agreements?

- How does the additional demand at one substations affect DG capacity at other substations?
The effect of raising the voltage limit

The graph shows the relationship between substation number and DG capacity (MW) at 11.25kV. As the substation number increases, the DG capacity decreases linearly, indicating a decreasing trend in DG capacity with increasing substation number.
The effect of raising the voltage limit

Substation number

DG capacity (MW)

11.25kV 11.3kV 11.35kV 11.4kV
Possible strategies for operating voltage constrained 11kV feeder

How does the raising the point-of-connection voltage limit affect the capacity for DG?

How much additional non-firm DG capacity can be connected when using non-firm agreements?

How does the additional demand at one substations affect DG capacity at other substations?
The effect of increasing demand

DG capacity increase (MW)

Location of demand increase (Substation number)
The effect of increasing demand

Location of demand increase (Substation number)

DG capacity increase (MW)

Primary

100kW
The effect of increasing demand

Location of demand increase (Substation number)

DG capacity increase (MW)

Primary

100kW
Possible strategies for operating voltage constrained 11kV feeder

How does the raising the point-of-connection voltage limit affect the capacity for DG?

How much additional non-firm DG capacity can be connected when using non-firm agreements?

How does the additional demand at one substations affect DG capacity at other substations?
The effect of non-firm connection agreement

FDG

DG capacity (MW)

Substation number

Primary

14
The effect of non-firm connection agreement

FDG  NFDG

Primary

1  2  3  4  5  6  7  8  9  10  11  12  13

DG capacity (MW)

Substation number

1  2  3  4  5  6  7  8  9  10  11  12  13

Firm  NF 10%

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Conclusions

Greater capacity at any substation that is voltage constrained.

Increase in the capacity in the middle regions of the feeder.

Additional capacity if demand is connected either at the same location or further away from the primary.
Thank you for listening!

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