EDF ENERGY networks

SOME THOUGHTS ON CHARGING PRINCIPLES FOR MICRO-GENERATORS

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OPENING THOUGHTS

- Having thought this through and put down my thoughts it does all seem logical
  - So I am waiting for someone to shoot me down!
- Further there's no "rocket science" here in fact it could really be considered as an "FBO"
  - Flash of the Blindingly Obvious
- Focus area - small low voltage generation
  - Primarily G83/1 exporting micro generators but possibly up to some 10s of kW in capability
  - Supplier registered & traded
  - Existing processes exist for SVA non-half hourly settlement
    - P213 not withstanding!
  - Demand model is probably a variation of the Distribution Reinforcement Model (DRM)
  - Looking for a common tariff solution rather than something more complex
  - Need to fit into this environment/constraint

BACKGROUND THINKING (1)

- Connecting a single non-half hourly metered micro generator at an existing customer's premise (i.e. onto an existing low voltage feeder):
  - Utilises but is unlikely to trigger reinforcement (thermal) to the service unless it is at the larger end of the size range
    - A modern 100A domestic service will take 23kW but its not designed to take this constantly!
    - There are many existing services in the 40-60A (9-14kW) range
  - Utilises but is unlikely to trigger reinforcement (thermal) to the low voltage network unless at the extreme end of a feeder
    - More likely on a rural network than an urban one
  - Is unlikely to trigger reinforcement (either at the substation or along the network) because of over voltage
  - Is less likely to utilise and unlikely to trigger reinforcement (either thermal or fault current) to the secondary substation
  - Is unlikely to utilise the secondary substation or the high voltage system as it might be expected that local demand will "mop up" all of the export
- Any capital costs would trigger application of the Connection Charge rules and a customer contribution
  - The balance of costs would fall on the DNO and be collected through Use of System
  - Operation & maintenance costs would fall under Use of System

BACKGROUND THINKING (2)

- The above principles are less likely to hold for clusters of generators:
  - Services – same principle applies but as a sole use asset chargeable under connection
  - Over voltage - much more likely, necessitating voltage control techniques either at the substation or along the network
  - Low voltage network/secondary substation - more likelihood of triggering reinforcement (either thermal or fault current) once cluster becomes large enough
    - If all single customers unlikely to identify a customer who has triggered the reinforcement but DNO could recover some costs from future generators under five year rule in connection charge regulations
    - Possible for large or mixed developments but these are less likely to be retrofits by existing customers and more likely to be new developments or redevelopments in which case there is a developer involved at the connection stage
  - High voltage system more likely to be utilised by a DG cluster particularly if time of maximum generation corresponds to low demand
  - For example a housing estate where every house had DCHP in the early morning or if every house has photovoltaic on summer afternoons
  - Likelihood of reinforcement required and/or the higher voltage network being utilised will be increased or decreased by the technology mix (or lack thereof!)
- This is of course theory as we are not at present witnessing significant clusters of microgeneration!

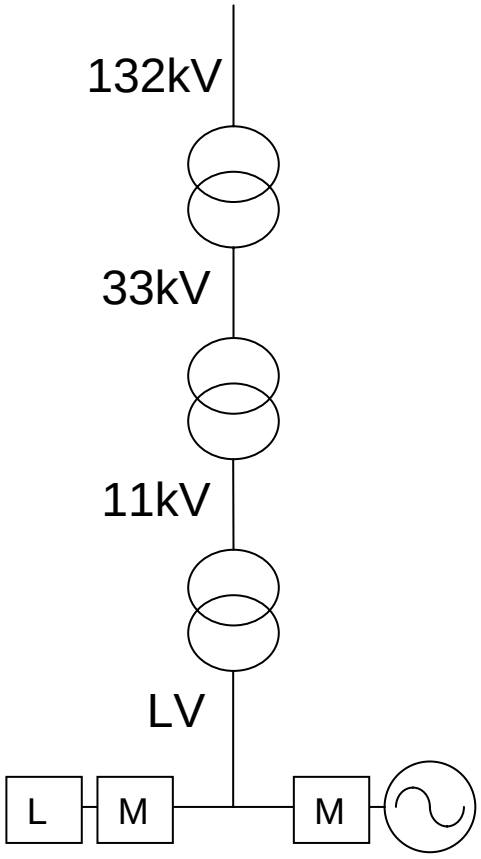
BROAD PRINCIPLES (1)

- In a world where DNO networks remain demand dominated and generation is small and unclustered, some broad conclusions can be drawn:
  - Microgen's can cause costs on the low voltage system but to date and in the short term these are very low or zero, primarily because of dispersal
  - Suppliers use the low voltage network to transport electricity from their microgen customers to their demand customers
  - Microgens do not cause costs on the high voltage system and in the short term this can be expected to continue because of the lack of clustering
  - Suppliers are not usually utilising the high voltage network and are definitely not utilising the extra high voltage network(!) to transport electricity from their microgen customers to their demand customers
- DNOs have forecasts of generation likely to be connected to the network and the expected costs incurred for their existing microgen pricing models
  - These could be developed to take account of network utilisation effects as well as reinforcement costs

BROAD PRINCIPLES (2)

- At low voltage two options:
  - A marginal cost model where the microgen gets “free” use of the existing network (paid for by demand customers) and only pays the marginal cost
    - This is the basis of the current price control
    - It is the basis of EDF Energy Network’s separate DG pricing model
  - A shared cost model where total cost of the network is apportioned between demand and generation within the charging model rather than the price control
    - This is the mechanism used by the National Grid charging model
    - It would be necessary if future price controls were set on a consolidated basis (i.e. no DG RAV)
- At higher voltages
  - If the Customer’s generator is some way ‘down’ the network and is exporting and that export is absorbed by other customers at a similar voltage then the load on the higher voltage assets is reduced
  - Load related (as against fault level) reinforcement is triggered by demand at time of system peak so if the microgen was exporting at time of system peak the load is reduced, potentially deferring the reinforcement
  - The microgen customer should receive a ‘credit’ for deferring this reinforcement in the tariff model

HOW MIGHT A DRM COST MODEL LOOK?



Network Component	Demand Model (£/kVA)	DG Model (£/kVA) [Marginal]
EHV	25	-25
HV Network	15	-15
Secondary Substation	5	2
LV Network	10	3
Total	55	-35

GOING FORWARD

- Is there an appetite for methodology developments incorporating these principles?
  - Would it better facilitate the objectives?
- EDF Energy Networks will look to develop a microgen DG charging model to incorporate the principles outlined above
  - Do others want to participate in this?
- Make some choices between marginal cost or apportioned cost as the input to a DG model
  - Do others have a view on this?
- Understand the typical export kW at time of system peak
  - I am seeking input on this from the DG community
- Understand the typical export kWh/kW at time of system peak
  - I am seeking input on this from the DG community

THANK YOU

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