

## Virtual Private Networks

Dave Miller

August 2007

### Introduction

1. Ofgem's Distributed Energy Working Group (DEWG) seeks to encourage local low-carbon energy production, as part of the wider programme to reduce CO<sub>2</sub> emissions. The group's specific aim is to remove barriers to distributed energy (DE) schemes from the regulatory and commercial framework.
2. The private wire network has been held up as a model to promote DE schemes. However:
  - the consensus within DEWG is that the issues are not about networks, but about trading; and
  - there is legitimate concern within BERR/Ofgem over removing most of the protection enjoyed by customers of licensed suppliers.
3. This paper therefore lays out two models to replicate the majority of the beneficial features of private wire networks on the public (i.e. licensed distribution) system. Each aggregates a number of sites before presenting them to the Trading Arrangements: one option uses a virtual MPAN<sup>1</sup>, the other a BMU<sup>2</sup>.
4. The assumption here is that the DE scheme will be operated under the licence exemption rules, specifically as regards the supply element, although the thresholds for such exemptions are not examined here. The 'BMU' option outlined may also shed some light on the small licensed supplier issue.
5. The paper seeks more to illuminate the debate than propose a finished solution.
6. This paper reflects only the author's current view, and does not necessarily represent the settled view of CE Electric UK. The author also apologises for any errors arising from his limited understanding of non-network issues.

### Private Wire Networks

7. Private wire networks adopt a different philosophy from seeking 'fairly' to reward export. Rather, they focus on the demand side. By taking both generation and demand out of the Trading Arrangements, there is no need to unbundle the cost components within the retail tariff. Instead, the full value of the retail tariff becomes a benchmark against which to compare the internal costs of the DE scheme.
8. There is a natural aggregation of generation and demand within the private wire network, so the (otherwise conventional) MPAN at the boundary with the public system shows only the net flow. This leaves the costs faced by the DE scheme as:
  - external:
    - through the retail tariff:
      - top-up/standby wholesale costs inc. transmission losses;
      - residual TNUoS/BSUoS;
    - DUoS, according to a tariff attributed to the virtual MPAN; and
    - distribution losses, again attributed to the net flow through the virtual MPAN

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<sup>1</sup> Metering Point Administration Number: currently used to account for each identifiable pattern of energy flow at a premises. That is, import and export have separate MPANs, as do unrestricted and restricted tariffs

<sup>2</sup> Balancing Mechanism Unit: an aggregation of MPANs used as the basis for wholesale energy trading

- internal:
    - own generation costs
9. There is no direct cost of imbalance risk, except as reflected in the top-up/stand-by tariff.
10. Given that there is a difference between import and export tariffs, the value of these schemes is as much about avoiding the import tariff as it is securing a 'fair' reward for any residual export.

## Virtual Private Networks: the 'MPAN' Approach

11. In theory, we could replicate exactly the exposure of a private wire DE scheme to the Trading Arrangements by creating a single virtual MPAN, aggregating metered volumes from participating generation and demand individually connected to the public network.
12. This would allow us to sustain retail competition, as individual customers would be free to join or leave the scheme.
13. Some pre-processing would be needed before submitting data to settlements, but this is no different in principle to existing data collection processes<sup>3</sup> for aggregating a number of physical meters into one (otherwise conventional) MPAN. The data collector would need to maintain a list of participating meter systems, and some care would be required in maintaining the definitive list of MPANs. This last arises because customer choice will lead to meters migrating on and off the definitive list of individually-traded MPANs.
14. If the scheme were well balanced, it would minimise exposure to TNUoS, BSUoS and transmission losses, all of which would be charged net through a retail tariff applied to the virtual MPAN by a licensed supplier. This leaves the costs faced by the DE scheme as:
- external:
    - through the retail tariff:
      - top-up/standby wholesale costs inc. transmission losses;
      - residual TNUoS/BSUoS;
    - DUoS, according to a tariff attributed to the virtual MPAN; and
    - distribution losses, again attributed to the net flow through the virtual MPAN
  - internal:
    - own generation costs
15. There is no direct cost of imbalance risk, except as reflected in the top-up/stand-by tariff.
16. As with the full private wire network option, the DE scheme operator would tender for an import/export tariff with a licensed supplier.
17. All this is exactly as for a private wire network, as there remains a single MPAN across which is traded the net energy flow of the DE scheme. This options requires only a side contract with the local licensed distributor for short-haul DUoS.

## Virtual Private Networks: the 'BMU' Approach

18. A similar approach to the virtual MPAN model would be for a licensed supplier to dedicate a single 'production' BMU to the (licence-exempt) DE scheme. Registration and data collection/aggregation would generally remain as they currently are, with the conventional MPANs from participating generation and demand both allocated to this BMU and being netted off within it.

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<sup>3</sup> See, for example, BSCP502 s4.8.1

19. If the DE scheme were well balanced, it would minimise exposure to TNUoS, BSUoS and transmission losses, all of which would be charged net on current methodology. The risk premium, so far as it relates to imbalance (as opposed to retail-side risk) could in theory be taken by the DE scheme. This leaves the costs faced by the DE scheme as:
- external:
    - top-up/standby costs, directly related to wholesale prices, inc. transmission losses;
    - residual TNUoS/BSUoS;
    - DUoS; and
    - distribution losses
  - internal:
    - own generation costs; and
    - imbalance risk
20. Both DUoS and distribution losses will be attributed to the individual MPANs within the BMU. They may therefore not fully net off, as the factors applied to import and export MPANs may not be exactly equal and opposite. Some work is required to see how close we can reasonably get to netting off the impact of genuinely opposing flows.
21. These effects could be achieved without establishing a discrete BMU, as no change to existing processes is required. However, creating a separate BMU should isolate a relatively small DE scheme from a supplier's wider portfolio. In turn, this should enable the particular characteristics of that DE scheme to be recognised in the contract between 'host' supplier and DE operator.
22. Akin to full private wire network and 'MPAN' options, the DE scheme operator would tender for an import/export tariff with a licensed supplier. The difference is that this would be based upon the BMU rather than individual MPANs, but the effect should be the same.

## Conventional Approach

23. It seems (at least to the author) that we should be able to replicate many of the features of the 'BMU' approach within the conventional approach of establishing a 'fair' reward for export. If retail tariffs are set correctly, and export is rewarded fairly, then the economics of a DE scheme should be the same regardless of whether a separate BMU is established.
24. The issue here may be the inevitable averaging that happens when individual projects are absorbed into the diverse portfolio of a major supplier. The advantage of the 'BMU' approach is that it separates out the DE scheme, so its true balance position may be seen more clearly.

## Small Licensed Suppliers

25. The DE scheme could establish itself as a licensed supplier. Here, the charges faced would generally be as for the 'BMU' option outlined earlier. While there are some unavoidable extra costs flowing from the supply licence, such as BSC subscriptions, the large and expensive back-office systems suppliers require could be argued to be 'essential facilities'. They would therefore be made widely available, just as Virgin and Tesco market financial services using other companies' back-office systems.
26. Two variants of an enabling agreement might be required, one for small licensed suppliers and the other for licence-exempt DE schemes. Both would involve BSC/CUSC-related interfaces and the management of supplier agents. The licence-exempt version would also involve registration by the host supplier on behalf of the exempt DE scheme.

27. One key difference is the potential need to secure contracts for matching generation. The better balanced the DE scheme, the more practical it becomes simply to take a risk on System Price.

## Customers With Own-Generation (CWOOGs)

28. While not directly relevant to this debate, considering CWOOGs may shed some light upon it. Like private-wire DE schemes, CWOOGs reap the value of the full avoided retail tariff. However, if they seek to trade that energy locally, they currently find that the value of the energy they generate falls dramatically. This suggests market failure.
29. One view of that potential failure is that the retail tariff has been set incorrectly and, for example, that top-up and stand-by tariffs for both CWOOGs and private wire networks should be significantly higher than normal demand tariffs to reflect (e.g.) imbalance risk.
30. Alternatively, this may be an effect of the absorption of small schemes into suppliers' large portfolios. Something like the 'BMU' model outlined earlier should more easily reflect the true costs of service.

## Scale

31. There are issues of scale in considering these options. Community-scale DE schemes will generally fall within the licensing thresholds, supporting the use of MPAN or BMU options. Conversely, wide-area schemes such as that proposed for London will tend towards the small licensed supplier approach.
32. Similarly, for DE schemes (including CWOOGs) where generation is well matched to demand, the issue of (residual) export reward is less material than for 'merchant' schemes with significant 'excess' generation.
33. As we are unlikely to find one solution that fits all circumstances, there is merit in considering where changes to current arrangements might best be focussed.

## Conclusions

34. It is submitted here that:
- private wire networks are not generally established to resolve network issues; and
  - many of the benefits of private networks in relation to the Trading Arrangements can be addressed over public networks.
35. It is at least theoretically possible to replicate exactly the benefits of private networks in relation to the Trading Arrangements by creating a virtual single MPAN for each site. It is possible to go further and apply this approach to multiple sites, which may reap further benefits.
36. An alternative is to create a BMU dedicated to each DE scheme. This reaps many of the benefits of the virtual single MPAN, limited mainly by inevitable averaging effects in setting distribution loss adjustment factors and tariffs. This option also requires less disruption to existing commercial arrangements.
37. Both these arrangements require an 'enabling agreement' between the DE scheme and a licensed supplier, for the latter to provide the former with the services required to operate under the current commercial framework.

38. Finally, the small licensed supplier situation is very close to the BMU option if access to the 'essential services' of the high fixed cost back office systems can be made available. Only if the DE scheme is not well balanced does the issue of securing matching generation arise.

39. The options may be summarised as:

	imbalance	TNUoS	DUoS	losses	generation contracts
private wire network	thro' (net) import/export tariff	thro' (net) import/export tariff	net on import/export tariff	net	for residual volume, thro' 'host' supplier
MPAN	thro' (net) import/export tariff	thro' (net) import/export tariff	net on import/export tariff	Net	for residual volume, thro' 'host' supplier
BMU	direct thro' BM	net direct	approximately net by MPAN tariffs	transmission net: distribution approximately net by MPAN	for residual volume, thro' 'host' supplier
small licensed supplier	direct thro' BM	net direct	approximately net by MPAN tariffs	transmission net: distribution approximately net by MPAN	direct for residual (if any)

40. For all options, the key to minimising exposure to charges is to minimise the imposition of costs, notably by balancing generation and demand within the scheme.

41. This suggests that there is a continuum between the positions of a private wire network and a small licensed supplier, with relatively little change in the costs faced by each.

42. No recommendations are made here, as this paper is intended solely to stimulate discussion.