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The debate over zonal or national electricity pricing raged for two years. Industry friendships were lost. Multiple expensive, and flawed, cost benefit studies were presented. In the end the Government decided against zonal pricing, apparently because it was not guaranteed to benefit all customers (the denial of economically appropriate benefits to Scottish consumers because London consumers may face higher prices is something that I would have on repeat in my playlist if I was a SNP politician).

Ironically, given the volume of work that was done, and that NESO supported zonal pricing, the implications of the assumptions that NESO intend to make in their cost benefit analysis for new transmission were missed. This is particularly the case with regard to a decision to use the social carbon value for avoided CO₂ emissions, which will mean a 2030 assumed carbon value of more than £400/t in the cost benefit analysis compared to a futures price for EU Allowances of around 100 Euros/t. The use of the social carbon value appears to materially weaken the case for zonal pricing.

Proponents of zonal electricity pricing point to economic benefits from more optimal decisions at both the investment stage, where generators and consumers can choose to locate at the most economic locations taking into account the local value of electricity, and the operational stage where generation, demand, storage and interconnector flow decisions can be based on the local electricity value. The benefits of zonal pricing over national pricing increase as the basis differential between the value of electricity in different zones grows.

Assuming a higher value of avoided CO₂ will induce more transmission investment because building transmission to bring wind generation from Scotland to the south will displace gas-fired generation, reducing CO₂ emissions, therefore the higher the value of CO₂ the more transmission seems viable. Transmission should be built until the implicit basis differential between the value of electricity in different zones is equal to the marginal cost of additional transmission between them.

Using the social value of carbon for the NESO cost benefit analysis for new transmission may, if the NESO methodology overcomes optimism bias in transmission delivery assumptions and therefore achieves an equilibrium basis differential between zones, materially remove any benefits of zonal pricing at both the investment and operational stages.

1. *Development of transmission in response to the social cost of carbon will significantly remove transmission constraints between zones and hence any basis differential between the zonal values of electricity, eroding the benefits of implementing zonal pricing.*

As noted previously, transmission should be developed up to the point where the basis differential between zones is equal to the marginal cost of additional transmission (ignoring lumpy transmission and the multi-year life of transmission assets). Versus the use of a market carbon value, the use of the social cost of carbon will increase the modelled basis differential between zones by raising the marginal cost of gas-fired generation in the south of England. The response will be to build more transmission until the equilibrium between basis differential and transmission cost is re-established.

Using rough numbers of 60 p/th for gas (average of monthly forward market prices for 2030 NBP on the Chicago Mercantile Exchange), 100 Euros /t for market CO₂ (assuming UK – EU cost equivalence) and £400/t for social carbon values (UK Government Green Book carbon value guidance), I calculate marginal gas-fired generation cost in 2030 as £72 / MWh using market carbon values and 197 £/MWh using social carbon values (in fact the NESO cost benefit analysis may use a multiplier for assumed balancing market gas-fired generation cost of 2.3 based on historic relationships, therefore the transmission assessment may use 453 £/MWh with social carbon values rather than a market price based 165 £/MWh). Either way, the number of hours of transmission congestion will be much lower for an equilibrium level of transmission build with social carbon values, a rough initial guesstimate suggesting that with social carbon values congestion hours will be 36% of the level if market carbon pricing is assumed in the cost benefit analysis. This limits the gains from zonal pricing.

Operational benefits from zonal pricing should therefore be significantly lower if social carbon values drive the cost benefit analysis for transmission build.

2. *Zonal pricing, without a compensating transmission pricing regime, would provide perverse incentives for generation location.*

Under zonal pricing, zonal electricity prices will reflect market gas and carbon prices. If transmission is built in response to social carbon values this will compress the market basis differential between zones and reduce the disincentive to build generation in Scotland. Effectively the reduction in congestion hours benefits northern generation.

It was noted in the zonal versus national debate that there are a variety of levers that Government / NESO have to influence the location of new generation and this challenges the inclusion of siting benefits as a benefit of zonal pricing. To add to that, zonal pricing without a mitigating transmission charging system would actually introduce perverse incentives for generation location where there is a significant inconsistency between market carbon prices and the social carbon value used by NESO for the cost benefit analysis of new transmission. This creates a potential vicious circle, with transmission investment driven by high theoretical carbon values compressing the actual market basis differential between zones and providing a market incentive for more generation to locate up north, which would then drive more transmission investment.