

Negative Weights

CISG 16 May 2005

UoS Methodology Definition

2.16 The zonal marginal km for demand zones are calculated as follows:

$$WNMkm_j = \frac{-1 * NMkm_j * Dem_j}{\sum_{j \in Di} Dem_j}$$

$$ZMkm_{Di} = \sum_{j \in Di} WNMkm_j$$

Where

Di = Demand zone

Dem = Nodal Demand from transport model

(i) calculate the demand weighted nodal shadow costs

For zone 14 this would be as follows:

Demand zone	Node	Nodal Marginal km	Demand (MW)	Demand Weighted Nodal Marginal km
14	ABHA4A	-381.25	148.5	-18.39
14	ABHA4B	-381.72	148.5	-18.42
14	ALVE4A	-328.31	113	-12.05
14	ALVE4B	-328.31	113	-12.05
14	AXMI40_SWEB	-337.53	117	-12.83
14	BRWA2A	-281.64	92.5	-8.46
14	BRWA2B	-281.72	92.5	-8.47
14	EXET40	-320.12	357	-37.13
14	HINP20	-247.67	4	-0.32
14	INDQ40	-401.28	450	-58.67
14	IROA20_SWEB	-194.88	594	-37.61
14	LAND40	-438.65	297	-42.33
14	MELK40_SWEB	-162.96	102	-5.40
14	SEAB40	-63.21	352	-7.23
14	TAUN4B	-273.79	97	-8.63
		Totals	3078	-287.99

(ii) sum the demand weighted nodal shadow cost to give a zonal figure. For zone 14 this is shown in the above table and is -287.99km.

Effect of Negative Weights

- Negative demand alters the weighting factor in two ways
- In a micro effect on a Nodal basis, and
- In a macro effect on a Zonal basis

Illustrative example

- To illustrate both effects, consider a simple 2 Node example

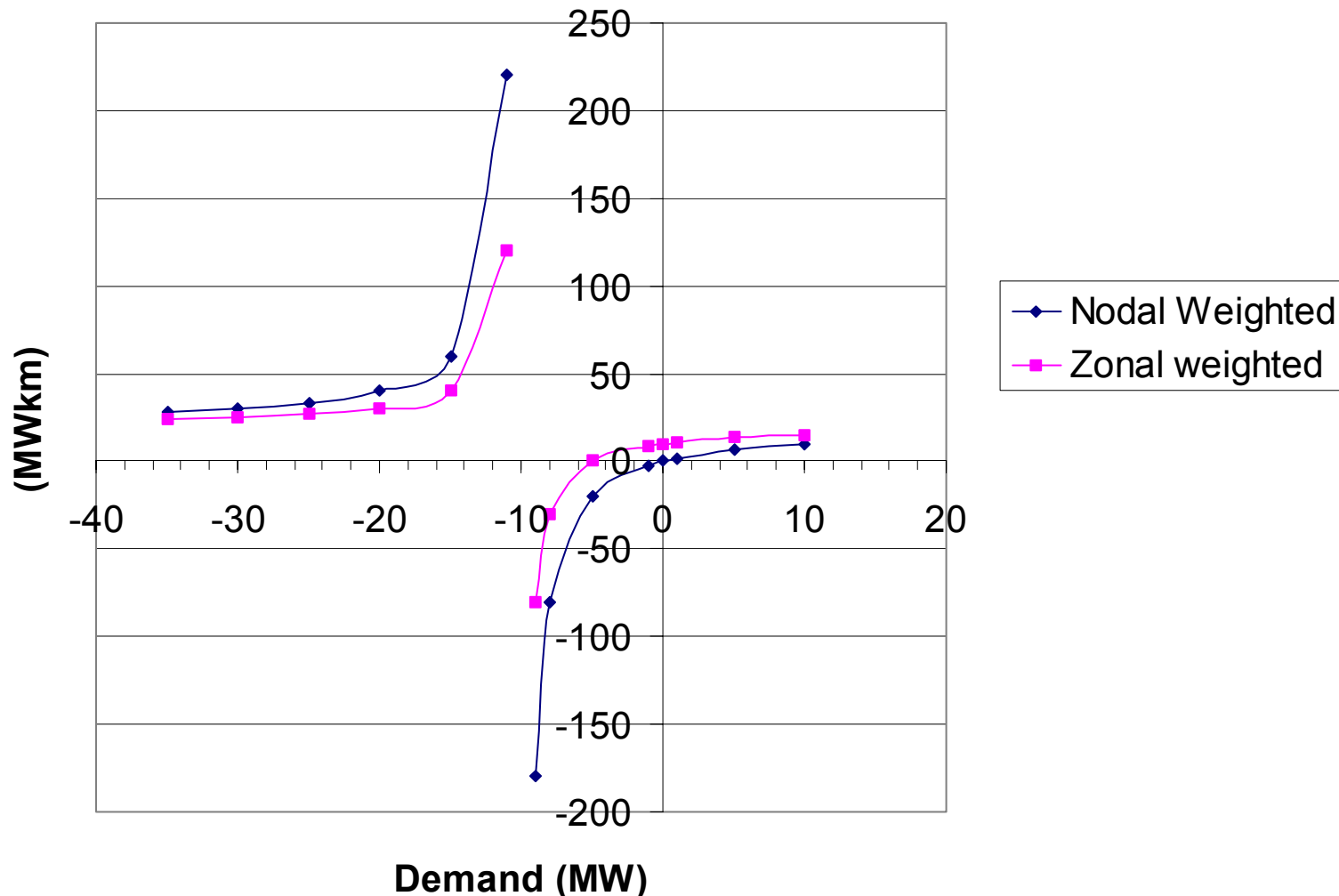
Node	Nodal Marginal km	Demand (MW)	Demand Weighted Nodal Marginal km
A	10	10	5.00
B	20	10	10.00
		Total Demand	Zonal Weighted Marginal km
		20	15.00

Illustrative example

- To illustrate both effects, consider a simple 2 Node example

Node	Nodal Marginal km	Demand (MW)	Demand Weighted Nodal Marginal km
A	10	10	20.00
B	20	-5	-20.00
		Total Demand	Zonal Weighted Marginal km
		5	0.00

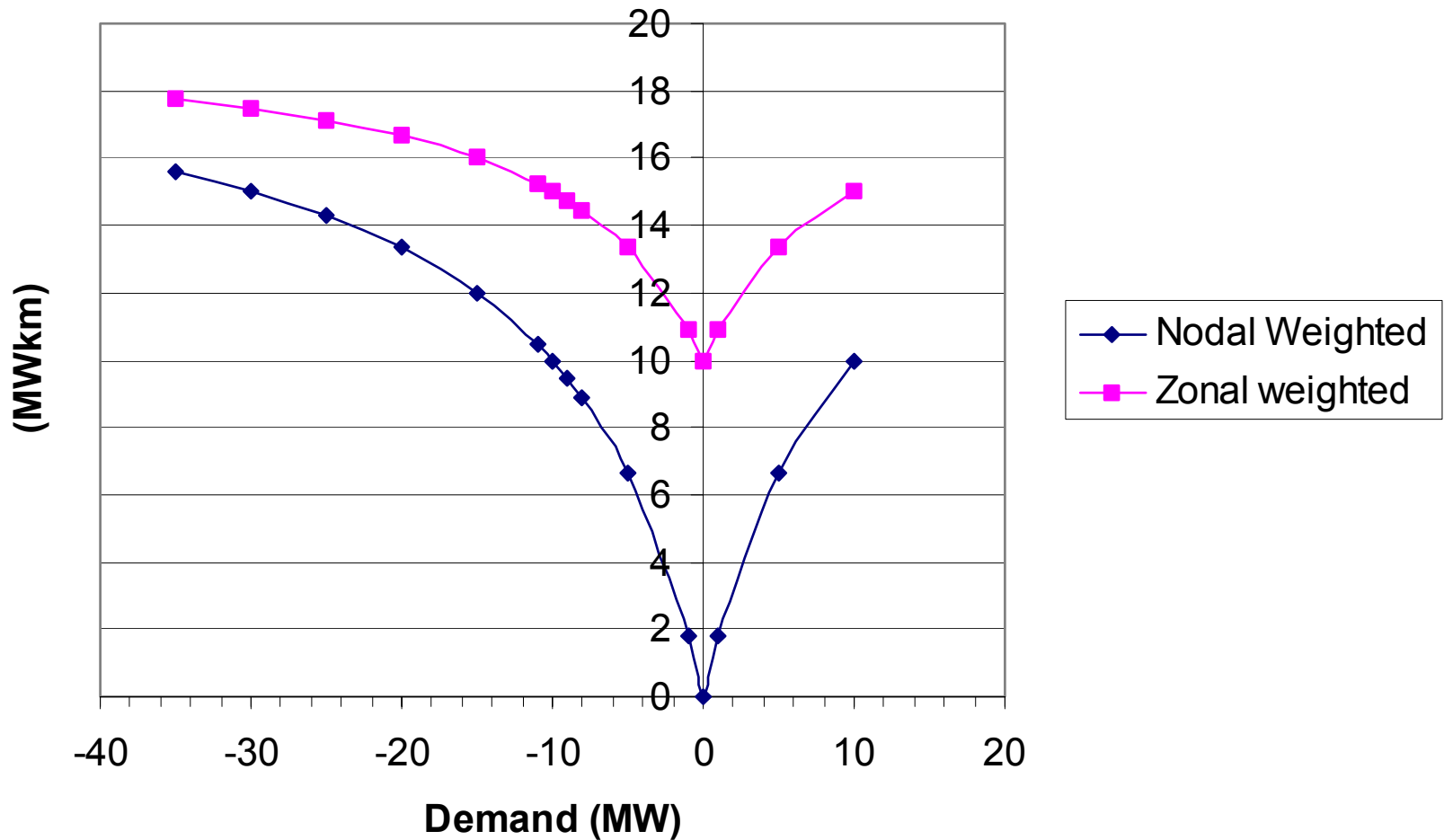
Plot of change of Demand (Node B) vs change in Marginal MWkm



Alternative Options

- Use absolute values
- Exclude negative demand values
- Substitute 'average' value for negative demand values
- Don't weight, use average for zonal MWkms

Using absolute values



Using average Zonal MWkms values

Demand		2005/06 Tariffs	Using averages	
Zone No.	Zone Name.	HH Zonal Tariff (£/kW)	HH Zonal Tariff (£/kW)	Variance
1	Northern Scotland	0.0411	0.0465	0.0054
2	Southern Scotland	4.1144	4.1410	0.0266
3	Northern	7.3937	7.8091	0.4154
4	North West	11.1371	10.7222	-0.4149
5	Yorkshire	11.1821	11.3989	0.2168
6	N Wales & Mersey	11.2102	11.8284	0.6182
7	East Midlands	13.4658	13.4334	-0.0325
8	Midlands	15.0270	15.2715	0.2445
9	Eastern	14.0285	14.6611	0.6327
10	South Wales	18.3159	18.0776	-0.2384
11	South East	15.9894	15.6647	-0.3247
12	London	18.5167	16.6855	-1.8312
13	Southern	17.8334	18.3572	0.5238
14	South Western	20.4899	20.6729	0.1830

Conclusion?