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12 January 2023

Our ref: CAJAN23

Your ref:

Subject: Cost Assessment – SEW Modelling Submission

Dear Daniel

We welcome the opportunity to submit models ahead of the PR24 modelling consultation in Spring 2023. From a process perspective, we consider that Ofwat's early engagement with the industry on the econometric models will aid in companies' business plan preparations and will mitigate the risk of late, unexpected changes to the modelling in PR24. Moreover, engagement with the industry will support the development of robust cost assessment models that account for relevant drivers of expenditure, both between companies and over time. While we will engage fully with the models presented by Ofwat and the rest of the industry in the Spring 2023 consultation, we request that Ofwat continues to engage with the industry on the cost models either through additional consultations (e.g. on cost adjustment claims) or through the Cost Assessment Working Groups (CAWGs).

This response focuses on the technical aspects of botex modelling. It is worth noting that there are a number of other factors which should be considered by Ofwat when designing the cost assessment framework at PR24. These include:

- It will be necessary to make appropriate adjustments for factors which affect individual companies, but are not accounted for in the models. We understand that this is the intent of the cost adjustment mechanism process

- Ofwat will need to understand the extent to which efficiency improvements in the industry have been delivered in the form of service delivery improvements rather than cost adjustments in the past. Econometric models should act a source of data when considering this question.

- If there are continued service delivery improvements which are expected to be delivered from base expenditure in AMP8, Ofwat will need to consider this when forecasting what cost reductions (often referred to as frontier efficiency improvements), if any, can be achieved simultaneously.

- Ofwat will need to consider whether the botex econometric modelling approach leads to the squeezing of capital maintenance over time. We welcome the recognition in the final methodology that this may apply to mains renewals.

Using the PR24 modelling consultation dataset that Ofwat has published on its website, our submission includes models on wholesale and residential retail that we consider perform well against Ofwat's assessment criteria based on the data available. However, we note the following limitations with the submitted models.

- The models perform well based on the data that is currently available. Alternative models may perform better once new data (e.g. additional outturn years for AMP7 and AMP8 business plan information, or refinements to the modelled cost) becomes available. Similarly, following Ofwat's guidelines and PR19 precedent, we have used the Random Effects estimation approach to estimate these models. We consider that alternative estimation approaches should not be excluded from Ofwat's assessment at PR24 ex ante.

- While the estimated relationships between costs and cost drivers are directionally intuitive from an operational perspective, we are still assessing whether the magnitude of the estimated relationship is operationally intuitive to the extent possible. We ask that Ofwat also considers whether the magnitude of the relationship between cost and cost drivers are aligned with operational expectations when developing models for PR24.

- We consider that our models account for a range of operational characteristics. However, we note that several exogenous drivers of expenditure are omitted from them (for e.g. due to lack of data or statistically insignificant coefficients), such that post-modelling adjustments for individual companies may be required. Similarly, the models are estimated using historical data only, which relies on the assumption that AMP8 will be broadly comparable to previous AMPs (specifically, AMP5, AMP6 and AMP7). These models will need to be adapted to reflect additional outturn data as well as step changes in operational environment that companies are likely to experience in AMP8.

- We have not submitted models that control for service quality, in line with Ofwat's reluctance to account for service quality at PR19. Because of this, our models will only fund companies to deliver the level of service that has been achieved by the benchmark companies in the historical period. Moreover, some companies may have enhanced their level of service through enhancement expenditure and, as such, the impact of enhancement expenditure on service improvements would need to be accounted for when determining the level of service funded through the base expenditure models (i.e. it may be less than the level of service actually achieved by the benchmark companies if said companies have improved service through enhancement expenditure). If Ofwat sets particularly stretching performance commitments at PR24, then post-modelling adjustments will be required to fund the expenditure required to meet these targets.

Below, we outline some of the key differences between the models included in the submission and the PR19 models.

Wholesale water

In all of the water models that we present, we have adopted Ofwat's modelled cost definition in line with the PR24 methodology. However, we note that the modelling dataset does not include explicit drivers of network reinforcement requirements and, therefore, the models could over- or under-fund specific companies for network reinforcement activity. If this remains the case at PR24, we consider that Ofwat should adopt mechanisms to increase (or decrease) companies' allowances to reflect increases (or decreases) in network reinforcement requirements in AMP8.

For the water resources plus (WRP) models, we have made one amendment to Ofwat's WRP2 model (used at PR19). Specifically, we consider that weighted average complexity should be modelled in levels, rather than in logarithms. The leads to an improved model fit, and allows for an easier operational interpretation of the estimated coefficient. We also note that, while the weighted average complexity measure has some advantages relative to measures capturing the proportion of water treated at different complexity levels, the weights attached to the different complexity variables are somewhat arbitrary. We are currently exploring whether the weighting structure is aligned with operational expectations, and we ask that Ofwat also validates whether the weights are robust from an operational perspective and improves on them where necessary.

We note that source-level and WTW-level economies of scale are clearly operationally relevant drivers of WRP expenditure. That is, companies that can (on account of their operating environment) construct few, large treatment works should be able to benefit from lower unit costs for abstracting and treating water. However, SEW's region is characterised by several, smaller water sources and, as such, the lowest cost solution available to SEW is to operate several, smaller treatment works. As such, SEW cannot benefit from the same economies of scale available to other companies. Despite the strong operational rationale, on the current dataset, the estimated relationship between WRP expenditure and cost drivers that reflect the size of treatment works are weaker from a statistical or operational perspective when included in the WRP models, which may necessitate company-specific adjustments for the affected companies. Nevertheless, Ofwat should explore the inclusion of such cost drivers in its PR24 models once the PR24 dataset has been finalised, as we consider economies of scale to be a material driver of such expenditure.

We have proposed changes to Ofwat's PR19 treated water distribution (TWD) model, as follows.

1. We consider that connected properties can be a valid alternative to lengths of main in capturing the differences in scale between companies. Connected properties typically performs as well as (or better than) lengths of main from a statistical perspective, and may implicitly capture some costs associated with network reinforcement (note that a post-modelling adjustment may be necessary for network reinforcement regardless of the measure of scale in the TWD model).

2. We find that average pumping head (APH) typically performs well in the TWD models, often leading to an improved model fit relative to booster pumping stations per lengths of main (BPSPLM). While both APH and BPSPLM are both intended to

capture pumping requirements, we consider that APH might better capture the OPEX associated with pumping and BPSPLM might better capture the capital maintenance associated with having more assets. This could explain why the two cost drivers are not strongly correlated with each other, and why both measures can be included in a single cost model. However, we are still assessing whether the inclusion of both measures in a single model could 'double-count' the impact of pumping requirements on costs. We encourage Ofwat to consider the inclusion of both measures in the TWD models.

3. We find that properties per lengths of main is a valid measure of density when assessing TWD expenditure. If this density measures is included in the TWD models, the model fit improves relative to the inclusion of other density measures (i.e. weighted average density). Note that, in line with statistical and operational evidence, we model a 'U-shaped' relationship between density and costs in all TWD models.

Given the large metering programmes that some companies (including SEW) have undertaken in previous AMPs, we expect that the affected companies will experience increased meter renewal rates in AMP8. While we have found a positive relationship between meter renewal rates and TWD expenditure in the cost models, the relationship is statistically insignificant. Therefore, we have not included such models in this submission. However, the performance of this cost driver might improve once more data becomes available, such that meter renewal activity can be modelled explicitly. Alternatively, a post-modelling adjustment may be required, similar to its post-modelling adjustment to growth enhancement at PR19.

Our proposed wholesale water (WW) models reflect the insights found in the WRP and TWD models. We note that APH in the TWD section of the value chain is typically a stronger cost driver than overall APH (which includes APH in WRP) in the WW models. Indeed, we have found that APH (WRP) is consistently insignificant in the WRP and WW models, which could indicate that part of the pumping costs are already implicitly captured by the other cost drivers. As such, we control for APH (TWD) in the WW models.

Residential retail

When testing alternatives to the PR19 residential retail models, we found that the bottom-up models (i.e. modelling debt related costs and other operating costs separately) perform poorly relative to the TOTEX models. As such, we agree with Ofwat's provisional decision to focus on TOTEX models for PR24. Nonetheless, the performance of the bottom-up models may change with additional (outturn and business plan) data, while they can also provide a reasonable cross-check to the TOTEX models. As such, we consider that Ofwat should remain open to the consideration of bottom-up models at PR24 and continue to explore them.

The key difference between the models that we submit and Ofwat's PR19 models relates to the treatment of deprivation. We have found no strong operational or statistical justification for selecting one deprivation over another, yet some companies' performance is sensitive to the choice of measure. One solution for this is for Ofwat to triangulate across a range of models that account for different deprivation measures. Alternatively, as proposed in our submission, Ofwat could consider composite deprivation metrics in the TOTEX models. We find that composite measures typically outperform singular deprivation measures from a statistical perspective (e.g. improved significance on the coefficients and model fit), and it also mitigates the risk that companies are overfunded or underfunded based on the arbitrary decision as to the 'best' measure of deprivation.

On the current data, we have found that there is statistically significant scale economies in the TOTEX model specifications. This suggests that retail costs can be modelled on an aggregate cost basis (i.e. instead of a unit cost basis), in line with the wholesale cost modelling, which appears to improve some of the other model diagnostics (e.g. the RESET test).

We trust the contents of our submission prove useful, however should you have any queries or questions about the data then please do not hesitate to contact me.

Yours sincerely

Matt Hersey
Economic Manager
South East Water

South East Water – WRP, TWD and WW models

Econometric model formula:

1. SEW_WRP1: $\ln(\text{WRP BOTEX}) = \alpha + \beta_1 \ln(\text{properties}_{it}) + \beta_2 (\text{weighted average complexity})_{it} + \beta_3 \ln(\text{weighted average density LAD}_{it}) + \beta_4 (\ln(\text{weighted average density LAD}_{it}))^2 + \varepsilon_{it}$
2. SEW_TWD1: $\ln(\text{TWD BOTEX+}) = \alpha + \beta_1 \ln(\text{properties}_{it})) + \beta_2 \ln(\text{average pumping head (TWD)}_{it}) + \beta_5\ln(\text{weighted average density LAD}_{it}) + \beta_6 (\ln(\text{weighted average density LAD}_{it}))^2 + \varepsilon_{it}$
3. SEW_TWD2: $\ln(\text{TWD BOTEX+}) = \alpha + \beta_1 \ln(\text{lengths of main}_{it})) + \beta_2 \ln(\text{average pumping head (TWD)}_{it}) + \beta_5\ln(\text{weighted average density LAD}_{it}) + \beta_6 (\ln(\text{weighted average density LAD}_{it}))^2 + \varepsilon_{it}$
4. SEW_TWD3: $\ln(\text{TWD BOTEX+}) = \alpha + \beta_1 \ln(\text{lengths of main}_{it})) + \beta_2 \ln(\text{average pumping head (TWD)}_{it}) + \beta_3 \ln(\text{booster pumping stations per lengths of main}_{it}) + \beta_4\ln(\text{weighted average density LAD}_{it}) + \beta_5 (\ln(\text{weighted average density LAD}_{it}))^2 + \varepsilon_{it}$
5. SEW_TWD4: $\ln(\text{TWD BOTEX+}) = \alpha + \beta_1 \ln(\text{lengths of main}_{it})) + \beta_2 \ln(\text{average pumping head (TWD)}_{it}) + \beta_3\ln(\text{connected properties per lengths of main}_{it}) + \beta_4 (\ln(\text{connected properties per lengths of main}_{it}))^2 + \varepsilon_{it}$
6. SEW_WW1: $\ln(\text{WW BOTEX+}) = \alpha + \beta_1 \ln(\text{properties}_{it})) + \beta_2 (\text{weighted average complexity}_{it}) + \beta_3 \ln(\text{average pumping head (TWD)}_{it}) + \beta_4\ln(\text{weighted average density LAD}_{it}) + \beta_5 (\ln(\text{weighted average density LAD}_{it}))^2 + \varepsilon_{it}$
7. SEW_WW2: $\ln(\text{WW BOTEX+}) = \alpha + \beta_1 \ln(\text{properties}_{it})) + \beta_2 \ln(\text{weighted average complexity}_{it}) + \beta_3 \ln(\text{average pumping head (TWD)}_{it}) + \beta_4\ln(\text{weighted average density LAD}_{it}) + \beta_5 (\ln(\text{weighted average density LAD}_{it}))^2 + \varepsilon_{it}$

Description of the dependent variable

The dependent variables are defined as per Ofwat's consultation analysis files based Ofwat's proposed modelled costs for PR24 i.e. the sum of:

- Power
- Income treated as negative expenditure
- Bulk Supply
- Renewals expensed in year (infrastructure)
- Renewals expensed in year (non-infrastructure)
- Other operating expenditure excluding renewals
- Maintaining the long-term capability of assets (infrastructure)
- Maintaining the long-term capability of assets (non-infrastructure)
- Addressing low pressure enhancement costs
- Atypical expenditure
- Network reinforcement

Minus the sum of the following costs:

- Costs associated with the Traffic Management Act

- Statutory water softening
- NRSWA diversions (non-S185)
- Other non-S195 diversions
- Developer services base cost adjustment

This is also consistent with Ofwat's PR24 methodology.

Description of the explanatory variables

- Connected properties (sum of BN2221 and BN2161).
- Lengths of main (BN1100)
- Properties per lengths of main (Connected properties divided by lengths of main)
- Proportion of water treated in complexity bands W3–6, as calculated in Ofwat's analysis files
- Weighted average complexity, as calculated in Ofwat's analysis files
- Weighted average density LAD (code: WAD_LAD), as reported in the published wholesale dataset
- Average pumping head (TWD) (BN4870)
- Booster pumping stations per lengths of main (BN11390 divided by lengths of main)

Brief comment on the models

The models presented below have operationally intuitive coefficients (directionally) and perform reasonably well against Ofwat's assessment criteria, although we note that the magnitude of the relationships between costs and cost drivers (not just the direction) should be validated from an operational perspective to the extent possible which we are reviewing. We emphasise that the models have been identified based on the data currently available—alternative models may perform better once new data becomes available (e.g. additional years of AMP7, AMP8 business plan information, adjustments to modelled cost definitions) or if new estimation approaches are considered. In particular, the modelling consultation invites companies to submit models estimated using Random Effects, but we consider that alternative estimation approaches should not be excluded from Ofwat's suite of models ex ante.

We note that the models may not sufficiently account for factors that are expected to affect efficient costs in AMP8, nor fully capture the impact of certain exogenous factors on an outturn basis for individual companies.

Water resources plus (WRP)

Relative to the PR19 models, we consider that the model performance improves when controlling for weighted average complexity in levels (as opposed to in logarithms).[1] Moreover, the coefficient on the cost driver is better interpretable from an economic perspective. In particular, the coefficient on the weighted average complexity (in levels) estimates the impact of moving 1% of total water treated from complexity band 'x' to complexity band 'y' on predicted costs (in percentages) as the coefficient multiplied by the difference in the complexity bands (y - x). When the variable is modelled in logarithms (as per the PR19 models), the interpretability of the coefficient is less clear,[2] making it harder to validate the estimated relationship between complexity and expenditure with operational expectations. As such, we suggest that Ofwat reviews the construction of the weighted complexity measure for PR24.

We also note that while the weighted average complexity measure has some advantages relative to measures capturing the proportion of water treated at different complexity levels or water from different sources, the weights attached to the different complexity bands are somewhat arbitrary. We are currently exploring whether Ofwat's PR19 approach is aligned with operational expectations and requests Ofwat to reassess them for PR24.

The WRP models presented below do not explicitly account for the impact of economies of scale at the treatment plant or water source levels. The water modelling dataset contains variables that could capture this (e.g. the proportion of water treated in different size bands), and Ofwat has controlled for equivalent variables in wholesale wastewater. We explored controlling for such variables as part of this modelling consultation, but the estimated coefficients are statistically insignificant or operationally unintuitive on the full dataset. Nevertheless, Ofwat should explore the inclusion of such cost drivers in its PR24 models once the PR24 dataset has been finalised, as we consider economies of scale to be a material driver of expenditure.

Treated water distribution (TWD)

We propose cost models that differ from Ofwat's PR19 models in the following respects.

1. At PR19, Ofwat controlled for lengths of main as the primary scale driver because it outperformed connected properties on a statistical basis. However, this is no longer the case on the current dataset, so we present a model that controls for connected properties as a valid alternative to length of mains.
2. Models with average pumping head (APH) perform well when compared to equivalent models that control for booster pumping stations per lengths of main (as in PR19). While the two cost drivers capture pumping requirements, it is possible that they do so in subtly different ways: APH could more directly capture the energy costs associated with pumping requirements, while booster pumping stations could capture increased maintenance costs associated with having more assets. This could explain why it is possible to include both measures in an econometric model without harming its statistical

[1] The model fit improves from 0.907 when weighted average complexity is modelled in logarithms to 0.910 when weighted average complexity is modelled in levels. The other statistical diagnostics (e.g. RESET test, VIF) are largely unchanged. Note that the coefficient is statistically insignificant in both logarithms and levels.
[2] When modelling in logarithms, the cost impact of moving water between the treatment complexity bands depends on the current level of complexity.

properties (i.e. both coefficients can be significant and remain operationally intuitive in the same model). Indeed, there is limited correlation between APH and booster pumping stations per lengths of mains in the historical data (correlation coefficient of c. 0.15). We are assessing whether the inclusion of both measures in a single model could 'double-count' the impact of pumping requirements on costs.

3. We consider that an alternative, asset-based measure of density (connected properties per lengths of main) can perform well in the TWD model. Such measures were proposed by Ofwat in the PR19 modelling consultation,[3] and used by Ofwat to assess sewage collection costs in wholesale wastewater.[4] When replacing Ofwat's density measure in the PR19 TWD model with properties per lengths of main, the model fit marginally improves and the p value of the RESET test increases (indicating improved performance on the specification test). Indeed, comparing models TWD2 and TWD4 (that differ only in the choice of density measure), the model with connected properties per lengths of main (TWD4) has a better model fit and a narrower range of estimated efficiency scores. Note that we continue to estimate a 'U-shaped' relationship between density and TWD costs, in line with statistical evidence (i.e. the coefficient on the squared term is positive and significant across a range of specifications) and PR19 precedent.

With the new dataset, Ofwat published alternative measures for the weighted average density cost driver that differ on: (i) the level of granularity;[5] and (ii) the weighting approach.[6] We could not identify compelling statistical evidence to support one version of the weighted average density measure over another: the measures lead to similar model fit and range of estimated efficiency scores across model specifications are similar. We continue to assess whether any measures would be superior from an operational perspective and encourage Ofwat to examine the options carefully.

We tested the inclusion of meter renewal activity in the cost models, and find an operationally intuitive (directionally) albeit statistically insignificant relationship between modelled BOTEX and meter renewal activity. Given the large metering enhancement programmes that some companies (including SEW) have undertaken in previous AMPs, the affected companies may need to increase their meter renewal activity in AMP8. Currently, neither the PR19 models nor the models that we present in this submission capture the costs associated with meter renewals. As such, we request

[3] For example, see Ofwat (2018). Cost assessment for PR19: a consultation on econometric cost modelling. Appendix 1 – Modelling results. March 2018. p. 13 and p. 53.
[4] See Ofwat (2019), 'PR19 Final Determinations: Securing cost efficiency technical appendix', December, Table A2.2.
[5] At PR19, Ofwat's constructed the weighted average density measure using local authority district (LAD) data. Some of the new measures use more granular population distribution data at the Middle Super Output Area (MSOA) level.
[6] When aggregating the population density estimates for each statistical area within a company's operating region, Ofwat weighted the statistical area by the population within that area ('population-weighted') at PR19. Some of the new measures are instead weighted by the geographical size of the statistical area ('area-weighted').

Ofwat to consider including meter renewals in its econometric models, or allow for post-modelling adjustments.

Wholesale water (WW)

Our proposed wholesale water (WW) models combine the insights from the WRP and TWD models. We observe that APH of the TWD activity is a stronger cost driver than overall APH (which includes APH in WRP) in the WW models. Indeed, we have found that APH (WRP) is consistently insignificant in the WRP and WW models, which could indicate that the WRP pumping costs are implicitly captured by other cost drivers. As such, we control for APH (TWD) in the WW models. As WW is simply the sum of WRP and TWD, the development needs outlined in the sections above also apply here.

We note that the published modelling dataset does not include explicit drivers of network reinforcement requirements and, therefore, the TWD and WW models could over- or under-fund specific companies for network reinforcement activity. If this remains the case at PR24, an additional mechanisms to increase (or decrease) companies' allowances to reflect increases (or decreases) in network reinforcement requirements in AMP8 would be required.

General comment on model limitations

We have not submitted models that control for service quality, in line with Ofwat's reluctance to account for service quality at PR19. Because of this, our models will only fund companies to deliver the level of service that has been achieved by the benchmark companies in the historical period. The analysis of the level of service funded through base expenditure is complicated by the fact that there is no single measure of service, and different companies can perform well on different service measures. Moreover, some companies may have improved their service level through enhancement expenditure and, as such, the impact of enhancement expenditure on service improvements needs to be accounted for when determining the level of service achievable through base cost allowance (i.e. it may be less than the level of service achieved by the benchmark companies if said companies have improved service through enhancement expenditure).

If Ofwat sets particularly stretching performance commitments at PR24, post-modelling adjustments will be required to fund the expenditure required to meet these targets.

	SEW_WRP1	SEW_TWD1	SEW_TWD2	SEW_TWD3	SEW_TWD4	SEW_WW1	SEW_WW2
Dependent variable	BOTEX (WRP)	BOTEX+ (TWD)	BOTEX+ (TWD)	BOTEX+ (TWD)	BOTEX+ (TWD)	BOTEX+ (WW)	BOTEX+ (WW)
Connected properties (log)	1.068*** (0)	1.088*** (0)				1.056*** (0)	1.057*** (0)
Lengths of main (log)			1.069*** (0)	1.069*** (0)	1.045*** (0)		
Weighted average complexity	0.118 (0.135)					0.115*** (0.001)	
Weighted average complexity (log)							0.371** (0.021)
Average pumping head (TWD) (log)		0.373*** (0)	0.313*** (0)	0.276*** (0)	0.357*** (0)	0.259*** (0.005)	0.270** (0.009)

Booster pumping stations per lengths of main (log)				0.333*** (0.008)			
Weighted average density (LAD) (log)	-1.361*** (0.005)	-2.908*** (0)	-3.203*** (0)	-2.879*** (0)		-2.059*** (0)	-2.104*** (0)
Weighted average density (LAD) (log), squared	0.082*** (0.009)	0.202*** (0)	0.245*** (0)	0.228*** (0)		0.138*** (0)	0.142*** (0)
Properties per lengths of main (log)					-16.623*** (0)		
Properties per lengths of main (log), squared					2.055*** (0)		
Constant	-5.917*** (0)	-2.093 (0.261)	2.892* (0.057)	3.024** (0.032)	26.125*** (0)	-3.872*** (0)	-3.833*** (0.001)
Estimation method (OLS or RE)	RE	RE	RE	RE	RE	RE	RE
N (sample size)	187	187	187	187	187	187	187
Model robustness tests							
R2 adjusted	0.91	0.964	0.96	0.964	0.966	0.972	0.97
RESET test	0.329	0.734	0.599	0.476	0.845	0.771	0.771
VIF (max)	200.3	200.3	203.2	211.4	698	200.4	200.5
Pooling / Chow test	0.999	0.331	0.824	0.794	0.847	0.739	0.701
Normality of model residuals	0.59	0.052	0.918	0.926	0.474	0.46	0.441
Heteroskedasticity of model residuals	0	0.024	0.474	0.883	0.268	0	0
Test of pooled OLS versus Random Effects (LM test)	0	0	0	0	0	0	0
Efficiency score distribution (min and max)	50–198%	85–141%	71–133%	73–136%	75–128%	75–145%	74–145%

Sensitivity of estimated coefficients to removal of most and least efficient company	A [weighted average complexity becomes more significant]	G	G	G	G	G	A [weighted average complexity and average pumping head (TWD) become more significant]
Sensitivity of estimated coefficients to removal of first and last year of the sample	G	G	G	A [booster pumping station per length of main becomes less significant]	G	A [average pumping head (TWD) becomes less significant]	G

Efficiency scores

1. SEW_WRP1

Rank	Company	Efficiency score
1	SSC	50.05%
2	PRT	70.72%
3	ANH	73.78%
4	AFW	81.33%
5	SEW	97.59%
6	HDD	102.56%
7	YKY	104.03%
8	TMS	104.47%
9	NES	106.93%
10	WSH	108.24%
11	BRL	110.23%
12	SVE	110.46%
13	SWB	114.91%
14	NWT	118.87%
15	WSX	120.66%
16	SES	175.43%

17	SRN	197.83%

2. SEW_TWD1

Rank	Company	Efficiency score
1	SWB	85.42%
2	WSX	89.88%
3	NWT	95.07%
4	SSC	96.14%
5	SVE	97.84%
6	SES	98.18%
7	PRT	101.12%
8	SEW	101.91%
9	TMS	102.05%
10	NES	105.84%
11	SRN	110.28%
12	YKY	118.85%
13	AFW	119.01%
14	ANH	121.54%
15	HDD	126.66%
16	BRL	132.19%
17	WSH	140.94%

3. SEW_TWD2

Rank	Company	Efficiency score
1	SWB	71.40%
2	SES	92.11%
3	NWT	96.66%
4	WSX	96.97%
5	SVE	99.28%

6	PRT	100.18%
7	SSC	101.57%
8	TMS	103.84%
9	HDD	104.83%
10	NES	108.72%
11	SRN	112.55%
12	SEW	113.24%
13	ANH	119.12%
14	AFW	123.36%
15	WSH	126.45%
16	YKY	132.44%
17	BRL	132.96%

4. SEW_TWD3

Rank	Company	Efficiency score
1	SWB	73.19%
2	HDD	94.88%
3	SVE	96.99%
4	WSX	97.78%
5	NWT	98.29%
6	PRT	98.97%
7	SRN	101.73%
8	SES	102.48%
9	SSC	103.23%
10	TMS	109.39%
11	NES	112.90%
12	AFW	113.55%
13	SEW	116.40%
14	WSH	119.44%
15	BRL	125.41%
16	YKY	129.37%
17	ANH	135.78%

5. SEW_TWD4

Rank	Company	Efficiency score
1	SWB	74.77%
2	PRT	90.84%
3	SSC	94.25%
4	SES	97.36%
5	NWT	98.30%
6	TMS	101.23%
7	SVE	103.92%
8	SEW	104.61%
9	HDD	105.43%
10	NES	106.53%
11	SRN	109.00%
12	WSX	113.29%
13	ANH	118.19%
14	AFW	119.44%
15	YKY	121.30%
16	WSH	122.78%
17	BRL	128.35%

6. SEW_WW1

Rank	Company	Efficiency score
1	SSC	74.96%
2	PRT	93.07%
3	SWB	93.14%
4	SEW	96.45%
5	ANH	97.61%
6	AFW	98.36%
7	SVE	103.08%
8	TMS	104.06%
9	NES	104.25%

10	NWT	107.35%
11	HDD	108.10%
12	BRL	109.66%
13	WSX	109.71%
14	YKY	111.09%
15	WSH	118.79%
16	SES	119.38%
17	SRN	144.79%

7. SEW_WW2

Rank	Company	Efficiency score
1	SSC	74.39%
2	PRT	90.43%
3	SWB	94.13%
4	SEW	96.10%
5	ANH	98.81%
6	AFW	100.01%
7	SVE	101.83%
8	TMS	105.04%
9	WSX	105.96%
10	NES	105.99%
11	NWT	107.66%
12	HDD	109.86%
13	YKY	111.48%
14	BRL	113.70%
15	SES	119.12%
16	WSH	122.96%
17	SRN	145.03%