A Note on the Plausibility of the e2GAS Results for GTS

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1   Outline

The e2GAS international benchmarking was commissioned by the Council of European Energy Regulators (CEER) in 2015 and involved 22 gas transmission system operators from nine countries. This first full-scale international gas TSO benchmarking project, lasting from September 2015 to May 2016 is reported in Agrell et al. (2016). In the specific run for ACM following the benchmarking, GTS received a cost efficiency estimate of 81.6% using a total expenditure (TOTEX) model in DEA under non-decreasing returns to scale and after removal of two outliers. The outliers have been identified using the conventional methods defined in e.g. Agrell and Niknazar (2014).

This short note is devoted to the principal question regarding the plausibility of the e2GAS results and the GTS result in particular.

The outline is as follows: In Section 2 we relate to other assessments of gas transmission efficiency analyses to investigate the general plausibility of the range and average results obtained. The note is closed in Section 3 with some conclusions regarding the overall and specific plausibility.

2   Other assessments of gas transmission efficiency

There are some previously published efficiency studies for gas networks. It can therefore be interesting to compare our results with those in the literature and hereby getting an idea of the plausibility of our results.

However, before giving a few examples of such studies, it is important to mention some caveats.

Different studies use different models (cost concepts and cost drivers), have different sample sizes, and use different estimation techniques. It is therefore difficult to give well-founded comparisons with other studies without going into the details of the different contributions. The cost scope, for example, is very important; an inefficiency of 20% measured on a cost basis corresponding to say 40% of the total cost corresponds to a lower required savings target than for that of a TSO with a 9% inefficiency of the full cost basis. Likewise, a larger sample will in general lead to larger potentials when DEA is used to estimate the potential since the individual firms then compete with a larger group of firms.

In regulatory benchmarking, it is therefore common to make the transformation of efficiency scores to efficiency requirements dependent on a series of such factors. This explains, as an example, also why different regulators specify different speeds of the catch-up to best practice. In general, the lower the uncertainty is in the assessment and the lower the required savings, the shorter the catch-up period is set.

With these caveats, let us, without going into too many details, mention a few studies.

Amirteimoori, ea (2015) used the data of 25 Iranian gas companies and their production activities in the course of three years. Using a network DEA model, they find average efficiencies around 90%. This is higher than our average efficiency of 79% in the E2GAS study, but the difference is small in view of the differences in models and estimation techniques used. Moreover, note that the result does not suggest anything about the relative efficiency of the Iranian TSOs compared to European operators, only that they are about equally efficient, potentially due to operating in a single country.

Carrington ea (2002) present a benchmarking analysis, conducted for an Australian regulator, that derives measures of efficiency for Australian gas distributors relative to U.S. counterparts. The combined sample included some 59 gas companies. Several techniques, such as data envelopment analysis and stochastic frontier analysis, are used to ensure that their measures are robust to methodology choice. DEA-CRS technical efficiency is calculated at around 73% in 2 inputs 3 outputs model. The DEA-VRS models give mean efficiencies for the Australian companies of 87% and 82% for the US companies. Alternative definitions of operating expenditure give average values of 84-86%. SFA gives 79% for Australian firms. The efficiency levels we have estimated in the E2GAS study are of comparable magnitudes.

Farsi ea (2007) studies the cost structure of gas distribution utilities in Switzerland. Three stochastic frontier models are applied to a panel of 26 companies operating from 1996 to 2000. Efficiency is assumed to be constant over time. The analysis highlights the importance of output characteristics such as customer density and network size. The results suggest that the utilities could slightly reduce their operating costs by improving efficiency. The results suggest an average inefficiency of 6 to 7.5%. Again, this

corresponds to savings that are lower than the possibilities of average savings of some 21% in the E2GAS study.

Finally, let us mention the work by Jamasb ea (2007) for the Council of European Energy Regulators. This study comprises a sample of 43 US and 4 European gas TSOs and produce individual efficiency scores. The benchmarking is done using the three most widely adopted frontier-based benchmarking methods: DEA, COLS and SFA. They identified 7 cost drivers. The average efficiency scores depend naturally on the model used, included the specific cost measure applied and the specific estimation technique used. A summary is given in Table 1 below.

Table 1 Efficiency results from Jamasb et al. (2007, Table 32).

Technique	Variable	Obs.	Mean	Std. Dev.	Min	Max
SFA	O&M	328	.78	.10	.27	.94
	Totex1	328	.66	.15	.25	.93
	Totex2	328	.64	.14	.24	.91
	Revenue	327	.79	.09	.40	.90
COLS	O&M	328	.66	.21	.12	1
	Totex1	328	.62	.22	.18	1
	Totex2	328	.59	.23	.14	1
	Revenue	327	.54	.23	.13	1
DEA (CRS)	O&M	295	.54	.19	.09	1
	Totex1	295	.57	.22	.14	1
	Totex2	295	.56	.22	.12	1
	Revenue	294	.52	.22	.11	1
DEA (VRS)	O&M	295	.59	.21	.13	1
	Totex1	295	.62	.22	0	1
	Totex2	295	.61	.23	.12	1
	Revenue	294	.56	.23	.11	1

Compared to this study, the average efficiencies in the E²GAS study are somewhat high. The explanation here is found in the composition of the best practice frontier; the Jamasb study is essentially reproducing a US-based frontier estimate with a large spread, whereas E²GAS is uniquely including European TSOs.

In summary, it is difficult to make relevant and fair comparisons of the efficiency levels in different studies, but a brief view of some relevant studies suggests that the E2GAS levels are plausible.

3 Conclusions

The plausibility can be commented from two perspectives in this note:

1. The overall level could be compared to that of other studies. International independent studies from the sector using different methods have reached results that are both higher and lower than those of e2GAS, depending on the reference sets used (relative to which the performance is measured) and the scope of inputs included (totex and/or opex). However, the distribution and range of results for e2GAS are similar to that of comparable studies. In particular, the most comparable study by Carrington et al. (2002) yielded both similar levels and spread for multiple methods.

2. The consistency between DEA and UC scores also support the finding that indeed there seems to be a considerable inefficiency in the total expenditure of GTS. This amount is mainly consisting in excessive investment cost, although the data for e2GAS do not permit studying exactly which assets have been acquired at what time.

Generally, the range of inefficiency is larger in the sample at the introduction of incentive regulation and benchmarking. Over time the performance of the operators tend to converge to the sector's best practice, which lowers the range and increases the average score. The magnitude of efficiency differences found in E²GAS does not stand out in comparison to that of other sectors in pseudo-competition[1].

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[1] As an anecdote, a report by the Belgian Ministry of Justice (2012) revealed that the unit costs for a common DNA expertise made by eligible laboratories varied from 60€ to 300€! As long as cost recovery regulation was practiced, no court had noticed the difference. Renard, B. & Jeuniaux, P. (2012) *Coûts et pratiques autour des expertises ADN en matière pénale*, Report for the Federal Ministry of Justice and NICC, the national institute of criminology, Belgium.

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