

NETWORK CODE MODIFICATION PROPOSAL 0414

PROPOSALS TO REFORM THE TRANSCO ENERGY INCENTIVE

-INCORPORATION OF A LINEPACK PERFORMANCE MEASURE

INTRODUCTION

The incentive properties of proposals to introduce a linepack performance measure into the structure of the energy incentive have been discussed at several Energy Workstream meetings.

Three models have been proposed based on the same performance measures, but different methods to determine the cost/reward.

Transco has previously produced a note outlining the incentive properties of each model for discussion at the Energy Workstream on 17th Jan 2000. This report builds on this work and presents algebraic expressions which might define how each conceptual model is applied. Parameter values associated with likely £-2m, £0 and £322k annual outcomes, based on historic values of the performance measures from gas year 1999/2000, are presented to inform the debate.

PERFORMANCE MEASURES

The current energy incentive utilises two performance measures based on the difference between system marginal prices and SAP. It has been suggested that another measure based upon the spread of prices on a day transacted by Transco is used. For the purposes of this analysis a single price performance measure based on the difference between the buy and sell marginal system prices has been defined as follows:-

$$\text{Price PM\%} = \frac{(\text{SMP Buy} - \text{SMP Sell})}{\text{SAP}} \times 100$$

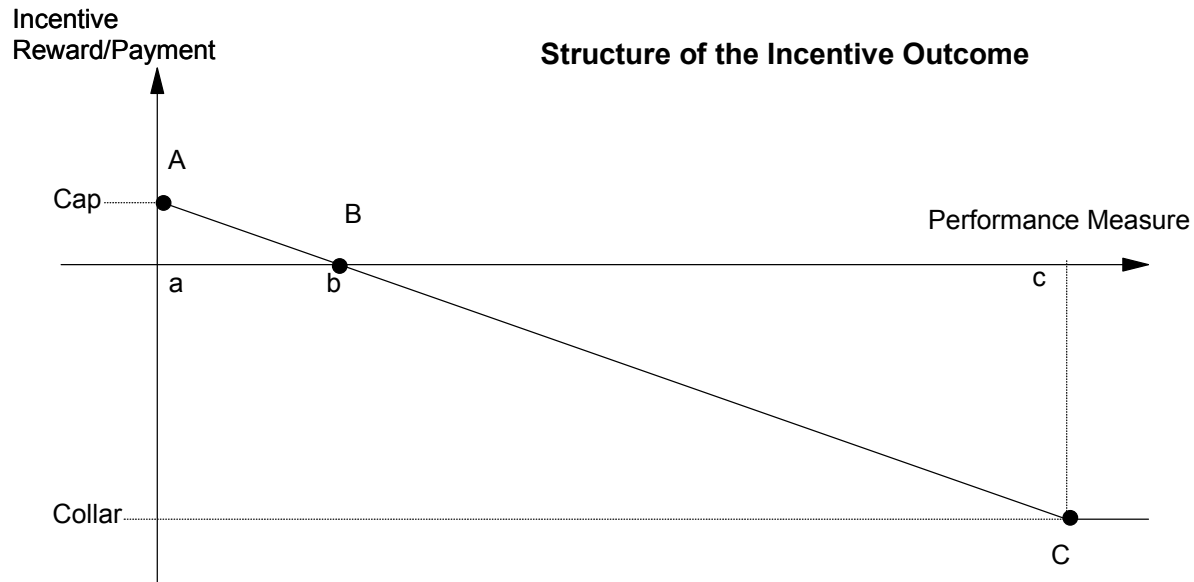
A linepack performance measure based on the absolute difference between the closing linepack and the start of day linepack has also been proposed, namely:-

$$\text{Linepack PM (mcm)} = \text{Abs}(\text{End of Day Linepack} - \text{Start of Day Linepack})$$

Figure 1 in the appendix shows the distribution of the price and linepack performance measures for Gas Year 1999/2000.

INCENTIVE PARAMETERS

Each performance measure might be translated into a financial value using a simple relationship as outlined below:-



The points A, B and C represent:-

- A (0, Cap) -daily cap (maximum reward)
- B (b, 0) -neutral point or "target" level (zero outcome)
- C (c, Collar) -daily collar (maximum payment)

The following equations describe the incentive outcome function, $f(x)$, for performance measure x :-

$$f(x) = \begin{cases} (b-x)/b * \text{Cap} & \text{if } x \leq c \\ \text{Collar} & \text{if } x > c \end{cases}$$

where $c = (\text{Cap} - \text{Collar}) * b / \text{Cap}$

Separate functions, $f_P(x_P)$ and $f_L(x_L)$, would apply for the price and linepack performance measures where

$$\begin{aligned} x_P &= \text{price performance measure} \\ x_L &= \text{linepack performance measure} \end{aligned}$$

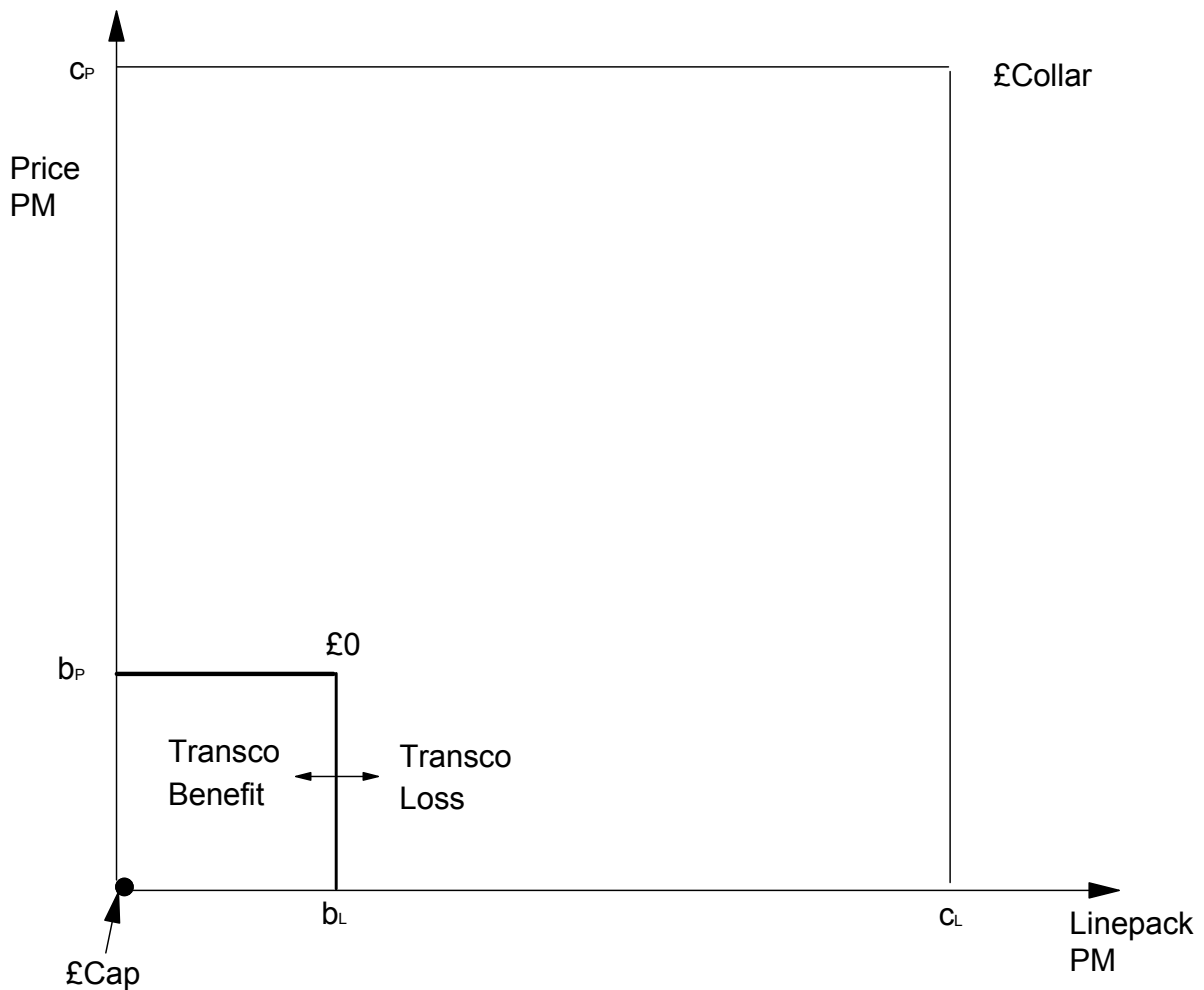
The financial values of the cap and collar are suggested to be the same for both performance measures. The incentive outcome functions then only require the setting of "target" points b_P and b_L for each of the price and linepack performance measures. The approach to determining Transco's risk reward will then determine the properties of the incentive structure.

MODEL 1. THE “WORST OF APPROACH”

The “worst of approach” was designed to increase Transco focus on both linepack performance and price efficiency. Transco would only receive a reward if both price and linepack performance are better than target levels. Whenever either performance measure is below target Transco faces a loss.

The net incentive outcome is defined as follows:-

$$\text{Incentive Performance} = \min [f_P(x_P), f_L(x_L)]$$



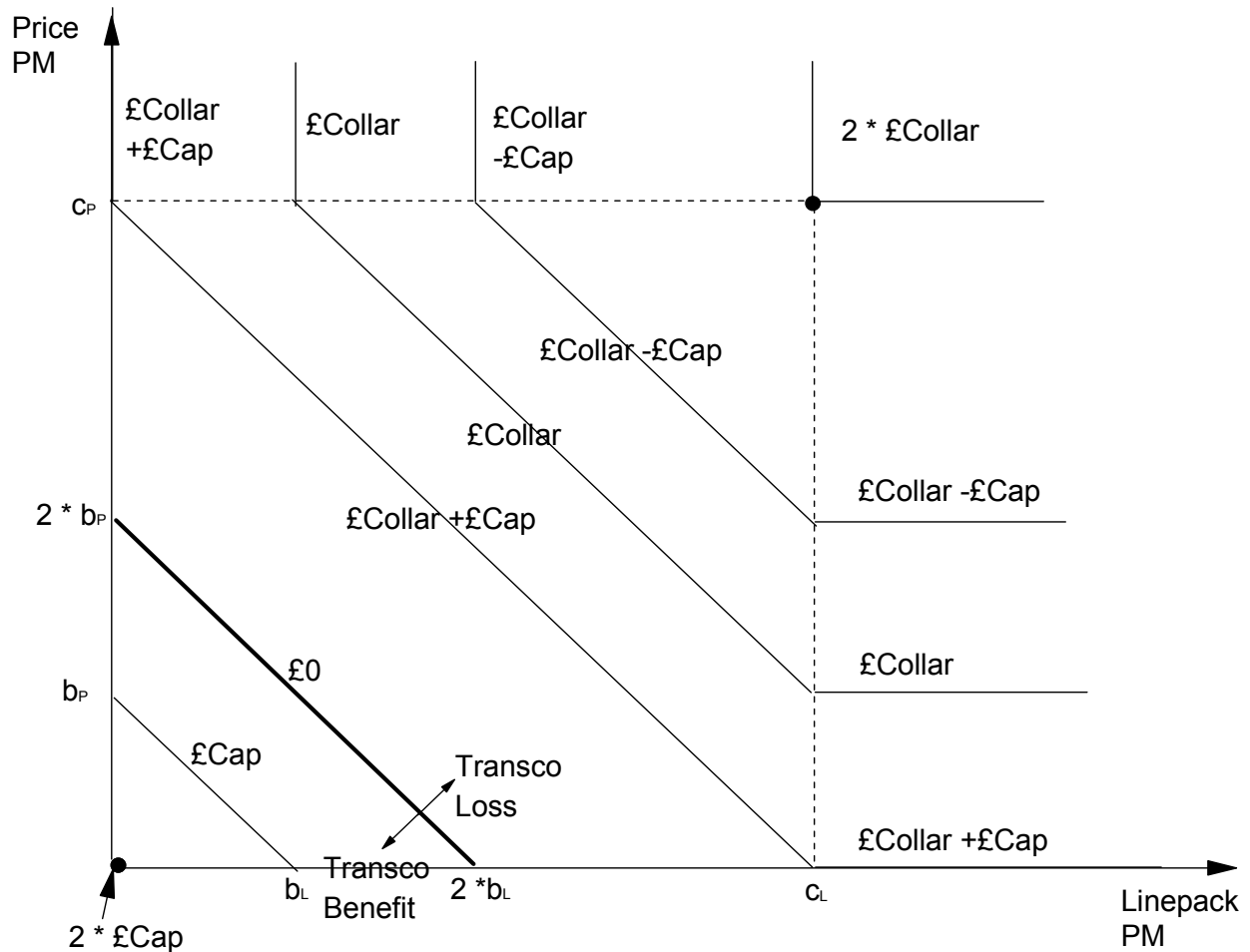
- The solid lines represent contours of equal incentive outcome
- Transco encouraged to move the measures in such a way that the performance point lies on the closest possible contour line to the origin.
- Performance within the box in the left hand corner implies a benefit to Transco, outside implies a loss.

MODEL 2. THE “ADDITIVE MODEL”

The additive model was designed to increase Transco focus on linepack performance, but by the simple addition of a linepack performance measure into the energy incentive structure.

The net incentive outcome is defined as follows:-

$$\text{Incentive Performance} = f_P(x_P) + f_L(x_L)$$



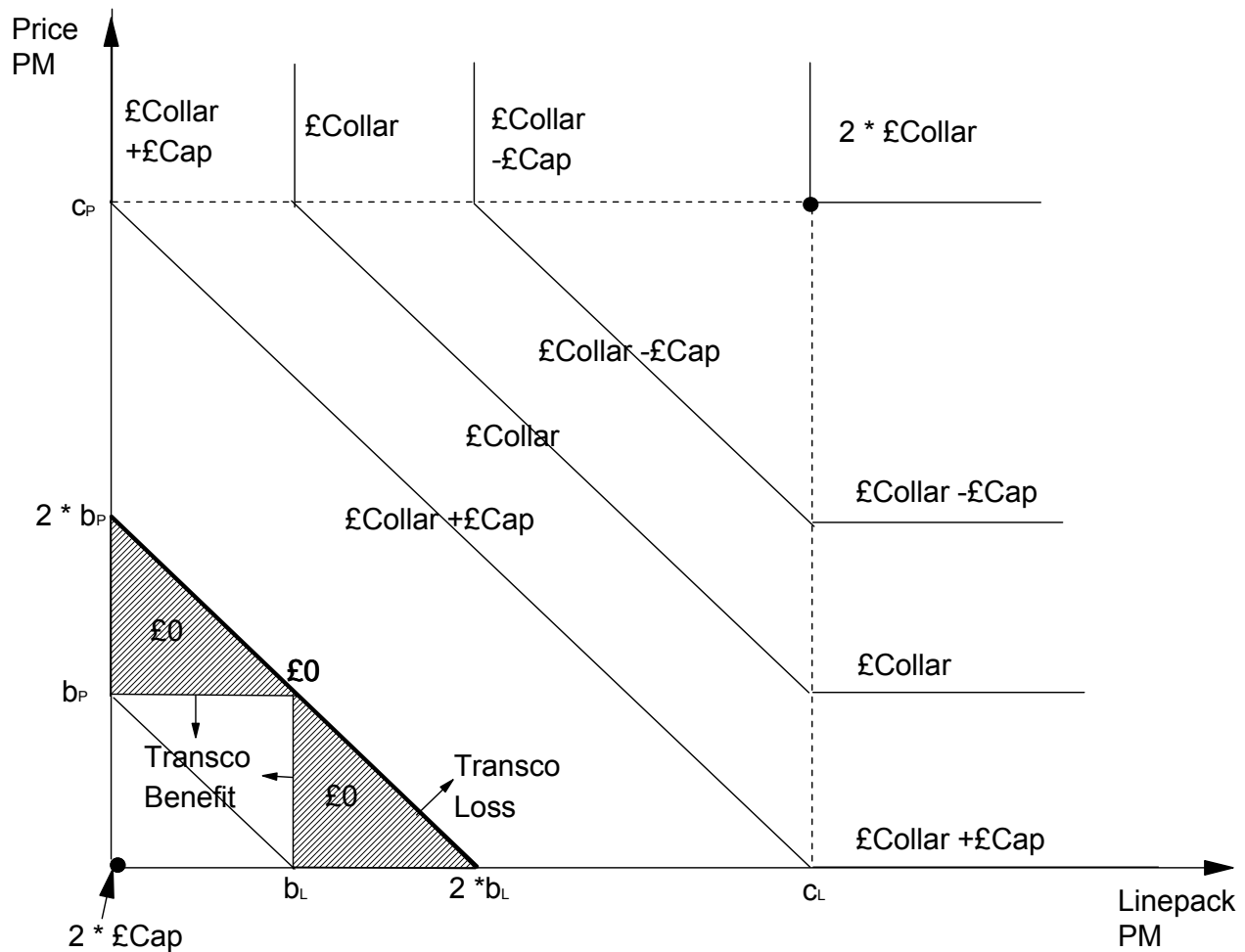
- The diagonal lines within the dotted box region represent contours of equal incentive outcome. Both performance measures are less than the collar.
- The horizontal and vertical lines outside the box represent contours of equal incentive outcome with one (or both) performance measure above the collar.
- Performance below the bold diagonal line implies a benefit to Transco, above implies a loss.
- Transco encouraged to move both measures in such a way that the performance point lies on the closest possible diagonal line to the origin.

MODEL 3. THE “HYDRID MODEL”

The hybrid model is based on the structure of model 2, but with Transco only being rewarded if it delivers a performance better than target for both performance measures (the overriding consideration underlying Model 1). However the hybrid model was developed so that provided at least one of the performance targets was met then Transco should not face a loss.

The net incentive outcome is defined as follows:-

$$\begin{aligned} \text{Incentive Performance} &= 0 && \text{if } x_P \leq b_P / b_L * (2 b_L - x_L), \text{ and } x_L > b_L \text{ or } x_P > b_P \\ &= f_P(x_P) + f_L(x_L) && \text{otherwise} \end{aligned}$$



- The diagonal lines within the large dotted box represent contours of equal incentive outcome.
- The shaded area represents the zones for which Transco would be neutral.
- Performance within the left hand corner box implies a benefit to Transco
- Transco encouraged to move both measures in such a way that the performance point lies on the closest possible diagonal line to the origin.

INCENTIVE PARAMETERS AND OUTCOMES

As requested by the RGTA Energy discussion on 17th Jan 2000, parameter values for each of the incentive models associated with likely £-2m, 0, £+322k annual outcomes have been determined to inform the incentive debate. The parameters have been calculated assuming the historic values for the two suggested performance measures associated with performance observed in 1999/2000 gas year.

The cap and collar have been applied at the current levels of £4,000 and -£30,000. The price performance measure target level has been fixed at 10%, broadly equivalent to the 5% targets applicable to the System Buy and System Sell incentive measures currently in operation.

Figure 2 shows the incentive outcome for varying linepack performance targets, b_L , for each model. The table below shows the linepack target, to the nearest 0.1 mcm, to yield the appropriate financial position.

Table 1. Linepack Target Levels (mcm) to yield incentive outcome ($b_P = 10\%$)

Outcome	Model 1	Model 2	Model 3
-£2m	1.7	1.3	1.3
£0	4.8	2.5	2.7
+£322k	7.1	2.9	3.2

Figure 3 shows the price and linepack performance measure functions with the linepack performance target at 4.8 mcm.

Figures 4-12 show the price and linepack performance measures and contours of equal payment/reward for each case in the above table.