Competition for Scheduled Waste Collection Services - Sustainable Market Structure

Prepared for

Transpacific Industries Group (NZ) Ltd

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This paper is provided in support of the applications for clearance by Transpacific Industries Group (NZ) Limited (TPI) in relation to the proposed acquisition of solid waste businesses of Enviro Waste Services Limited in Blenheim/Nelson, Timaru, Christchurch and Dunedin and without prejudice to any argument or material which may be used in support of TPI's appeal against Decision 604.

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Executive Summary

In Decision 604, the Commerce Commission (the Commission) declined to grant clearance to the applicant, Transpacific Industries Group (NZ) Limited (TPI), to acquire a set of assets from Enviro Waste Services Limited. The Commission was not satisfied that the proposed transaction would not substantially lessen competition in some markets.

This report was commissioned to assist TPI in understanding the competitive impact of the transaction in respect of wheelie bin and FEL collection services. We have investigated the demand and cost conditions relevant to these collection services in each of the areas relevant to TPI's original application. Demand modelling is presented in a companion paper. This report investigates the sustainable structure of FEL and wheelie bin collection markets. It is particularly focused on understanding the business case for entry and expansion, a matter that was of concern to the Commission in Decision 604.

We adapted TPI's cost models for wheelie bin and FEL service. Some of their assumptions were changed in ways that made the entrant's business case worse but somewhat more realistic. Sales costs, in particular, were front-loaded into the start-up phase rather than spread over several years. In both models, the entrant was assumed to start slowly and not grow beyond year one. That is, our entrant takes a year to reach any particular level of output, and then adds no further volume in subsequent years.

Particular care was taken over route density, which needs to be modelled. We considered the relationship between route density (defined as bin lifts per kilometre) and total volume (defined as bin lifts per week). We explain why this relationship needs to be increasing but with a declining slope, and use raw data from each of TPI's regional operations to calibrate a logarithmic function.

We also investigated the coherence between the results of this route density modelling and the assumptions that Manawatu Waste presented to the Commerce Commission. For our FEL model, we tested our route density predictions against real data that Manawatu Waste provided from its Palmerston North FEL service. Our model was able to predict the reported real data of Manawatu Waste with a high degree of accuracy. For wheelie bins, Manawatu Waste's assumptions were of route densities of [ ] kilometres per lift. They were not linked to any particular market in the Commission's report; our modelling is very consistent with these values if they are from the [ ] market. The performance of our route density models against these factual checks increases our confidence in them.

We linked the adapted cost models to revenue and market share information from each location, and derived the minimum number of bins an entrant would require in order to break even. We used the market size information from the Commission's confidential report for this purpose, but have revealed nothing in this report that will compromise the confidentiality agreement we signed with the Commission.

There are two key outputs from this modelling. We estimated the largest number of stand-alone operators that each area could sustain by dividing the minimum sustainable scale into the total size of each market. We also estimated the smallest number of trucks that could service each location, assuming each was operating at 55 hours per week.

The break-even standard in our models assumes that truck and bin acquisition costs are capitalised and depreciated, and all sales costs are expensed in year one. Truck and bin costs are financed by borrowing and interest is paid at 10% per annum. In subsequent years, (straight line) depreciation charges are booked and repaid off the loan so that interest payments decline over time. We define breakeven to be the situation where the NPV of operating profits and losses is zero, using a 12% discount rate. Typically, this means that at the breakeven point, the entrant makes losses in year one, which is always more financially difficult than future years. To break-even, subsequent profits must more than offset the initial losses because we discount the future at 12%. These standards are consistent with those that the Commission implicitly adopted in its Decision.

Table 1 summarises the results of this analysis for wheelie bin collections. It shows, for example, that an entrant wheelie bin operator could cover its costs in Taupo if it sold [ ] bins, but that [ ] bins would be required to cover costs in Dunedin. [ ] [ ], with the result that [ ] bins would be required for an entrant to cover costs in that area.

Table 1 Sustainable Number of Wheelie Bin Operators **[CONFIDENTIAL]**

Market	Breakeven Bins	Estimated Maximum Sustainable Firms	Estimated Minimum Trucks Required
Taupo	[ ]	[ ]	[ ]
New Plymouth	[ ]	[ ]	[ ]
Wanganui	[ ]	[ ]	[ ]
Palmerston North	[ ]	[ ]	[ ]
Horowhenua/Kapiti	[ ]	[ ]	[ ]
Nelson	[ ]	[ ]	[ ]
Christchurch	[ ]	[ ]	[ ]
Dunedin	[ ]	[ ]	[ ]

The variation in breakeven bin numbers across markets is caused by differences in the achievable route densities (ie the extent to which customers are spread out, and the length of disposal trips) and differences in market prices. In locations with more densely packed customers, low distances for disposal trips and high prices, one can break even with a relatively small number of bins.

If the maximum sustainable number of firms were indeed present, each would be operating above and to the left of the flat part of their average cost curve. However prices are such that this would be feasible.

As noted above, our estimates of the minimum number of trucks required assume full utilisation of capacity, which we take to mean operating for 55 hours per week. In its first year of operation, the entrant is assumed to collect only half of its subsequent volume, however, so there is considerable down-time in year one. A market is said to be "structurally competitive" if there is room for several firms, all operating at an efficient scale. Table 1 shows that all of the wheelie bin markets are structurally competitive.

A similar analysis was completed for FEL collections. We did this separately for two types of truck. However from the perspective of an entrant it is likely that the relatively low cost (4x2) truck type would be used. The results are shown in Table 2, and can be interpreted in the same way as for wheelie bins. As was the case for wheelie bins, prices for FEL's seem particularly low in [ ].[1] Indeed, in the case of FELs, [ ].

Table 2 Sustainable Number of (4x2) FEL Operators **[CONFIDENTIAL]**

Market	Breakeven Bins	Estimated Maximum Sustainable Firms	Estimated Minimum Trucks Required
Taupo	[ ]	[ ]	[ ]
New Plymouth	[ ]	[ ]	[ ]
Wanganui	[ ]	[ ]	[ ]
Palmerston North	[ ]	[ ]	[ ]
Horowhenua/Kapiti	[ ]	[ ]	[ ]
Nelson	[ ]	[ ]	[ ]
Christchurch	[ ]	[ ]	[ ]
Timaru/Oamaru	[ ]	[ ]	[ ]
Dunedin	[ ]	[ ]	[ ]

Our overall conclusions from this analysis are that:

- FEL markets are structurally less competitive than wheelie bins, but entry still appears feasible in most markets
    - An entrant could cover costs with [ ]
- Wheelie bin entrants can cover their costs at quite low market shares
    - They would need [ ]

To understand these market share statements, note that the maximum number of sustainable firms occurs when each has the same market share. So 100 divided by the maximum number of sustainable firms is the market share of each expressed as a percentage. For example, in Dunedin, [ ] of the same size would each have [ ] of the market.

[1] [ ]

1. Introduction

In decision 604,[2] the Commerce Commission divided waste collection markets according to whether the service follows a regular schedule (eg weekly) or is provided on request. The Commission found that scheduled services include collection from bags, wheelie bins and front-end loaded (FEL) bins. The purpose of this report is to examine a set of geographic markets for these scheduled waste services. It is focussed primarily on commercially provided services, so it excludes municipal contracts for waste collection.

We have estimated the sustainable structure of each market, which can be expressed in two complementary ways. Both measures use the truck as the unit of analysis. All collection firms require at least one truck, so we can assess the extent to which each market can be competitive by investigating the number of trucks that it could support. We refer to this as the maximum number of sustainable firms. This is an upper bound on the number of distinct operators a market could support.

Our second measure is a lower bound on the number of trucks. For this, we assume that all trucks are operating for 55 hours/week, and estimate the number that would be required to serve each market. Note that if a market could be completely served by one truck, that would be the least cost means of supply, and the market would be a natural monopoly.

It is important to realise that costs and prices are both relevant inputs into this analysis. If prices are high relative to costs, more firms could survive. There are clearly some economies of route density in scheduled collection markets; our modelling embeds these economies and implicitly reveals their materiality; we believe this is useful for competition analysis.

The competition issues of most interest concern the feasibility of entry and expansion under particular constraints on pricing and initial market share. We address this issue by constructing a single cost model for each type of service (FEL and wheelie bin), and linking it to geographic market data.

[2] Decision on the application for clearance for Transpacific Industries (NZ) Limited to acquire the South Island assets and businesses of Enviro Waste Services Limited and up to 50% of the shares in Manawatu Waste Limited.

2. FEL Cost Analysis

Our analysis of FEL costs began with TPI's models and added on additional modules to allow them to analyse the issues of interest. Our attention was mainly focused on the use of a 4x2 truck, because this would be the preferred strategy for an entrant. However for completeness we also investigate the situation of an entrant with a 6x2 truck.

2.1. Structure of the Models

We built the models for the purpose of understanding whether entry and expansion would be feasible in each geographic market post-transaction, and the number of distinct firms that could be sustained given costs and the size of the market. For this purpose, the critical questions concern the average costs an entrant could achieve at particular levels of penetration. If those average costs are less than average revenue, entry is feasible.

We ensured that all sales costs were incurred in year one, which makes the entrant's business case relatively tough but also quite realistic. Having acquired customers in year one, we assume that the scale of the entrant's business does not increase further over time.

The break-even standard in our models assumes that truck and bin acquisition costs are capitalised and depreciated, and all sales costs are expensed in year one. Truck and bin costs are financed by borrowing and interest is paid at 10% per annum. In subsequent years, (straight line) depreciation charges are booked and repaid off the loan so that interest payments decline over time. We define breakeven to be the situation where the NPV of operating profits and losses is zero, using a 12% discount rate. Typically, this means that at the breakeven point, the entrant makes losses in year one, which is always more financially difficult than future years. To break-even, subsequent profits must more than offset the initial losses because we discount the future at 12%.

2.1.1. Route Density

A key issue concerns the way route density affects average costs. In its assessment of the models provided by TPI and ESL, the Commission identified route density as a factor that made it difficult for an entrant to expand (paragraph 363). It was considered relatively easy to gain a toehold in the market, but very difficult to expand beyond that point.

To investigate the crucial issue of route density, we requested information from TPI at the level of individual geographic markets. We were provided with the number of lifts per week and the number of kilometres run per week. Our objective is to use these data to develop a prediction of route density for an entrant. In most markets an entrant's scale will be considerably smaller than that of TPI, so we need a way of predicting route density for operators that do not resemble TPI.

We posit the existence of a functional relationship between route density (which we measure using lifts/km) and total volume in a region (lifts/week). As volume increases, density should also improve, so this is likely to be a positively sloped relationship. Further, the ratio of our volume and density measures is distance per week (ie, lifts/week ÷ lifts/km = km/week), which will not fall as volume rises.[3] This means that route density functions of the type presented in Figure 1 cannot increase in slope moving from left to right. As a result, curves such as the 'S' shape often used to represent diffusion of a new product are not reasonable representations.

Figure 1 Predictions of Route Density Models **[CONFIDENTIAL]**

Based on these considerations we believe that a logarithmic function offers the most useful model of the relationship between route density and volume. We used the following model to predict route densities as a function of lifts per week in each market.

Route Density (lifts/km) = α ln (1+ bins lifts/week)

The parameter α was calibrated separately for each market using TPI's data. We expect that the relationship differs across regions because of the density of potential customers, and the running distances required for disposal. The result is curves with the same general shape as those shown in Figure 1; those particular curves are for wheelie bins, but exactly the same process was used (separately) for all FEL and wheelie bin markets. The shape of the FEL route density curves are therefore identical to those in Figure 1; only their positions within the graphed space are different.

Our models imply that route density always increases with the scale of the entrant's business, but it does so at a declining rate. That is, as bin numbers increase, the route density benefit of selling another bin progressively declines.

[3] Total distance on a route will only stay constant if an extra bin can be collected without deviating from the original route **and** can be accommodated in the same load delivered to the landfill or RTS. Otherwise it will increase.

Our density models are of course an abstraction from reality, as any model must be. However they do respect the available theoretical constraints and they are also consistent with the only real data that are available to us. The Commission could presumably improve their accuracy by requesting data from other operators, but we cannot.[4]

As a cross check on our FEL route density modelling, we compared our prediction with the Manawatu Waste data from Palmerston North, as reported by the Commission in column J of attachment 9. Our model predicts a route density of [[redacted]]. As noted in section 3.1 below, our route density predictions are also very close to cross check data for wheelie bins. We are therefore confident that the route density models are reasonably accurate.

2.1.2. Market Share

TPIs provided estimates of its own market share, from which we were able to derive an estimate of total market size in each region. Some of these assumptions turned out to be inconsistent with the Commission's reported market shares however. For accuracy, we have used the Commission's market share data for our analysis. To preserve confidentiality, no information that could be used to reveal those data is presented in this report.

2.1.3. Post-Entry Expansion

We assumed that a truck would only operate for a maximum 10 hours per day for 5.5 days per week or 55 hours per week. Once entrants grow to the point that they cannot collect all their bins within that time frame, they are assumed to buy a new truck. This errs on the side of under-valuing the business case for an entrant (ie it makes their financial position seem somewhat worse than it is). We understand that TPI drivers often operate for around 50 hours per week. An entrant would probably also work up to 55 hours while building scale prior to investing in an additional truck.

It is worth noting that we have not modelled a corporate waste collector such as TPI. A corporate collector would have a different cost structure to the entrants we are considering. They would have additional cost categories for example, such as head office costs. They may also purchase newer and/or larger equipment.

Expansion for the entrants we model would involve selling more bins, to secure greater utilisation of a truck, and subsequently investing in a second truck. Depending on the way an entrant was structured, our models might also be reasonable representations of a three-truck operator.

[4] Any other assumption-based analysis, such as scenario modelling, is unlikely to improve on the work reported here. Real data from small scale operators could be used to further test the robustness of our models.

2.2. Results

We have modelled the FEL markets in two different ways. Table 3 summarises the modelling under the assumption that all FEL trucks are 4x2. This is the way an entrant is likely to start operations, because it economises on capital. The number of bins required to break even is shown for each market, along with the estimated total number of bins in that market. We then estimate the maximum number of sustainable firms as total market bins divided by break even bins, rounded down to the nearest integer.

Table 3 FEL Market Structure Summary Assuming 4x2 Trucks **[CONFIDENTIAL]**

Market	Breakeven Bins	Estimated Maximum Sustainable Firms	Estimated Minimum Trucks Required
Taupo	[ ]	[ ]	[ ]
New Plymouth	[ ]	[ ]	[ ]
Wanganui	[ ]	[ ]	[ ]
Palmerston North	[ ]	[ ]	[ ]
Horowhenua/Kapiti	[ ]	[ ]	[ ]
Nelson	[ ]	[ ]	[ ]
Christchurch	[ ]	[ ]	[ ]
Timaru/Oamaru	[ ]	[ ]	[ ]
Dunedin	[ ]	[ ]	[ ]

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In some cases, particularly Christchurch, [ ]. None would achieve an efficient scale of operation (ie none would reach the flat part of their average cost curves), but revenues would be sufficient to allow them to exist. The average cost curve underlying this analysis is shown in Figure 2. It is clear from this graph that one could [ ].

Table 3 also shows the minimum number of 4x2 FEL trucks that would be required to service each market. These figures assume full utilisation of 55 hours per week.

In practice, many FEL operators use larger 6x2 trucks. These have larger payloads and therefore economise on the time and running costs incurred in disposal trips. Offsetting these advantages to some degree are the higher initial capital costs. We replicated the above analysis assuming all trucks are 6x2, and the results are shown in Table 4 below.

Figure 2 Average Cost Curve: 4x2 FEL Service in Christchurch **[CONFIDENTIAL]**

Comparisons between Table 3 and Table 4 are consistent with what one would expect: when 6x2 trucks are used there are generally fewer vehicles required to service each market, the break even bin numbers are higher, and the maximum number of sustainable firms is lower. It can be inferred from this analysis that, where a combination of 6x2 and 4x2 trucks are in use, the sustainable market structure indicators will lie between those of Table 3 and Table 4.

Table 4 FEL Market Structure Summary Assuming 6x2 Trucks **[CONFIDENTIAL]**

Market	Breakeven Bins	Estimated Maximum Sustainable Firms	Estimated Minimum Trucks Required
Taupo	[ ]	[ ]	[ ]
New Plymouth	[ ]	[ ]	[ ]
Wanganui	[ ]	[ ]	[ ]
Palmerston North	[ ]	[ ]	[ ]
Horowhenua/Kapiti	[ ]	[ ]	[ ]
Nelson	[ ]	[ ]	[ ]
Christchurch	[ ]	[ ]	[ ]
Timaru/Oamaru	[ ]	[ ]	[ ]
Dunedin	[ ]	[ ]	[ ]

3. Wheelie Bin Cost Analysis

We were supplied with a model of wheelie bin costs that was developed by TPI and was previously submitted to the Commerce Commission. This model formed the basis for our analysis, but it was changed so that it provided a more complete picture of the economics of entry into wheelie bin service in each market.

In decision 604, the Commission described (at paragraph 359) two modifications it made to the wheelie bin model supplied by TPI. Those changes were to

- increase the capital cost of entry (wheelie bins aside) from the level assumed by TPI; and
- cut the assumed revenues for commercial and residential customers.

We believe that neither of these changes are warranted. Two rationales were given for increasing the capital cost of entry. One was confidential but we assume by deduction that it was related to the cost of the collection truck. Alternatively the Commission suggested that additional costs could be used to buy a sales vehicle or a back-up truck. There is strong evidence that $50,000 is an adequate allowance for an $8m^3$ REL truck, as shown in Table 5.

Table 5 Prices for REL Trucks (Source: Covec web search 24 July 2007)

Price	Year	Capacity (m3)	Link
$45,000	1995	8.4	http://www.autobase.co.nz/trucks-for-sale/Isuzu/NRR/337827.html
$45,000	1996	10	http://www.autobase.co.nz/trucks-for-sale/Mitsubishi/Fuso/427388.html
$39,375	1995	8	http://www.autobase.co.nz/trucks-for-sale/Isuzu/Forward/377053.html

The TPI model also includes a detailed breakdown of sales costs, including for time to visit prospective customers, sales support materials for every prospective customer, and a relatively low conversion rate from visits to sales. It assumes that the salesperson walks between prospects, which incurs a significant time cost. If capital is added in the form of a sales vehicle, the time cost would also need to be reduced. Since we see no mention of the Commission doing that, in our modelling, we have retained the walking salesperson assumption.

The third possibility the Commission point to as requiring additional capital is to purchase a back-up truck. We believe this is unrealistic. We find it difficult to believe that an entrant would spend twice as much as necessary simply as a precaution against breakdown (note that maintenance can be scheduled outside of normal collection hours).

In the case of revenues, the Commission's rationale for reducing the per-customer revenue was that an entrant would need "a bargaining point to induce customers to change from their existing known supplier to the unknown new entrant". This is a fair point, but it is not applicable in the situation the Commission contemplates, which is that the transaction would substantially lessen competition. If that was so, prices would increase by a non-trivial amount. An entrant could then acquire customers using TPI's existing (pre-transaction) prices.

Put another way, we should be trying to model the extent to which an entrant could constrain TPI in the factual scenario (ie the post-transaction world). If the transaction does substantially lessen competition, then TPI will be free to increase its prices. If an entrant could be profitable at today's (pre-transaction) prices, then TPI will not be able to increase its prices because that would provide the entrant with "a bargaining point to induce customers to change". So the relevant question is whether an entrant could be profitable at today's prices.

For the above reasons, we retained TPI's vehicle cost and revenue assumptions in our modelling.

3.1. Structure of the Model

The same basic model structure was used for wheelie bins and FELs. In particular, our treatment of route density for wheelie bins was exactly as described in section 2.1.1 above.

We attempted to check our wheelie bin route density modelling against material reported in Decision 604. However this was less conclusive than in the case of the FEL cross-check discussed above. A spreadsheet printout from a wheelie bin model that Manawatu Waste submitted to the Commission was reported in Appendix 5 of the Decision. That model includes parameters for route density, but clearly does not claim that these parameters are based on real data. They are labelled "Assumed km's per bin lift".

Manawatu Waste's assumptions, as set out in the printout from their model, are not consistent with the density curves we have estimated for Palmerston North: their assumed density lies below the curve we estimated. This does not necessarily mean that Manawatu Waste's assumption is invalid or that our modelling is inaccurate. Perhaps the most likely explanation is that it was based on their experience in Taupo rather than Palmerston North. Our model for Taupo predicts an even lower route density than Manawatu Waste's assumption at the same volume [ ]. As noted below (section 3.2), this does not necessarily make entry or expansion infeasible.

3.1.1. Market Share

As for the FEL model, TPI provided estimates of its own market share, from which we were able to derive an estimate of total market size in each region. Some of these assumptions turned out to be inconsistent with the Commission's reported market shares however. For accuracy, we have used the Commission's market share data for our analysis; no information that could be used to reveal those data is presented in this report.

3.1.2. Post-Entry Expansion

We again assumed that a truck would only operate for a maximum 10 hours per day for 5.5 days per week or 55 hours per week. Once entrants grow to the point that they cannot collect all their bins within that time frame, they are assumed to buy a new truck. This errs on the side of under-valuing the business case for an entrant (ie it makes their financial position seem somewhat worse than it is). We understand that TPI drivers often operate for around 50 hours per week. An entrant would probably also work up to 55 hours while building scale prior to investing in an additional truck.

3.1.3. Customer Mix and Revenue

We used TPI's pricing in the model. Business and residential customers were combined into a single model in the ratio of 1:3.

3.2. Results

The summary results from the wheelie bin models are provided in the following table. It shows that at current prices, there is room for multiple operators collecting wheelie bins in each of these markets.

Table 6 Sustainable Number of Wheelie Bin Operators **[CONFIDENTIAL]**

Market	Breakeven Bins	Estimated Maximum Sustainable Firms	Estimated Minimum Trucks Required
Taupo	[ ]	[ ]	[ ]
New Plymouth	[ ]	[ ]	[ ]
Wanganui	[ ]	[ ]	[ ]
Palmerston North	[ ]	[ ]	[ ]
Horowhenua/Kapiti	[ ]	[ ]	[ ]
Nelson	[ ]	[ ]	[ ]
Christchurch	[ ]	[ ]	[ ]
Dunedin	[ ]	[ ]	[ ]

In order to break even, a wheelie bin operator would need to sell [ ] bins in Christchurch (for example). At that point, it would not be on the flat part of the average cost curve, as shown in Figure 3, but it would nevertheless be able to recover all of its costs.

Figure 3 Average Cost Curve for Wheelie Bins in Christchurch **[CONFIDENTIAL]**

The average cost curve shown in Figure 3 has some jagged sections where average cost increases. These are the points at which additional vehicles need to be added to service demand. Fixed (and average) costs increase in a step at these points.