

**Calculation of the consequences of energy
consumption standards for the market supply of
domestic refrigerators and freezers**

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Author(s)
P.E.J. Vermeulen
R.J.M.J. Weijers

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NOVEM
PO Box 17
6130 AA Sittard

Summary

At the request of the Ministry of Economic Affairs, NOVEM is investigating the feasibility under the Energy Conservation Appliances Act of setting minimum efficiency requirements of the energy consumption of domestic refrigerators and freezers. This particular study has examined the consequences of such efficiency requirements for the market supply. The investigation considered three aspects:

- the resulting reduction in the average energy consumption of the appliances available for sale;
- the size and composition of the residual market (numbers, brands, etc.);
- the effect on average prices and on minimum prices.

The study was carried out using a database of all the refrigerators and freezers available for sale in 1990/1991.

The study concludes that minimum efficiency requirements can be formulated that will bring down energy consumption by 10 per cent without any unacceptable price rises or elimination of brands. With such an efficiency requirement, around 50 per cent of the present supply of appliances would be 'banned'. While stricter efficiency requirements will lead to greater savings, they will also have considerably more negative consequences for the market supply as a whole. Stricter efficiency requirements (around 15 to 20 per cent reduction) would, however, be acceptable for part of the market. This is the case for freezers and four-star refrigerators with one temperature controller.

There are at the moment energy-efficient models for sale with around 50 per cent below average consumption. Any additional price will pay for itself within the appliance's life-span through the energy cost savings. It is estimated that on the basis of these state-of-the-art models, a reduction in energy consumption of 40 per cent must be considered feasible, given the repeated tightening up of minimum efficiency requirements.

As a result of the replacement of the present stock with more energy-efficient models, minimum efficiency requirements will eventually lead to a decline in the national consumption of electricity. The present stock requires an average electrical capacity of 350 MW. Reductions of 10 to 40 per cent of consumption through minimum efficiency requirements will therefore lead to reductions in average demand for capacity of between 35 and 140 MW.

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1 Introduction

At the request of the Ministry of Economic Affairs, NOVEM is investigating the feasibility of introducing measures under the Energy Conservation Appliances Act to reduce the energy consumption of domestic appliances through regulations.

In the course of 1990 IMET-TNO (prior to 1-1-91: MT-TNO) carried out various studies on behalf of NOVEM into the domestic refrigerators and freezers sector. The following reports of these studies were published:

- Ref. 1: a summary of legal requirements (energy labelling, standards) in countries other than the Netherlands;
- Ref. 2: an analysis of the market supply of domestic refrigerators and freezers;
- Ref. 3: an inquiry into sales;
- Ref. 4: recommendations in particular about the way in which limit values can be chosen for maximum permissible energy consumption.

Following on from these studies NOVEM has drafted an Action Plan with a view to the implementation of an Order in Council (under the provisions of the Energy Conservation Appliances Act) involving a ban on the offer for sale of refrigerators and freezers with an energy consumption higher than a 'limit value' that has yet to be determined [5].

Under the provisions of this Action Plan, the Heat and Refrigeration Technology Department of IMET-TNO was commissioned to work out the consequences for the market supply of various proposals for 'limit values', in accordance with the method of [4].

This report contains results for limit values for the whole domestic refrigerator and freezer market, with the exception of:

- (camping) absorption refrigerators;
- 'no-frost' equipment.

Two proposals for limit values have been worked out for each main category with a different degree of 'effect' on the market supply; their consequences for the rest of the market supply are described.

2 Method

Database

[2] made use of a database based on the market supply in 1988. Comparison of this market supply with that summarised in the VEEN Energy Indicators 90/91 revealed many differences, both as regards brand names and types and as regards features. Use was therefore made of an update of the database, based on the VEEN Energy Indicators 90/91. These VEEN Energy Indicators can be found in Appendix 1.

Limit values

The recommendations given in [4] have been adopted for the formulation of limit values for energy consumption, in other words:

- the maximum permissible energy consumption is given for each function category as a function of the 'corrected net volume' (see §3.1).

This is illustrated by reference to Figure 1. Energy consumption is plotted on the y-axis against corrected net volume on the x-axis. The symbols represent the models available for sale. The continuous dividing line is the limit value for maximum permissible energy consumption. The energy consumption of the models above the line is too high and these models are therefore 'banned'.

Use has (necessarily: see Appendix 1) been made in this study of energy consumptions in kWh/24 hours, rounded off to one decimal place. For comparison with the dividing lines the limit value has in each case been rounded off to two decimal places.

Determining dividing lines

[4] describes a method for choosing the position of the dividing lines.

Arguments applicable here are:

- on the one hand, achieving a satisfactory result (= reduction in energy consumption);
- on the other, retaining sufficient consumer choice at an acceptable price level.

The aim of this study was not so much to determine the limit values as to chart the consequences of certain choices for limit values. Calculations have therefore been made for different positions of the dividing lines (see §3.1). These positions were not chosen at random, however. The resulting reduction in energy consumption must really be more or less the same over the entire volume range.

At the same time sufficient supply must remain over the entire volume range. It was also necessary to obtain a continuous dividing line [4]. The dividing lines were chosen so that they would meet these conditions by trial and error. In some cases this meant bending the dividing line, as, for example, is the case in Figure 25.

Quantities calculated

The calculations of the effect on market supply involved the following quantities:

- The remaining brand name/type combinations for each volume category (known as the 'residual market'), as regards both the number and the individual brand names.
- The average energy consumption of the market supply, for both the original market supply and for the residual market.
- The average recommended price of the market supply, for both the original market supply and for the residual market.
- Where the average recommended price of the residual market was greater than that for the original market, we checked whether the higher price paid for itself through the lower energy consumption. To do this we converted the standard consumption to the practical consumption by multiplying it by a factor 0.7. The 'simple payback time' (= additional cost/saving per year) was calculated with an electricity tariff of 22 cents per kWh.
- We examined whether 'the cheapest model' would remain on the market. We made a distinction here between free-standing equipment and built-in or built-under models, on account of the significant price differences between these different types.

Categories

We used the breakdown of categories employed in [2] as a basis. As regards the four-star refrigerator group, we replaced the frozen food/total volume ratio with the distinction according to one or two temperature controllers (normally associated with the use of one or two compressors). We opted for this change (announced in [2] in consultation with KEMA, the Dutch quality-control institute for electrical appliances).

It should also be noted that for various reasons the following types of equipment were not included in the analysis:

- refrigerators based on the absorption principle (in particular camping or drink chiller applications);
- wine chillers;
- refrigerators with a zero degree compartment.

3 Results

3.1 Form of presentation

The calculations described in §2 were carried out in the same way for all the categories. The results can therefore be presented in uniform fashion. This presentation is explained below.

The main categories are discussed separately in the sections below. The main categories in question are:

- 3.2.1 Refrigerators without a frozen food compartment
- 3.2.2 Refrigerators with a frozen food compartment: no stars
and one star
- 3.2.3 Refrigerators with two stars
- 3.2.4 Refrigerators with three stars
- 3.2.5 Refrigerators with four stars
 - 3.2.5.1 One temperature controller
 - 3.2.5.2 Two temperature controllers
- 3.2.6 Freezers

The presentation of each main category begins with a figure (Figure 1, for example), in which the energy consumption of each model in the database is plotted as a function of the corrected volume. The corrected volume is the product of the net volume and a correction factor that takes account of the storage temperature of that volume. These factors have the following values [4]:

Area	Factor
Cellar space	0.65*
Refrigerator (5°C)	1.00
Freezer 0/1 star	1.55
Freezer 2 stars	1.85
Freezer 3/4 stars	2.15

* Following consultation with KEMA, the average temperature of the cellar space was changed from 10°C [4] to 12°C. As a result the correction factor has changed from 0.75 [4] to 0.65.

The separate volume categories can be distinguished by means of different symbols. The dividing lines drawn on these figures are those for which the subsequent calculations have been made. In each case we have:

'dividing line 1' : for a reduction in energy consumption of around 10 per cent

'dividing line 2' : ditto for 15 per cent.

The consequences of these dividing lines for the market supply and the average energy consumption for the market supply are summarised in a table (Table 1, for example). These tables show the consequences both for each volume category and for the entire main category.

The economic consequences of the elimination of part of the market can be derived from a table with average price rises and associated payback times and also from figures in which the selling price is plotted against the specific energy consumption; see, for example, Table 3 and Figure 2.

The payback times have been calculated with a tariff of 22 cents per kWh. For other tariffs (x cents per kWh, for instance) the calculations can be corrected as follows:

$$\text{payback time (tariff } x) = \frac{\text{payback time} \times 22}{x}$$

Where the average price falls on elimination of part of the market, the table has been left blank.

Also of interest is the extent to which certain brand names are eliminated when the dividing lines are introduced. To this end a summary of the number of models for each brand name has been made for each main category, both in the present situation and in the residual market, see Table 5, for example.

Finally, we have made a table showing the most economical of all the free-standing models for each volume category, with type designation, energy consumption and price. This has only been done for those volume categories for which the number of models is sufficiently large.

3.2 Results for each main category

3.2.1 Refrigerators without a frozen food compartment

The dividing lines used are (V_c in litres, E_g in kWh/24 hours):

Dividing line 1

$$E_g = 1 \times 10^{-3}[V_c] + 0.6$$

Dividing line 2

$$E_g = 0.86 \times 10^{-3}[V_c] + 0.556$$

The results for the refrigerators without a frozen food compartment can be found in Tables 1 to 5 and Figures 1 to 15.

The results were:

Dividing line	Reduction in market supply	Reduction in energy consumption
1	62%	13%
2	82%	20%

The dividing lines have been chosen so that the 'contribution' to the reduction in energy consumption is comparable for each volume category. The tables show that this has been reasonably successful.

The reductions in market supply are substantial, although there is still sufficient supply over the volume range as a whole in the case of dividing line 1. In the case of dividing line 2 the choice is limited to large refrigerators.

Generally speaking the residual market becomes more expensive:

- from 10 to 113 guilders in the case of dividing line 1
- from 15 to 219 guilders in the case of dividing line 2.

In the case of dividing line 1 the additional costs pay for themselves within the model's life-span in six cases out of seven. This number is halved in the case of dividing line 2. Dividing line 2 also results in the complete disappearance of the larger built-under refrigerators (Figure 14).

As regards the 'cheapest' model, the following can be derived from Figures 2 to 15 for the seven groups examined:

Dividing line	Cheapest stays on the market	Almost the same	Cheapest disappears
1	1	2	4
2	-	1	6

Table 5 shows that dividing line 1 results in the elimination of four of the 35 brand names. They are:

- IAR
- Nordland
- Ocean
- Pelgrim

The 'major' brands remain on the market. Dividing line 2 eliminates 19 of the 35 brand names, including 'major' brands such as Ignis, Miele, Philips and Zanussi.

To conclude, the table below shows the most economical free-standing model for each major volume category:

Volume category [litres]	Brand/type	Energy consumption [kWh/24h]	Price [NLG]
100-150	Caravell HJK 160 A	0.4	849
150-200	Gram LER 200	0.2	1359
200-300	Bosch KSR 2512 (2)*	0.6	1279
300-450	Gram K 395	0.8	1645

* () = number of models with the same lowest energy consumption

3.2.2 Refrigerators with a no-star or one-star frozen food compartment

The market supply of compression refrigerators with a no-star or one-star frozen food compartment is extremely limited; altogether nine and 14 models respectively. This supply is divided between two volume categories and includes both free-standing and built-under models. The supply for each of the eight subcategories is therefore extremely limited (sometimes just one model).

Since the energy consumption of no-star refrigerators differs only slightly from that of one-star models, the two categories have been combined.

The calculations will show that the market reductions for each category do not differ much, so this combination can be regarded as acceptable.

The following dividing line was used as a basis for the calculation (V_c in litres, E_g in kWh/24 hours).

Dividing line 1

$$E_g = 1.3792 \times 10^{-3}[V_c] + 0.5897$$

This dividing line results (Table 6) in a reduction in energy consumption of 11 per cent and a reduction in market supply of 43 per cent (56 per cent and 36 per cent for no-star and one-star respectively).

The summary below shows that, while a reduction in supply of 43 per cent is not extreme, because the supply is small, two of the eight groups disappear altogether.

Volume [l]	Stars	Free-standing/ built-under	Number of models	
			Original	Residual Market
100-150	0	free-standing	5	2
	0	built-under	2	1
	1	free-standing	7	4
	1	built-under	5	4
150-200	0	free-standing	1	1
	0	built-under	1	0
	1	free-standing	1	1
	1	built-under	1	0

Application of a more stringent dividing line would cause even more groups to be completely eliminated. The choice for the consumer would then be drastically reduced. For this reason no second dividing line was applied to the no-star and one-star refrigerator group.

The other results for dividing line 1 can be found in Tables 6 to 10 and Figures 16 to 24. Because of the small size of the market the results vary widely from one group to another; some groups become very much more expensive, while others become very much cheaper and others again disappear altogether. No simple conclusion can be drawn.

There is no point giving a table of the most economical refrigerator for this main category, since the number of models in each volume category is too small.

3.2.3 Refrigerators with a two-star frozen food compartment

The following dividing lines were used (V_c in litres, E_g in kWh/24 hours):

Dividing line 1

$$V_c \leq 269$$

$$E_g = 1.78 \times 10^{-3} [V_c] + 0.62$$

$$V_c > 269$$

$$E_g = 2.76 \times 10^{-3} [V_c] + 0.3569$$

Dividing line 2

$$E_g = 1.312 \times 10^{-3} [V_c] + 0.5895$$

The refrigerators with a two-star frozen food compartment category contains just 20 brand names/type combinations altogether. The results can be found in Tables 11 to 15 and Figures 25 to 31.

The results for the category as a whole were:

Dividing line	Reduction in market supply	Reduction in energy consumption
1	32%	8%
2	70%	14%

Figure 25 shows that in the case of dividing line 1 there is still sufficient supply available throughout the volume range (the smallest models are absorption refrigerators). Dividing line 2 eliminates the larger volumes.

The price changes (Tables 13 and 14) give an extremely varied picture because of the small number of models. There is no price rise for the biggest group (100-150 litres). Figures 26, 27 and 28 show that in the case of dividing line 1 most if not all the cheapest models remain on the market. This ceases to be true in the case of dividing line 2.

Dividing line 1 eliminates just two of the 13 brand names, including Zanussi, while dividing line 2 eliminates eight of the 13, including major brands such as Frilec, Ignis and Philips.

As regards the most economical model, only the 100 to 150 litre category comes into contention:

Volume category [litres]	Brand/type	Energy consumption [kWh/24h]	Price [NLG]
100-150	Indesit R 1400 WI(3)*	0.7	599

* () = number of models with the same lowest energy consumption

3.2.4 Refrigerators with a three-star frozen food compartment

The following dividing lines were used (V_c in litres, E_g in kWh/24 hours):

Dividing line 1

$$V_c \leq 269$$

$$E_g = 1.78 \times 10^{-3} [V_c] + 0.62$$

$$V_c > 269$$

$$E_g = 2.76 \times 10^{-3} [V_c] + 0.3569$$

Dividing line 2

$$E_g = 1.593 \times 10^{-3} [V_c] + 0.6157$$

The results of the calculations for three-star refrigerators can be found in Tables 16 to 20 and Figures 32 to 45.

The results were:

Dividing line	Reduction in market supply	Reduction in energy consumption
1	55%	11%
2	82%	15%

In the case of dividing line 1 the energy saving is the same for each volume category. In the case of dividing line 2 there are extreme reductions in supply and energy saving in the smallest volume category.

The reductions in market supply are substantial: 55 per cent in the case of dividing line 1 and 82 per cent in the case of dividing line 2. In the case of dividing line 1 there is still sufficient choice; dividing line 2 on the other hand reduces the variety in the supply quite drastically.

In the case of dividing line 1 the residual market does not essentially become any more expensive. Where price rises do occur, they affect just one model. The capacity of most of the supply is between 100 and 200 litres, these models becoming either cheaper or hardly any more expensive.

In the case of dividing line 2 there is a price rise across the board which, in more than half the cases, does not pay for itself through lower energy consumption.

As regards the 'cheapest' model, Figures 33 to 45 give the following result for the seven groups examined:

Dividing line	Cheapest stays on the market	Almost the same	Cheapest disappears
1	2	1	4
2	-	1	5

Dividing line 1 eliminates six of the 31 brand names, including:

- Edy
- Frigidaire
- Frilec
- Hoover
- Marijnen

Dividing line 2 eliminates 11 more brand names, including 'major' brands such as Ignis, Miele, Philips and Zanussi.

We looked for the most economical model in two volume categories, since the number of refrigerators in these categories was sufficiently large:

Volume category [litres]	Brand/type	Energy consumption [kWh/24h]	Price [NLG]
100-150	Caravell HJK 160	0.5	849
150-200	Blomberg KI 163(4)*	0.8	1399

* () = number of models with the same lowest energy consumption

3.2.5 Refrigerators with four-stars

This category has been subdivided into two main categories:

- a) four-star refrigerators with one temperature controller
- b) four-star refrigerators with two temperature controllers

The reason for this split has already been explained in section 2.

3.2.5.1 One temperature controller

The following dividing lines were used (V_c in litres, E_g in kWh/24 hours):

Dividing line 1

$$E_g = 1.8432 \times 10^{-3}[V_c] + 0.8706$$

Dividing line 2

$$E_g = 1.5243 \times 10^{-3}[V_c] + 0.8000$$

The results for four-star refrigerators with one temperature controller can be found in Tables 21 to 25 and Figures 46 to 58.

The results were:

Dividing line	Reduction in market supply	Reduction in energy consumption
1	45%	10%
2	73%	19%

Sufficient supply remains across the entire volume range with both dividing line 1 and dividing line 2. Dividing line 1, however, does eliminate one of the subcategories (150-200 litres built-under), while dividing line 2 eliminates another built-under category.

On the whole (Tables 23 and 24) there are no significant price rises, in the case of either dividing line 1 or dividing line 2.

As regards the 'cheapest' model, the results from Figures 47 to 58 for the six groups examined are:

Dividing line	Cheapest stays on the market	Almost the same	Cheapest disappears
1	2	2	1
2	1	2	—

Table 25 shows that dividing line 1 eliminates five of the 33 brand names, none of them a major brand.

Dividing line 2 eliminates a much larger number (14), including brands such as Zanussi and Philips.

The most economical refrigerators are:

Volume category [litres]	Brand/type	Energy consumption [kWh/24h]	Price [NLG]
201-300	Blue Air DF 230 (2)*	1.0	899
301-450	Bosch KSV 3712	1.1	1649

* () = number of models with the same lowest energy consumption

3.2.5.2 Two temperature controllers

The following dividing lines were used (V_c in litres, E_g in kWh/24 hours):

Dividing line 1

$$E_g = 0.9815 \times 10^{-3}[V_c] + 1.000$$

Dividing line 2

$$E_g = 1.000 \times 10^{-3}[V_c] + 1.000$$

The results for four-star refrigerators with two temperature controllers can be found in Tables 26 to 31 and Figures 59 to 65.

The results were:

Dividing line	Reduction in market supply	Reduction in energy consumption
1	67%	10%
2	92%	18%

Comparison with the four-star refrigerators with one temperature controller shows that energy consumption varies less with this category, so the effect of standardisation is also much less. Substantial market reductions are needed to force down the average consumption for the supply. In the case of dividing line 2 this leads to the elimination of the supply above 400 litres (could perhaps be overcome by bending the dividing line).

Prices rise in almost all cases; and nor do they pay for themselves either. At the same time the cheapest models are eliminated in all subcategories; this results in significantly more expensive models (500 guilders or more).

Both dividing lines result in sharp reductions in the number of brands (18 and 23 of the 29). And in the case of dividing line 1 this includes major brands such as Philips, Ignis and Gram.

The most economical refrigerators are:

Volume category [litres]	Brand/type	Energy consumption [kWh/24h]	Price [NLG]
201-300	Blomberg KFS 314	1.2	1550
301-450	Zanker FR 3505 L	1.4	1939

3.2.6 Freezers

After a process of trial and error the following dividing lines were used (V_c in litres, E_g in kWh/24 hours):

Dividing line 1

$$V_c \leq 803$$

$$E_g = 0.8344 \times 10^{-3}[V_c] + 0.900$$

$$V_c > 803$$

$$E_g = 2.416 \times 10^{-3}[V_c] + 0.370$$

Dividing line 2

$$V_c \leq 798$$

$$V_c > 798 \quad E_g = 0.6391 \times 10^{-3}[V_c] + 0.85$$

$$E_g = 2.44 \times 10^{-3}[V_c] + 0.587$$

The results for the freezers can be found in Tables 32 to 36 and Figures 66 to 84.

The results were:

Dividing line	Reduction in market supply	Reduction in energy consumption
1	44%	11%
2	65%	18%

The 'contribution' to the reduction in energy consumption for each volume category is very similar for both dividing lines (maximum difference 9-16 per cent). The effects on market supply vary more widely; reductions of between 29 and 63 per cent for dividing line 1 and between 47 and 88 per cent for dividing line 2.

The summary (Figure 66) shows that there is still sufficient supply available across the entire volume range.

The residual market is on average hardly any more expensive than the original market:

- from -90 to +60 guilders for dividing line 1
- from -154 to +56 guilders for dividing line 2.

In the majority of cases any price rise pays for itself within the life-span of the appliance.

As regards the 'cheapest' model, the results for the nine groups examined on the basis of Figures 67 to 84 are:

Dividing line	Cheapest stays on the market	Almost the same	Cheapest disappears
1	—	7	2
2	—	4	5

Little changes in the case of dividing line 1, but in the case of dividing line 2 the cheapest model is eliminated for half of the groups. Generally speaking, the differences are less than 100 guilders; the only major change is with the small built-under freezer (Figure 77).

Table 36 shows that only a few brand names remain fully intact. Dividing line 1 eliminates seven of the 38 brand names, this number rising to 10 for dividing line 2. The following brand names are affected:

Dividing line 1

- Antarc
- Edy
- Etna
- Frilec
- Neff
- Pelgrim
- Scholtes

Dividing line 2

- plus:
- ATAG
- Blue Air
- Erres

The table below shows the most economical free-standing freezer for each of the volume categories:

Volume category [litres]	Brand/type	Energy consumption [kWh/24h]	Price [NLG]
0-100	Marijnen MV 150 (5)*	0.9	699
100-150	Electrolux GSN 1300	0.8	979
150-200	Electrolux GTE 1900(9)	0.7	1179
200-300	Liebherr GTS 3064	0.6	1623
300-450	Liebherr GTS 3664	0.7	1763
> 450	E KF 48 SU (2)	1.3	1379

* () = number of models with the same lowest energy consumption

3.3 Summary

We can say that the consequences of energy consumption standards for the market supply vary a great deal for the different main categories. This is illustrated for a number of categories in Figure 85, where the reduction in market supply is plotted on the y-axis against the energy consumption of the residual market (relative to original consumption) on the x-axis.

A reduction in the market supply of 50 per cent, for example, leads to a reduction in energy consumption of 13 per cent for freezers and 7 per cent for four-star refrigerators with two temperature controllers.

To achieve a reduction in energy consumption of 10 per cent, the market supply must be reduced by 40 per cent in the case of freezers and no less than 65 per cent in the case of four-star refrigerators with two temperature controllers.

Table 37 gives the calculated results of the reduction in market supply and energy consumption for all the main categories and for each dividing line.

The other consequences (economy, number of brands, etc.) also display a broad spread for each main category. We have introduced a rating system as a means of comparing these consequences for each main category. The negative consequences for market supply of setting limit values for energy consumption are called 'contraindications'. The following rating system has been used (figure = number of contraindications).

Supply

- Appearance of gaps in supply (in volumes)
 - limited : 1
 - marked : 2
- Elimination of certain subcategories of volume,
 - built-under/free-standing- per subcategory: 1

Brands

- Reduction in the number of brands
 - 20 to 35 per cent: 1
 - 35 to 50 per cent: 2
 - > 50 per cent : 3
- Reduction in number of 'major' brands
 - some: 1
 - many: 2

Economy

- Residual market becomes more expensive
 - but soon pays for itself : 1
 - payback time - life-span : 2
 - does not pay for itself : 3
- Cheapest eliminated
 - depending on price rise: 1 to 2

Each main category has been rated in this way. It should be noted that while this rating system has an objectifying effect, a certain amount of subjectivity remains.

Table 37 gives a summary of the contraindications for each main category and dividing line. The following can be derived from this table.

Dividing line 1, which leads to a reduction in energy consumption of around 10 per cent, is accompanied by a generally limited number of contraindications. Most contraindications occur with:

- no-star and one-star refrigerators
- four-star refrigerators with two temperature controllers.

Uneconomical price rises and the elimination of brands are the most important contraindications for these main categories.

Dividing line 2, which leads to a reduction in energy consumption of between 15 and 20 per cent, gives rise to many more contraindications. The fewest contraindications occur with:

- freezers
- four-star refrigerators with one temperature controller.

4 Discussion

Market supply and sales

The immediate effect of setting limit values for maximum permissible energy consumption is an abrupt fall in the average energy consumption of the market supply. Then, we hope, the average energy consumption of models purchased will fall as well. Ultimately, it is a matter of the average energy consumption of the stock falling. This average energy consumption of the stock is derived by averaging over an extremely varied range of refrigerators and freezers.

The range consists of various categories (function, volume). Each category is filled with age groups, which have been purchased in successive years. There is a certain average electricity consumption for each age group. This consumption depends on:

- the energy consumption of the market supply current in that year;
- the purchasing pattern in that year;
- the increase in consumption through ageing;
- the conditions of use (in particular ambient temperature).

The renewal of stock takes place through replacement of old models and through expansion of the stock. If old models are replaced by more economical models and if expansion involves economical models, then the average energy consumption of the stock could fall.

In theory these effects can be calculated. [4] gives an outline of the category/age matrix to be used and the information required for the calculation. [4] also discusses the following steps:

- changes in market supply;
- changes in purchases;
- changes in stock.

In general terms it can be said that [4] concludes that the whole process that must eventually lead to a reduction in the average energy consumption of the stock can only be outlined in a very simple fashion. The main reason for this is the absence of information that is essential for an accurate calculation.

For the intermediate step from market supply to market sales the most detailed information about sales as a function of energy consumption can be found in [3]. The results given in [3] appear here in Table 38 and are illustrated in Figures 86 to 88. The reader is referred to [3] and [4] for the background information. This information is used in [3] and [4] to establish a link between the spread across the energy consumption of the market supply and that of sales.

For the market as a whole (Figure 86) it follows that the distribution of the number of models for sale amongst three energy consumption classes is broadly the same as the distribution of sales amongst the same energy consumption classes. This means that a certain reduction in the average energy consumption of the models for sale results in an identical reduction (relatively) in the average energy consumption for sales, at least where buying behaviour remains the same. If a distinction is made between the different main categories identified in [3], then more substantial differences occur between supply and sales, see Figures 87 and 88.

[4] concludes:

Small refrigerators (0, 1 and 2 stars, < 200 litres)	: relatively higher sales of energy-efficient models
Four-star refrigerators/freezers	: substantially higher sales of energy-efficient models
Small freezers (< 200 litres)	: a predominant share of models with average consumption
Large freezers (> 200 litres)	: more substantial sales of uneconomical models

The division used in [3] and [4] into 'economical', 'average' and 'uneconomical' does not of course coincide with the dividing lines used in this study; on the one hand in terms of definition [3] and [4]: limits to specific consumption for each volume category, here: continuous dividing lines for energy consumption as a function of V_c), on the other in terms of values [3] and [4]: based on average $\pm 0.5 \times$ standard deviation, here: aimed at around 10 per cent and around 15 per cent reduction).

Also, various categories were (necessarily) combined and others were excluded from the study in [3]. We must therefore conclude that it is impossible to translate the calculated changes in market supply exactly into changes in sales.

In qualitative terms, however, the following applies:

- For freezers a reduction in the average energy consumption of the models for sale will result in a greater reduction in the average energy consumption of the models sold; for some categories of refrigerator the reverse will be true.
- As far as the market as a whole is concerned, a given drop in the average energy consumption of the supply will broadly speaking be reflected by an identical drop in the average energy consumption of models sold.

All this is subject to buying behaviour remaining the same. What this means is that portion of sales that is 'banned' is spread amongst the models that may be sold in such a way that their spread does not change [4].

Further reductions in energy consumption

§3.2 gives the most energy efficient model for each main category and each volume category. This information may give us an idea of the maximum saving that can be achieved with present-day technology and present-day economy.

Table 39 gives a summary of the minimum consumptions, along with the average consumption of the present supply and the associated maximum feasible reduction. It is clear that the maximum reduction varies widely; from 74 per cent in the case of 150-200 litre refrigerators to 13 per cent in the case of three-star refrigerators.

Broadly speaking, we can identify three cases:

- extremely economical models : more than 70 per cent saving
- economical models : up to 50 per cent saving
- normal models : around 20 per cent saving

The normal models are not significantly more expensive. The summary below calculates payback times for the economical and extremely economical models.

Efficient

- Caravell HJK 160
(3 stars, 100-150 litres)
 - energy consumption 48 per cent below average
 - price NLG 849
 - average price NLG 930
 - no additional price

(The Liebherr refrigerator from the same category with the same low consumption costs an additional 217 guilders, which pays for itself in 8.7 years.)

- Liebherr GTS 3064
(200-300 litre freezer)
 - energy consumption 50 per cent below average
 - price NLG 1623
 - average price NLG 1331
 - additional price NLG 292
 - payback time 8.6 years

Extremely efficient

- Gram LER 200
(150-200 litre refrigerator)
 - energy consumption 74 per cent below average
 - price NLG 1359
 - average price NLG 851
 - additional price NLG 508
 - payback time 15.6 years

It is safe to say that the economical models, with a consumption up to 50 per cent below average, are either not more expensive or pay for themselves during their life-span.

There are such models for sale in several categories. While these economical models are not (yet) on offer for all categories, it must be considered possible with present-day technology to supply models for all categories with a reduction of up to 50 per cent; perhaps with the sole exception of the smallest freezers and the four-star/two-controller fridge/freezer combinations.

The extremely economical Gram LER 200 has only appeared on the market very recently and has a price significantly above the market average. On average this extra price will not pay for itself. The high recommended price will doubtless be associated with the innovative and unique nature of the model. With larger series the price will undoubtedly come down. This is not the case at the moment, however.

We may therefore conclude that by setting limit values for energy consumption with the present market supply, a reduction in energy consumption of up to 40 per cent below the current average must be regarded as feasible.

National savings potential

The effect of introducing limits for maximum permissible energy consumption has been estimated in [4] on the following basis:

Market supply

- At the starting date the limit values in force are such that the average energy consumption of the market supply will fall by 10 per cent;
- After five years the limit values will be revised so that, compared with the original situation, energy consumption will fall by 20 per cent. Since a reduction of around 40 per cent ought to be possible, there will still be sufficient scope for the market;
- No further technological improvements take place.

Market sales

- The change in the average energy consumption for total market sales is the same as the change in the average energy consumption of the market supply;
- Sales are based solely on replacement.

Stock

- The size of the stock will remain the same;
- The life of the appliances is 15 years;
- The energy consumption of the appliances included in the stock is a function of the year of purchase. This consumption falls by 3 per cent per year up to the 'starting date' of the standardisation;
- The oldest models will be replaced 'en bloc' after 15 years.

The results of the estimate appear in Figure 89. The average energy consumption of the total stock is set out on the y-axis against the energy consumption at the starting date. Figure 89 shows that the effect of standardisation of consumption only comes about gradually. Ultimately, of course, the relative effect of standardisation is the same as the reduction in the average energy consumption of the supply, at least where the above assumptions apply.

The present stock is estimated at 5.5×10^6 refrigerators and 2.3×10^6 freezers. An average energy consumption of 350 kWh/year for refrigerators and 500 kWh/year for freezers [4] means a present average consumption for the stock of 394 kWh/year. The average electrical capacity for domestic refrigeration and freezing over a year is therefore 350 MW.

Standardisation will ultimately lead to the following reductions in average electrical capacity required:

Measure	Reduction in average energy consumption for supply	Reduction in electrical capacity
For all categories dividing line 1	10%	35 MW
For all categories dividing line 2, with the exception of 0/1*	17%	60 MW
For all categories 'economical' models	40%	140 MW

5 Conclusions

- An analysis of the present market supply of domestic refrigeration and freezing equipment shows that minimum efficiency requirements can be formulated that will bring down energy consumption by 10 per cent without any unacceptable price rises or elimination of brands. With such an efficiency requirement, around 50 per cent of the present supply of appliances would be 'banned'.
- While stricter efficiency requirements will certainly lead to greater savings for the market supply as a whole, they will also have considerably more negative consequences. Stricter efficiency requirements (around 15 to 20 per cent reduction) would, however, be acceptable for part of the market. This is the case for freezers and four-star refrigerators with one temperature controller.
- There are at the moment energy-efficient models for sale with around 50 per cent below average consumption. Any additional price will pay for itself within the appliance's life-span through the energy cost savings. It is estimated that on the basis of these state-of-the-art models, a reduction in energy consumption of 40 per cent must be considered feasible, given the repeated tightening up of minimum efficiency requirements.
- As a result of the replacement of the present stock with more energy-efficient models, minimum efficiency requirements will eventually lead to a decline in the national consumption of electricity. The present stock requires an average electrical capacity of 350 MW. Reductions of between 10 and 40 per cent of consumption through minimum efficiency requirements will therefore lead to reductions in average demand for capacity of between 35 and 140 MW.

6 References

- [1] P.E.J. Vermeulen. A Review of the International Situation as regards Regulations concerning the Energy Consumption of Domestic Refrigeration and Freezing Equipment. MT-TNO Report 89-356, November 1989 (in Dutch).
- [2] P.E.J. Vermeulen. Characterisation of Market Supply and Energy Consumption of Domestic Refrigeration and Freezing Equipment. MT-TNO Report 90-045, March 1990 (in Dutch).
- [3] Van Heijst Marketing Bureau. Qualitative and Quantitative Review of the Domestic Refrigeration and Freezing Equipment Market in the Netherlands. May 1990 (in Dutch).
- [4] P.E.J. Vermeulen. Recommendations relating to Regulations concerning the Energy Consumption of Domestic Refrigeration and Freezing Equipment. MT-TNO Report 90-044, March 1990 (in Dutch).
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7 Authentication

Name and address of the principal

NOVEM
PO Box 17
6130 AA Sittard

Names and functions of the cooperators

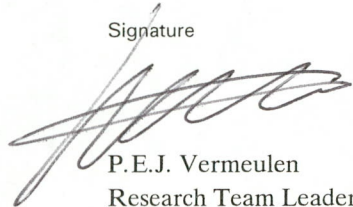
P.E.J. Vermeulen
R.J.M.J. Weijers

Names of establishments to which part of the research was put out to contract

—

Date upon which, or period in which, the research took place

Signature



P.E.J. Vermeulen
Research Team Leader

Approved by



F.M. van Bergen
Head of Department

Appendix 1 English translation of captions of figures and tables

Tables 1 till 37 : see examples

Main category names, used in tables and figures

'koelkasten' : refrigerations without freezing department
'diepvriezers' : freezers
'nul/een; twee; drie; vier; sterren' : 0/1; 2, 3, 4 stars
'regelaar' : controller

Other names

'vrijstaand' : free standing
'inbouw' : built-in
'onderbouw' : built-under

Figure 89

vertical axis : energy consumption, relative to
consumption before standardization
horizontal axis : years
'gemiddelde levensduur' : average life time see main text

Captions on standard figures

'restmarkt' : residual market
'afvallers' : excluded from market
'(specifiek)energieverbruik' : (specific) energy consumption
'gecorrigeerd volume' : corrected volume

Special figures

Figure 85

vertical axis : residual market size, relative to original
market
horizontal axis : energy consumption of residual market,
relative to original market

Figures 86 to 88

relation between number of models (supply) and sales as a function of
energy consumption:

'zuinig' : energy efficient
'gemiddeld' : average energy consumption
'niet zuinig' : inefficient

Figure 86 : total market
Figure 87 : refrigerators
Figure 88 : freezers

*Calculation of the consequences of energy consumption standards
for the market supply of domestic refrigerators and freezers*

appendix 1-2

Table *Reduction of market supply and energy saving*

Category : *see main text*

Dividing line : *see main text*

Volume category [litres]	Market supply [numbers offered]			Energy consumption ¹⁾ [kWh/24 hrs]		
	original market	residual	reduction [%]	original	residual	reduction [%]
0 - 100						
100 - 150	44	18	59	0.76	0.64	16
150 - 200	80	25	69	0.78	0.67	14
200 - 300	40	19	52	0.87	0.77	11
300 - 450	9	3	67	0.93	0.82	12
>450						
Total	173	65	62	0.80	0.70	13

¹⁾ Averaged over the market supply

*Calculation of the consequences of energy consumption standards
for the market supply of domestic refrigerators and freezers*

appendix 1-3

Table *Economic consequences*

Category : see main text

Dividing line : see main text

Category, volumes in litres	Market supply		Average selling price		Price increase	Energy saving	Saving on energy costs	Simple pay-back time
	Original market	Residual market	Original market f	Residual market f	f	kWh/day	f/year	year
100 till 150								
free standing	18	10	699	714	15	0.12	6.7	2.2
built-in/built-under	26	8	1434	1547	113	0.12	6.7	16.9
151 till 200								
free standing	32	12	851	880	31	0.11	6.2	5.0
built-in/built-under	48	13	1271	1311	40	0.11	6.2	6.5
201 till 300								
free standing	20	9	1122	1132	10	0.10	5.6	1.8
built-in/built-under	20	12	1560	1586	26	0.10	5.6	4.6
300 till 450								
free standing	9	3	1481	1560	69	0.11	6.2	11.1
built-in/built-under	—	—	—	—	—	—	—	—

*Calculation of the consequences of energy consumption standards
for the market supply of domestic refrigerators and freezers*

appendix 1-4

Table *Effect on number of brand names*

Category : *see main text*

Brand names	Original supply	Dividing line 1 Number on residual market		Dividing line 2 Number of residual market	
		absolute	relative (%)	absolute	relative (%)
AEG	10	2	20	1	10
ATAG	3	2	67	1	33
BAUKNECHT	10	6	60	4	40
BLOMBERG	9	2	22	1	11
BLUE AIR	4	1	25	0	0
BOSCH	14	3	21	2	14
CANDY	1	1	100	0	0
CARAVELL	5	1	20	1	20
DERBY	1	1	100	0	0
EDY	2	2	100	1	50
ELECTROLUX	6	2	33	1	17
ERRES	1	1	100	0	0
ESTA	1	1	100	0	0
ETNA	3	1	33	0	0
FRIGIDAIRE	2	1	50	0	0
FRILEC	2	2	100	1	50
GRAM	6	6	100	4	67
IAR	2	0	0	0	0
IGNIS	1	1	100	0	0
INDESIT	1	1	100	1	100
KALORIK	3	1	33	0	0
KUPPERSBUSCH	10	4	40	3	30
LIEBHERR	13	5	38	2	15
MARIJNEN	3	1	33	0	0
MIELE	9	2	22	0	0
NEFF	5	1	20	1	20
NORDLAND	1	0	0	0	0
OCEAN	1	0	0	0	0
PELGRIM	2	0	0	0	0
PHILIPS/WHIRLPOOL	8	3	38	0	0
RONDO	3	1	33	0	0
SCHOLTES	3	1	33	0	0
SIEMENS	16	5	31	4	25
ZANKER	1	1	100	1	100
ZANUSSI	14	3	21	0	0

Tabel 1 MARKTREDUCTIE EN ENERGIEBESPARING BIJ KOELKASTEN

Categorie : koelkasten zonder vriesvak

Grenslijn 1 (ca. 10% reductie energieverbruik)

Volume categorie [liters]	Omvang van het aanbod [aantallen]			Energieverbruik ⁽¹⁾ [kWh/24 uur]		
	Huidig aanbod	Rest- markt	Reductie [%]	Huidig aanbod	Rest- markt	Reductie [%]
0 - 100						
100 - 150	44	18	59	0.76	0.64	16
150 - 200	80	25	69	0.78	0.67	14
200 - 300	40	19	52	0.87	0.77	11
300 - 450	9	3	67	0.93	0.82	12
> 450						
Gehele categorie	173	65	62	0.80	0.70	13

(1): Gemiddeld over het marktaanbod

Tabel 2 MARKTREDUCTIE EN ENERGIEBESPARING BIJ KOELKASTEN

Categorie : koelkasten zonder vriesvak

Grenslijn 2 (ca. 15% reductie energieverbruik)

Volume categorie [liters]	Omvang van het aanbod [aantallen]			Energieverbruik ⁽¹⁾ [kWh/24 uur]		
	Huidig aanbod	Rest- markt	Reductie [%]	Huidig aanbod	Rest- markt	Reductie [%]
0 - 100						
100 - 150	44	7	84	0.76	0.55	28
150 - 200	80	17	79	0.78	0.65	17
200 - 300	40	6	85	0.87	0.68	22
300 - 450	9	1	89	0.93	0.80	14
> 450						
Gehele categorie	173	31	82	0.80	0.64	20

(1): Gemiddeld over het marktaanbod

Tabel 3 PRIJSEFFECT EN TERUGVERDIENTTIJD

Categorie : koelkasten zonder vriesvak

Grenslijn 1 (ca. 10% reductie energieverbruik)

Categorie koelkasten in liters	Aantal merknamen		Gemiddelde prijs		Meer- prijs	Norm energie- besparing	Energie- kosten- besparing	Eenvoudige terugverdiëntijd
	Huidig aanbod	Rest- markt	Huidig aanbod	Rest- markt				
			f	f		kWh/dag	f/jaar	jaar
100 t/m 150 vrijstaand onderbouw	18	10	699	714	15	0,12	6,7	2,2
	26	8	1434	1547	113	0,12	6,7	16,9
151 t/m 200 vrijstaand onderbouw	32	12	851	880	31	0,11	6,2	5,0
	48	13	1271	1311	40	0,11	6,2	6,5
201 t/m 300 vrijstaand onderbouw	20	9	1122	1132	10	0,10	5,6	1,8
	20	12	1560	1586	26	0,10	5,6	4,6
300 t/m 450 vrijstaand onderbouw	9	3	1481	1550	69	0,11	6,2	11,1
	-	-	-	-	-	-	-	-

Gemiddeld elektriciteitsstarief: f0,22 per kWh.

Tabel 4 PRIJSEFFECT EN TERUGVERDIENTTIJD

Categorie : koelkasten zonder vriesvak
 Grenslijn 2 (ca. 15% reductie energieverbruik)

Categorie koelkasten in liters	Aantal merknamen		Gemiddelde prijs		Meer- prijs	Norm energie- besparing	Energie- kosten- besparing	Eenvoudige terugverdiëntijd
	Huidig aanbod	Rest- markt	Huidig aanbod	Rest- markt		kWh/dag	f/jaar	jaar
			f	f	f			
100 t/m 150 vrijstaand onderbouw	18	4	699	782	86	0,21	11,8	7,3
	26	3	1434	1653	219	0,21	11,8	18,6
151 t/m 200 vrijstaand onderbouw	32	8	851	968	117	0,13	7,3	16,0
	48	9	1271	1286	15	0,13	7,3	2,1
201 t/m 300 vrijstaand onderbouw	20	6	1122	1188	66	0,19	10,7	6,2
	20	-	1560	-	-	-	-	-
300 t/m 450 vrijstaand onderbouw	9	1	1481	1645	164	0,13	7,3	22,5
	-	-	-	-	-	-	-	-

Gemiddeld elektriciteitsstarief: f0,22 per kWh.

Tabel 5 EFFECT GRENSLIJNEN OP AANBOD AAN MERKNAMEN

Categorie : koelkasten zonder vriesvak

Merkmamen	Aantal huidig aanbod	grenslijn 1		grenslijn 2	
		Aantal restmarkt		Aantal restmarkt	
		absoluut	relatief (%)	absoluut	relatief (%)
AEG	10	2	20	1	10
ATAG	3	2	67	1	33
BAUKNECHT	10	6	60	4	40
BLOMBERG	9	2	22	1	11
BLUE AIR	4	1	25	0	0
BOSCH	14	3	21	2	14
CANDY	1	1	100	0	0
CARAVELL	5	1	20	1	20
DERBY	1	1	100	0	0
EDY	2	2	100	1	50
ELECTROLUX	6	2	33	1	17
ERRES	1	1	100	0	0
ESTA	1	1	100	0	0
ETNA	3	1	33	0	0
FRIGIDAIRE	2	1	50	0	0
FRILEC	2	2	100	1	50
GRAM	6	6	100	4	67
IAR	2	0	0	0	0
IGNIS	1	1	100	0	0
INDESIT	1	1	100	1	100
KALORIK	3	1	33	0	0
KUPPERSBUSCH	10	4	40	3	30
LIEBHERR	13	5	38	2	15
MARIJNEN	3	1	33	0	0
MIELE	9	2	22	0	0
NEFF	5	1	20	1	20
NORDLAND	1	0	0	0	0
OCEAN	1	0	0	0	0
PELGRIM	2	0	0	0	0
PHILIPS/WHIRLPOOL	8	3	38	0	0
RONDO	3	1	33	0	0
SCHOLTES	3	1	33	0	0
SIEMENS	16	5	31	4	25
ZANKER	1	1	100	1	100
ZANUSSI	14	3	21	0	0

Tabel 6 MARKTREDUCTIE EN ENERGIEBESPARING BIJ KOELKASTEN

Categorie : koelkasten met 0/1 sterren vriesvak

Grenslijn 1 (ca. 10% reductie energieverbruik)

Volume categorie [liters]	Omvang van het aanbod [aantallen]			Energieverbruik ⁽¹⁾ [kWh/24 uur]		
	Huidig aanbod	Rest- markt	Reductie [%]	Huidig aanbod	Rest- markt	Reductie [%]
0 - 100	19 4	11 2	50	0.77 0.88	0.69 0.80	11 9
100 - 150						
150 - 200						
200 - 300						
300 - 450						
> 450						
Gehele categorie	23	13	43	0.79	0.70	11

(1): Gemiddeld over het marktaanbod

Tabel 7 PRIJSEFFECT EN TERUGVERDIENTTIJD

Categorie : koelkasten met 0/1 sterren vriesvak

Grenslijn 1 (ca. 10% reductie energieverbruik), 0 sterren

Categorie koelkasten in liters	Aantal merknamen		Gemiddelde prijs		Meer- prijs	Norm energie- besparing	Energie- kosten- besparing	Eenvoudige terugverdiëntijd
	Huidig aanbod	Rest- markt	Huidig aanbod	Rest- markt				
			f	f	f	kWh/dag	f/jaar	jaar
100 t/m 150 vrijstaand onderbouw	5	1	652	805	153	0,13	7,3	20,1
	1	2	1091	1092	1	0,13	7,3	0,14
151 t/m 200 vrijstaand onderbouw	1	1	986	986	-	-	-	-
	1	0	1288	-				

Gemiddeld elektriciteitsstarief: f0,22 per kWh.

Tabel 8 PRIJSEFFECT EN TERUGVERDIENTTIJD

Categorie : koelkasten met 0/1 sterren vriesvak

Grenslijn 1 (ca. 10% reductie energieverbruik), 1 ster

Categorie koelkasten in liters	Aantal merknamen		Gemiddelde prijs		Meer-prijs	Norm energie-besparing	Energie-kosten-besparing	Eenvoudige terugverdiëntijd
	Huidig aanbod	Rest-markt	Huidig aanbod	Rest-markt				
			f	f	f	kWh/dag	f/jaar	jaar
100 t/m 150 vrijstaand	6	4	661	539	-122	-	-	-
	5	4	914	914	-	-	-	-
151 t/m 200 vrijstaand	1	1	749	986	219	0,05	2,8	78,2
	1	-	948	-	-	-	-	-

Gemiddeld elektriciteitsstarief: f0,22 per kWh.

Tabel 9 EFFECT GRENSLIJNEN OP AANBOD AAN MERKNAMEN

Categorie : koelkasten met 0/1 sterren vriesvak, 0 sterren

Merknamen	Aantal huidig aanbod	grenslijn 1	
		Aantal restmarkt	
		absoluut	relatief (%)
AEG	1	1	100
BAUKNECHT	3	2	67
ERRES	1	0	0
IGNIS	1	0	0
INDESIT	1	1	100
MARIJNEN	1	0	0
SIEMENS	1	0	0

Tabel 10 EFFECT GRENSLIJNEN OP AANBOD AAN MERKNAMEN

Categorie : koelkasten met 0/1 sterren vriesvak, 1 ster

Merknamen	Aantal huidig aanbod	grenslijn 1	
		Aantal restmarkt	
		absoluut	relatief (%)
BLOMBERG	1	1	100
BOSCH	2	2	100
CANDY	1	0	0
KALORIK	1	0	0
KUPPERSBUSCH	1	0	0
LIEBHERR	5	4	80
RONDO	1	0	0
SIEMENS	2	2	100

Tabel 11 MARKTREDUCTIE EN ENERGIEBESPARING BIJ KOELKASTEN

Categorie : koelkasten met 2 sterren vriesvak
 Grenslijn 1 (ca. 10% reductie energieverbruik)

Volume categorie [liters]	Omvang van het aanbod [aantallen]			Energieverbruik ⁽¹⁾ [kWh/24 uur]		
	Huidig aanbod	Rest- markt	Reductie [%]	Huidig aanbod	Rest- markt	Reductie [%]
0 - 100						
100 - 150	15	11	27	0.84	0.78	7
150 - 200	4	3	25	0.94	0.83	12
200 - 300	1	1	0	1.00	1.00	0
300 - 450						
> 450						
Gehele categorie	20	15	32	0.87	0.80	8

(1): Gemiddeld over het marktaanbod

Tabel 12 MARKTREDUCTIE EN ENERGIEBESPARING BIJ KOELKASTEN

Categorie : koelkasten met 2 sterren vriesvak
 Grenslijn 2 (ca. 15% reductie energieverbruik)

Volume categorie [liters]	Omvang van het aanbod [aantallen]			Energieverbruik ⁽¹⁾ [kWh/24 uur]		
	Huidig aanbod	Rest- markt	Reductie [%]	Huidig aanbod	Rest- markt	Reductie [%]
0 - 100						
100 - 150	15	4	73	0.84	0.73	13
150 - 200	4	2	50	0.94	0.80	15
200 - 300	1	0	100	1.00	0	100
300 - 450						
> 450						
Gehele categorie	20	6	70	0.87	0.75	14

(1): Gemiddeld over het marktaanbod

Tabel 13 PRIJSEFFECT EN TERUGVERDIENTTIJD

Categorie : koelkasten met 2 sterren vriesvak
 Grenslijn 1 (ca. 10% reductie energieverbruik)

Categorie koelkasten in liters	Aantal merknamen		Gemiddelde prijs		Meer- prijs	Norm energie- besparing	Energie- kosten- besparing	Eenvoudige terugverdiëntijd
	Huidig aanbod	Rest- markt	Huidig aanbod	Rest- markt				
			f	f	f	kWh/dag	f/jaar	jaar
100 t/m 150 vrijstaand onderbouw	15 -	11 -	618 -	548 -	-70 -	- -	- -	- -
151 t/m 200 vrijstaand onderbouw	4 -	3 -	704 -	789 -	85 -	0,06 -	3,4 -	25,0 -
201 t/m 300 vrijstaand onderbouw	1 -	1 -	899 -	899 -	- -	- -	- -	- -

Gemiddeld elektriciteitsstarief: f0,22 per kWh.

Tabel 14 PRIJSEFFECT EN TERUGVERDIENTTIJD

Categorie : koelkasten met 2 sterren vriesvak
 Grenslijn 2 (ca. 15% reductie energieverbruik)

Categorie koelkasten in liters	Aantal merknamen		Gemiddelde prijs		Meer- prijs	Norm energie- besparing	Energie- kosten- besparing	Eenvoudige terugverdiëntijd
	Huidig aanbod	Rest- markt	Huidig aanbod	Rest- markt				
			f	f	f	kWh/dag	f/jaar	jaar
100 t/m 150 vrijstaand onderbouw	15 -	4 -	618 -	549 -	-69 -	- -	- -	- -
151 t/m 200 vrijstaand onderbouw	4 -	2 -	704 -	784 -	80 -	0,11 -	6,2 -	12,9 -
201 t/m 300 vrijstaand onderbouw	1 -	- -	899 -	- -	- -	- -	- -	- -

Gemiddeld elektriciteitsstarief: f0,22 per kWh.

Tabel 15 EFFECT GRENSLIJNEN OP AANBOD AAN MERKNAMEN

Categorie : koelkasten met 2 sterren vriesvak

Merknamen	Aantal huidig aanbod	grenslijn 1		grenslijn 2	
		Aantal restmarkt		Aantal restmarkt	
		absoluut	relatief (%)	absoluut	relatief (%)
ANTARC	2	1	50	0	0
BLUE AIR	1	1	100	0	0
FRIGIDAIRE	1	1	100	1	100
FRILEC	3	3	100	0	0
HOOVER	1	1	100	1	100
IGNIS	1	1	100	0	0
INDESIT	2	2	100	1	50
KALORIK	1	1	100	0	0
MARIJNEN	2	0	0	0	0
OCEAN	2	2	100	1	50
PHILIPS/WHIRLPOOL	1	1	100	0	0
RONDO	1	1	100	1	100
ZANUSSI	2	0	0	0	0

Tabel 16 MARKTREDUCTIE EN ENERGIEBESPARING BIJ KOELKASTEN

Categorie : koelkasten met 3 sterren vriesvak
 Grenslijn 1 (ca. 10% reductie energieverbruik)

Volume categorie [liters]	Omvang van het aanbod [aantallen]			Energieverbruik ⁽¹⁾ [kWh/24 uur]		
	Huidig aanbod	Rest- markt	Reductie [%]	Huidig aanbod	Rest- markt	Reductie [%]
0 - 100						
100 - 150	66	35	47	0.95	0.86	10
150 - 200	31	16	48	0.98	0.88	10
200 - 300	35	9	74	1.12	1.01	10
300 - 450						
> 450						
Gehele categorie	132	60	55	1.00	0.89	11

(1): Gemiddeld over het marktaanbod

Tabel 17 MARKTREDUCTIE EN ENERGIEBESPARING BIJ KOELKASTEN

Categorie : koelkasten met 3 sterren vriesvak
 Grenslijn 2 (ca. 15% reductie energieverbruik)

Volume categorie [liters]	Omvang van het aanbod [aantallen]			Energieverbruik ⁽¹⁾ [kWh/24 uur]		
	Huidig aanbod	Rest- markt	Reductie [%]	Huidig aanbod	Rest- markt	Reductie [%]
0 - 100						
100 - 150	66	6	91	0.95	0.65	32
150 - 200	31	12	61	0.98	0.87	11
200 - 300	35	6	83	1.12	0.99	12
300 - 450						
> 450						
Gehele categorie	132	24	82	1.00	0.85	15

(1): Gemiddeld over het marktaanbod

Tabel 18 PRIJSEFFECT EN TERUGVERDIENTTIJD

Categorie : koelkasten met 3 sterren vriesvak
 Grenslijn 1 (ca. 10% reductie energieverbruik)

Categorie koelkasten in liters	Aantal merknamen		Gemiddelde prijs		Meer- prijs	Norm energie- besparing	Energie- kosten- besparing	Eenvoudige terugverdiëntijd
	Huidig aanbod	Rest- markt	Huidig aanbod	Rest- markt				
			f	f		kWh/dag	f/jaar	jaar
100 t/m 150 vrijstaand onderbouw	29	13	930	874	-56	-	-	-
	37	22	1444	1404	-40	-	-	-
151 t/m 200 vrijstaand onderbouw	16	5	888	843	-45	-	-	-
	15	11	1365	1384	19	0,10	5,6	3,4
201 t/m 300 0<=Vgecorr. <=269 vrijstaand onderbouw	3	1	1096	1276	180	0,12	6,7	26,9
	30	7	1685	1579	-106	-	-	-
Vgecorr.>= 269 vrijstaand onderbouw	2	1	1179	1738	559	0,10	5,6	99,8
	-	-	-	-	-	-	-	-

Gemiddeld elektriciteitsstarief: f0,22 per kWh.

Tabel 19 PRIJSEFFECT EN TERUGVERDIENTIJD

Categorie : koelkasten met 3 sterren vriesvak
 Grenslijn 2 (ca. 15% reductie energieverbruik)

Categorie koelkasten in liters	Aantal merknamen		Gemiddelde prijs		Meer- prijs	Norm energie- besparing	Energie- kosten- besparing	Eenvoudige terugverdientijd
	Huidig aanbod	Rest- markt	Huidig aanbod	Rest- markt		kWh/dag	f/jaar	jaar
100 t/m 150 vrijstaand onderbouw	29	4	930	971	41	0,3	16,9	2,4
	37	2	1444	1650	206	0,3	16,9	12,2
151 t/m 200 vrijstaand onderbouw	16	4	888	891	3	0,11	6,2	0,5
	15	8	1365	1431	66	0,11	6,2	10,6
201 t/m 300 vrijstaand onderbouw	5	1	1096	1275	179	0,13	17,3	24,5
	30	5	1685	1557	128	0,13	17,3	17,5

Gemiddeld elektriciteitsstarief: f0,22 per kWh.

Tabel 20 EFFECT GRENSLIJNEN OP AANBOD AAN MERKNAMEN

Categorie : koelkasten met 3 sterren vriesvak

Merknamen	Aantal huidig aanbod	grenslijn 1		grenslijn 2	
		Aantal restmarkt		Aantal restmarkt	
		absoluut	relatief (%)	absoluut	relatief (%)
AEG	9	8	89	3	33
ATAG	5	4	80	2	40
BAUKNECHT	7	2	29	2	29
BLOMBERG	7	3	43	2	29
BLUE AIR	1	1	100	1	100
BOSCH	12	4	33	1	8
CANDY	1	1	100	0	0
CARAVELL	2	2	100	2	100
EDY	2	0	0	0	0
ELECTROLUX	3	2	67	1	33
ERRES	2	1	50	0	0
ETNA	3	1	33	0	0
FRIGIDAIRE	1	0	0	0	0
FRILEC	3	0	0	0	0
GRAM	2	1	50	1	50
HOOVER	1	0	0	0	0
IGNIS	2	1	50	0	0
KALORIK	1	1	100	0	0
KUPPERSBUSCH	11	5	45	0	0
LIEBHERR	14	6	43	4	29
MARIJNEN	2	0	0	0	0
MIELE	7	2	29	0	0
NEFF	4	1	25	0	0
NORDLAND	1	0	0	0	0
OCEAN	1	1	100	0	0
PELGRIM	2	2	100	1	50
PHILIPS/WHIRLPOOL	5	1	20	0	0
RONDO	1	1	100	1	100
SCHOLTES	4	3	75	2	50
SIEMENS	11	4	36	1	9
ZANUSSI	14	2	14	0	0

Tabel 21 MARKTREDUCTIE EN ENERGIEBESPARING BIJ VIER STERREN KOELKASTEN

Categorie : koelkasten met een 4 sterren vriesvak en één temperatuur-regelaar

Grenslijn 1 (ca. 10% reductie energieverbruik)

Volume categorie [liters]	Omvang van het aanbod [aantallen]			Energieverbruik ⁽¹⁾ [kWh/24 uur]		
	Huidig aanbod	Rest- markt	Reductie [%]	Huidig aanbod	Rest- markt	Reductie [%]
0 - 100						
100 - 150	1	1	0	1.10	1.10	0
150 - 200	3	0	100	1.43	0	100
200 - 300	139	77	45	1.44	1.28	11
300 - 450	26	15	42	1.58	1.46	8
> 450						
Gehele categorie	169	93	45	1.46	1.31	10

(1): Gemiddeld over het marktaanbod

Tabel 22 MARKTREDUCTIE EN ENERGIEBESPARING BIJ VIER STERREN KOELKASTEN

Categorie : koelkasten met een 4 sterren vriesvak en één temperatuur-regelaar

Grenslijn 2 (ca. 15% reductie energieverbruik)

Volume categorie [liters]	Omvang van het aanbod [aantallen]			Energieverbruik ⁽¹⁾ [kWh/24 uur]		
	Huidig aanbod	Rest- markt	Reductie [%]	Huidig aanbod	Rest- markt	Reductie [%]
0 - 100						
100 - 150	1	0	100	1.10	0	100
150 - 200	3	0	100	1.43	0	100
200 - 300	139	39	72	1.44	1.16	19
300 - 450	26	6	77	1.58	1.31	17
> 450						
Gehele categorie	169	45	73	1.46	1.18	19

(1): Gemiddeld over het marktaanbod

Tabel 23 PRIJSEFFECT EN TERUGVERDIENTTIJD

Categorie : koelkasten met 4 sterren vriesvak en één temperatuurregelaar
 Grenslijn 1 (ca. 10% reductie energieverbruik)

Categorie koelkasten in liters	Aantal merknamen		Gemiddelde prijs		Meer- prijs	Norm energie- besparing	Energie- kosten- besparing	Eenvoudige terugverdiëntijd
	Huidig aanbod	Rest- markt	Huidig aanbod	Rest- markt				
			f	f	f	kWh/dag	f/jaar	jaar
100 t/m 150 vrijstaand onderbouw	- 1	- 1	- 1699	- 1699	- -	- -	- -	- -
151 t/m 200 vrijstaand onderbouw	3 -	- -	1092 -	- -	- -	- -	- -	- -
201 t/m 300 vrijstaand onderbouw	92 47	52 25	1119 2068	1139 2092	20 24	0,16 0,16	9,0 9,0	2,2 2,7
300 t/m 450 vrijstaand onderbouw	24 2	14 1	1575 2278	1492 2457	-83 179	- 0,12	- 6,7	- 26,7

Gemiddeld elektriciteitsstarief: f0,22 per kWh.

Tabel 24 PRIJSEFFECT EN TERUGVERDIENTTIJD

Categorie : koelkasten met 4 sterren vriesvak en één temperatuurregelaar
 Grenslijn 2 (ca. 15% reductie energieverbruik)

Categorie koelkasten in liters	Aantal merknamen		Gemiddelde prijs		Meer- prijs	Norm energie- besparing	Energie- kosten- besparing	Eenvoudige terugverdiëntijd
	Huidig aanbod	Rest- markt	Huidig aanbod	Rest- markt				
			f	f		kWh/dag	f/jaar	jaar
100 t/m 150 vrijstaand onderbouw	- 1	- -	- 1699	- -	- -	- -	- -	- -
151 t/m 200 vrijstaand onderbouw	3 -	- -	1092 -	- -	- -	- -	- -	- -
201 t/m 300 vrijstaand onderbouw	92 47	24 15	1119 2068	1128 1806	9 -262	0,28 -	15,7 -	0,6 -
300 t/m 450 vrijstaand onderbouw	24 2	6 -	1575 2278	1517 -	-58 -	- -	- -	- -

Gemiddeld elektriciteitsstarief: f0,22 per kWh.

Tabel 25 EFFECT GRENSLIJNEN OP AANBOD AAN MERKNAMEN

Categorie : koelkasten met 4 sterren vriesvak en één temperatuurregelaar

Merknamen	Aantal huidig aanbod	grenslijn 1		grenslijn 2	
		Aantal restmarkt		Aantal restmarkt	
		absoluut	relatief (%)	absoluut	relatief (%)
AEG	7	7	100	5	71
ANTARC	1	0	0	0	0
ATAG	1	0	0	0	0
BAUKNECHT	7	4	57	1	14
BLOMBERG	1	1	100	1	100
BLUE AIR	9	8	89	5	56
BOSCH	19	12	63	9	47
CANDY	4	4	100	4	100
EDY	3	2	67	1	33
ELECTROLUX	6	4	67	0	0
ERRES	6	1	17	0	0
ETNA	2	0	0	0	0
FRIGIDAIRE	1	1	100	0	0
FRILEC	1	0	0	0	0
GRAM	3	3	100	2	67
HOOVER	3	1	33	1	33
IAR	4	3	75	1	25
IGNIS	5	2	40	0	0
INDESIT	9	3	33	2	22
KALORIK	1	0	0	0	0
KUPPERSBUSCH	5	2	40	1	20
LIEBHERR	7	7	100	2	29
MARIJNEN	5	3	60	0	0
MIELE	6	5	83	2	33
NEFF	2	2	100	1	50
NORDLAND	1	1	100	1	100
OCEAN	7	3	43	1	14
PELGRIM	1	1	100	1	100
PHILIPS/WHIRLPOOL	11	1	9	0	0
RONDO	2	2	100	0	0
SCHOLTES	3	1	33	0	0
SIEMENS	11	5	45	4	36
ZANUSSI	15	4	27	0	0

Tabel 26 MARKTREDUCTIE EN ENERGIEBESPARING BIJ VIER STERREN KOELKASTEN

Categorie : koelkasten met een 4 sterren vriesvak en twee temperatuur-regelaars

Grenslijn 0 (ca. 6% reductie energieverbruik)

Volume categorie [liters]	Omvang van het aanbod [aantallen]			Energieverbruik ⁽¹⁾ [kWh/24 uur]		
	Huidig aanbod	Rest- markt	Reductie [%]	Huidig aanbod	Rest- markt	Reductie [%]
0 - 100						
100 - 150						
150 - 200						
200 - 300	41	24	41	1.55	1.43	8
300 - 450	34	18	47	1.63	1.56	4
> 450						
Gehele categorie	75	42	44	1.59	1.49	6

(1): Gemiddeld over het marktaanbod

Tabel 27 MARKTREDUCTIE EN ENERGIEBESPARING BIJ VIER STERREN KOELKASTEN

Categorie : koelkasten met een 4 sterren vriesvak en twee temperatuur-regelaars

Grenslijn 1 (ca. 10% reductie energieverbruik)

Volume categorie [liters]	Omvang van het aanbod [aantallen]			Energieverbruik ⁽¹⁾ [kWh/24 uur]		
	Huidig aanbod	Rest- markt	Reductie [%]	Huidig aanbod	Rest- markt	Reductie [%]
0 - 100						
100 - 150						
150 - 200						
200 - 300	41	18	56	1.55	1.40	10
300 - 450	34	7	79	1.63	1.49	9
> 450						
Gehele categorie	75	25	67	1.59	1.43	10

(1): Gemiddeld over het marktaanbod

Tabel 28 MARKTREDUCTIE EN ENERGIEBESPARING BIJ VIER STERREN KOELKASTEN

Categorie : koelkasten met een 4 sterren vriesvak en twee temperatuur-regelaars

Grenslijn 2 (ca. 15% reductie energieverbruik)

Volume categorie [liters]	Omvang van het aanbod [aantallen]			Energieverbruik ⁽¹⁾ [kWh/24 uur]		
	Huidig aanbod	Rest- markt	Reductie [%]	Huidig aanbod	Rest- markt	Reductie [%]
0 - 100						
100 - 150						
150 - 200						
200 - 300	41	5	88	1.55	1.29	17
300 - 450	34	1	97	1.63	1.40	14
> 450						
Gehele categorie	75	6	92	1.59	1.31	18

(1): Gemiddeld over het marktaanbod

Tabel 29 PRIJSEFFECT EN TERUGVERDIENTTIJD

Categorie : koelkasten met 4 sterren vriesvak en twee temperatuur-regelaars

Grenslijn 1 (ca. 10% reductie energieverbruik)

Categorie koelkasten in liters	Aantal merknamen		Gemiddelde prijs		Meer-prijs	Norm energie-besparing	Energie-kosten-besparing	Eenvoudige terugverdiëntijd
	Huidig aanbod	Rest-markt	Huidig aanbod	Rest-markt		kWh/dag	f/jaar	jaar
			f	f	f			
100 t/m 150 vrijstaand onderbouw	34	16	1605	1781	176	0,15	8,4	21
	7	2	2409	2549	140	0,15	8,4	16,7
151 t/m 200 vrijstaand onderbouw	34	7	1785	1906	121	0,14	7,9	15,3
	-	-	-	-	-	-	-	-

Gemiddeld elektriciteitsstarief: f0,22 per kWh.

Tabel 30 PRIJSEFFECT EN TERUGVERDIENTTIJD

Categorie : koelkasten met 4 sterren vriesvak en twee temperatuur-regelaars

Grenslijn 2 (ca. 15% reductie energieverbruik)

Categorie koelkasten in liters	Aantal merknamen		Gemiddelde prijs		Meer- prijs	Norm energie- besparing	Energie- kosten- besparing	Eenvoudige terugverdiëntijd
	Huidig aanbod	Rest- markt	Huidig aanbod	Rest- markt		kWh/dag	f/jaar	jaar
			f	f				
100 t/m 150 vrijstaand onderbouw	34	3	1605	1576	-29	-	-	-
	7	2	2409	2549	140	0,15	8,4	16,7
151 t/m 200 vrijstaand onderbouw	34	1	1785	1939	154	0,14	7,9	19,5
	-	-	-	-	-	-	-	-

Gemiddeld elektriciteitsstarief: f0,22 per kWh.

Tabel 31 EFFECT GRENSLIJNEN OP AANBOD AAN MERKNAMEN

Categorie : koelkasten met 4 sterren vriesvak en twee temperatuurregelaars

Merknamen	Aantal huidig aanbod	grenslijn 1		grenslijn 2	
		Aantal restmarkt		Aantal restmarkt	
		absoluut	relatief (%)	absoluut	relatief (%)
AEG	4	0	0	0	0
BAUKNECHT	4	0	0	0	0
BLOMBERG	4	1	25	1	25
BLUE AIR	1	0	0	0	0
BOSCH	8	6	75	1	13
CANDY	2	0	0	0	0
CARAVELL	2	0	0	0	0
DERBY	1	1	100	0	0
EDY	1	0	0	0	0
ELECTROLUX	3	1	33	0	0
ERRES	2	0	0	0	0
ESTA	1	1	100	0	0
FRIGIDAIRE	2	0	0	0	0
FRILEC	1	0	0	0	0
GRAM	1	0	0	0	0
IAR	3	0	0	0	0
IGNIS	1	0	0	0	0
INDESIT	1	0	0	0	0
KUPPERSBUSCH	1	0	0	0	0
LIEBHERR	6	4	67	1	17
MARIJNEN	2	0	0	0	0
MIELE	7	3	43	1	14
NORDLAND	2	0	0	0	0
OCEAN	2	0	0	0	0
PHILIPS/WHIRLPOOL	2	0	0	0	0
RONDO	1	1	100	0	0
SIEMENS	4	4	100	1	25
ZANKER	3	1	33	1	33
ZANUSSI	3	1	33	0	0

Tabel 32 MARKTREDUCTIE EN ENERGIEBESPARING BIJ DIEPVRIEZERS

Grenslijn 1 (ca. 10% reductie energieverbruik)

Volume categorie [liters]	Omvang van het aanbod [aantallen]			Energieverbruik ⁽¹⁾ [kWh/24 uur]		
	Huidig aanbod	Rest- markt	Reductie [%]	Huidig aanbod	Rest- markt	Reductie [%]
0 - 100	45	21	53	1.13	1.00	12
100 - 150	83	31	63	1.13	1.02	10
150 - 200	57	39	32	1.11	0.97	13
200 - 300	126	74	41	1.20	1.01	16
300 - 450	58	41	29	1.40	1.27	9
> 450	20	12	40	2.19	1.90	13
Gehele categorie	389	218	44	1.24	1.10	11

(1): Gemiddeld over het marktaanbod

Tabel 33 MARKTREDUCTIE EN ENERGIEBESPARING BIJ DIEPVRIEZERS

Grenslijn 2 (ca. 15% reductie energieverbruik)

Volume categorie [liters]	Omvang van het aanbod [aantallen]			Energieverbruik ⁽¹⁾ [kWh/24 uur]		
	Huidig aanbod	Rest- markt	Reductie [%]	Huidig aanbod	Rest- markt	Reductie [%]
0 - 100	45	7	64	1.13	0.94	17
100 - 150	83	0	88	1.13	0.96	15
150 - 200	57	27	52	1.11	0.88	21
200 - 300	126	54	57	1.20	0.90	25
300 - 450	58	31	47	1.40	1.17	16
> 450	20	8	60	2.19	1.84	16
Gehele categorie	389	137	65	1.24	1.02	18

(1): Gemiddeld over het marktaanbod

Tabel 34 PRIJSEFFECT EN TERUGVERDIENTTIJD

Categorie : diepvriezers

Grenslijn 1 (ca. 10% reductie energieverbruik)

Categorie koelkasten in liters	Aantal merknamen		Gemiddelde prijs		Meer- prijs	Norm energie- besparing	Energie- kosten- besparing	Eenvoudige terugverdiëntijd
	Huidig aanbod	Rest- markt	Huidig aanbod	Rest- markt				
			f	f	f	kWh/dag	f/jaar	jaar
0 tot 100 vrijstaand	24	11	720	762	42	0,13	7,3	5,7
	21	10	1512	1444	-68	-	-	-
100 t/m 150 vrijstaand	46	20	875	844	-31	-	-	-
	37	11	1505	1452	-53	-	-	-
151 t/m 200 vrijstaand	57	39	1169	1217	48	0,14	7,9	6,1
201 t/m 300 vrijstaand	126	74	1331	1339	8	0,19	10,7	0,7
300 t/m 450 0<=Vgecorr. <=803 vrijstaand	36	25	1222	1239	17	0,20	11,2	1,5
Vgecorr.>= 803 vrijstaand	22	16	1283	1343	60	0,08	4,4	13,3
>450 vrijstaand	20	12	1565	1475	-90	-	-	-

Gemiddeld elektriciteitsstarief: f0,22 per kWh.

Tabel 35 PRIJSEFFECT EN TERUGVERDIENTTIJD

Categorie : diepvriezers

Grenslijn 2 (ca. 15% reductie energieverbruik)

Categorie koelkasten in liters	Aantal merknamen		Gemiddelde prijs		Meer- prijs	Norm energie- besparing	Energie- kosten- besparing	Eenvoudige terugverdiëntijd
	Huidig aanbod	Rest- markt	Huidig aanbod	Rest- markt				
			f	f	f	kWh/dag	f/jaar	jaar
0 tot 100 vrijstaand	24	5	720	669	-21	-	-	-
	21	2	1512	1448	-64	-	-	-
100 t/m 150 vrijstaand	46	8	875	820	-55	-	-	-
	37	2	1505	1469	-36	-	-	-
151 t/m 200 vrijstaand	57	27	1169	1154	-15	-	-	-
201 t/m 300 vrijstaand	126	54	1331	1355	24	0,30	16,9	1,4
300 t/m 450 0<=Vgecorr. <=798 vrijstaand	36	19	1222	1278	56	0,30	16,9	3,3
Vgecorr.>= 798 vrijstaand	22	12	1283	1306	23	0,17	9,6	2,4
>450 vrijstaand	20	8	1565	1411	-154	-	-	-

Gemiddeld elektriciteitsstarief: f0,22 per kWh.

Tabel 36 EFFECT GRENSLIJNEN OP AANBOD AAN MERKNAMEN

Categorie : diepvriezers

Merknamen	Aantal huidig aanbod	grenslijn 1		grenslijn 2	
		Aantal restmarkt		Aantal restmarkt	
		absoluut	relatief (%)	absoluut	relatief (%)
AEG	20	18	90	9	45
ANTARC	2	0	0	0	0
ATAG	2	1	50	0	0
BAUKNECHT	15	6	40	4	27
BLOMBERG	13	7	54	2	15
BLUE AIR	3	1	33	0	0
BOSCH	24	16	67	9	38
CANDY	6	1	17	1	17
CARAVELL	9	9	100	9	100
DERBY	13	5	38	5	38
EDY	1	0	0	0	0
ELECTROLUX	16	10	63	9	56
ERRES	9	3	33	0	0
ESTA	14	6	43	5	36
ETNA	1	0	0	0	0
FRIGIDAIRE	3	1	33	1	33
FRIGOR	7	7	100	7	100
FRILEC	4	0	0	0	0
GRAM	12	9	75	6	50
HOOVER	3	3	100	1	33
IAR	4	3	75	2	50
IGNIS	13	3	23	2	15
INDESIT	12	5	42	1	8
KALORIK	3	3	100	1	33
KUPPERSBUSCH	8	5	63	1	13
LIEBHERR	46	34	74	18	39
MARIJNEN	13	9	69	7	54
MIELE	13	7	54	5	38
NEFF	4	0	0	0	0
NORDLAND	7	4	57	4	57
OCEAN	10	6	60	1	10
PELGRIM	1	0	0	0	0
PHILIPS/WHIRLPOOL	19	6	32	5	26
RONDO	15	12	80	10	67
SCHOLTES	2	0	0	0	0
SIEMENS	15	10	67	6	40
ZANKER	11	4	36	3	27
ZANUSSI	16	4	25	4	25

De gevolgen van het toepassen van minimum efficiency-eisen voor het marktaanbod van huishoudelijke koel- en vriesapparatuur

Tabel 37 Samenvatting resultaten per hoofdcategorie en grenslijn

Categorie	Grens- lijn	Reductie, [%]		Contra-indicaties		
		Markt- aanbod	Energie- verbruik	Economie Prijs restmarkt	Goed koopste	Aanbod breedte
koelkasten zonder vriesvak	1	62	13	1	2	0
	2	82	20	2	2	2
koelen en vriezen (0 en 1)	1	43	11	?	?	2
	2	-	-			
koelen en vriezen (2 sterren)	1	32	8	1	0	1
	2	70	14	1	1	2
koelen en vriezen (3 sterren)	1	55	11	0	1	1
	2	82	15	2	2	2
koelen en vriezen (4 sterren: één regelaar)	1	45	10	0	1	1
	2	73	19	0	1	2
koelen en vriezen (4 sterren: twee regelaars)	1	67	10	2	2	0
	2	92	18	3	2	1
Diepvriezers	1	44	11	2	0	0
	2	65	18	2	1	0

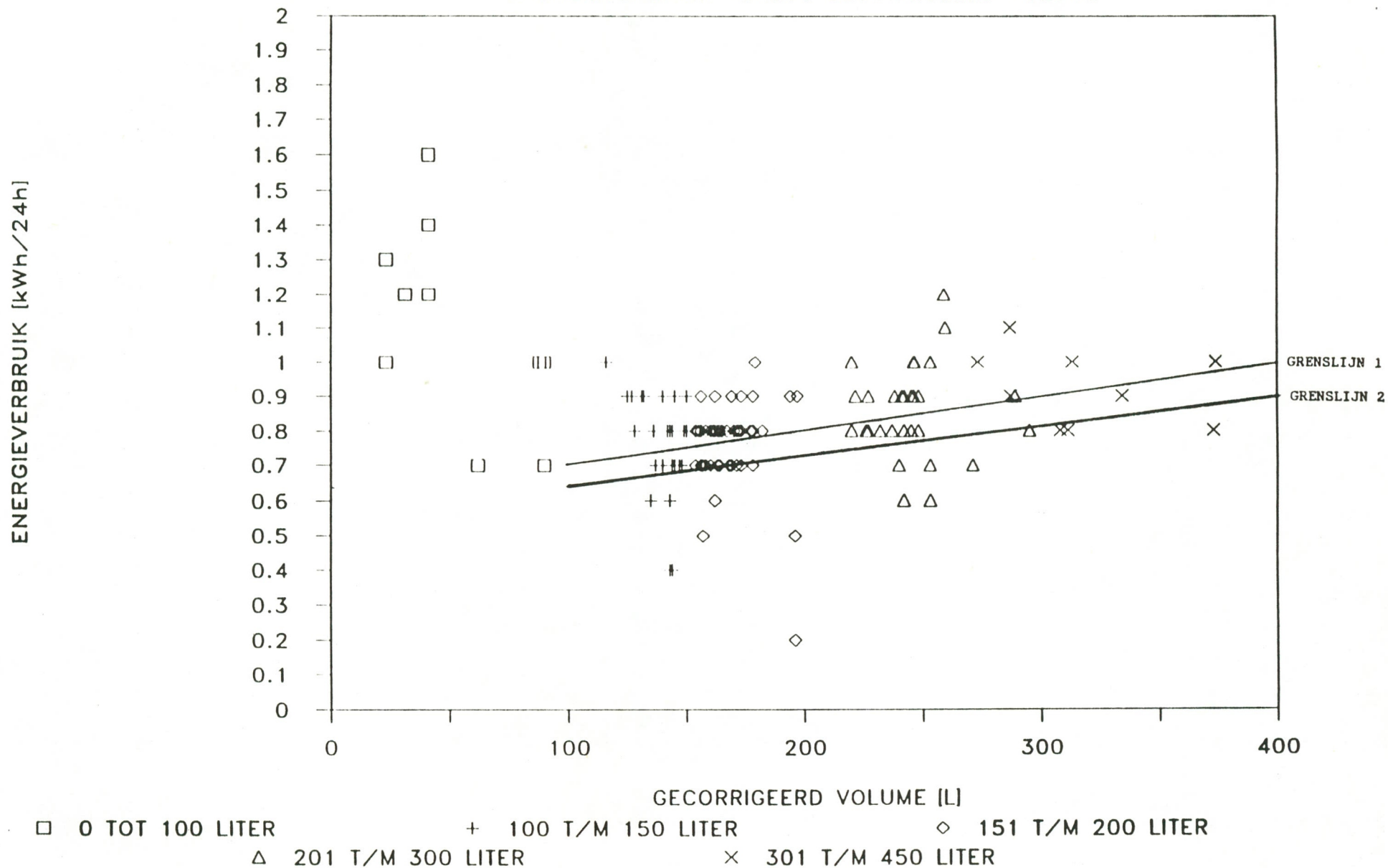
Tabel 38 Resultaten afzetenquête Ref. 3

categorie	zuinig	gemiddeld	niet zuinig	totaal
kleine koel- kasten	27.032	35.599	20.088	82.719
4 sterren koelen/vriezen	47.608	35.510	16.703	99.821
kleine diep- vriezers	7.853	32.764	3.825	44.442
grote diep- vriezers	4.944	7.829	10.038	22.811
totaal	87.437	111.702	50.654	249.739

Tabel 39 Maximum haalbare energiebesparingen

Hoofdcategorie	Volume [l]	Gemiddeld verbruik [kWh/24 u]	Minimum verbruik [kWh/24 u]	Maximum reductie [%]
koelkasten	100 - 150	0.76	0.4	47
	150 - 200	0.78	0.2	74
	200 - 300	0.87	0.6	31
	300 - 450	0.93	0.8	14
twee sterren	100 - 150	0.84	0.7	17
drie sterren	100 - 150	0.95	0.5	48
	150 - 200	0.98	0.8	13
vier sterren (1 regelaar)	200 - 300	1.44	1.0	31
	300 - 450	1.58	1.1	30
vier sterren (2 regelaars)	200 - 300	1.55	1.2	23
	300 - 450	1.63	1.4	14
diepvriezers	0 - 100	1.13	0.9	20
	100 - 150	1.13	0.8	30
	150 - 200	1.11	0.7	37
	200 - 300	1.20	0.6	50
	300 - 450	1.40	0.7	50
	> 450	2.19	1.3	41

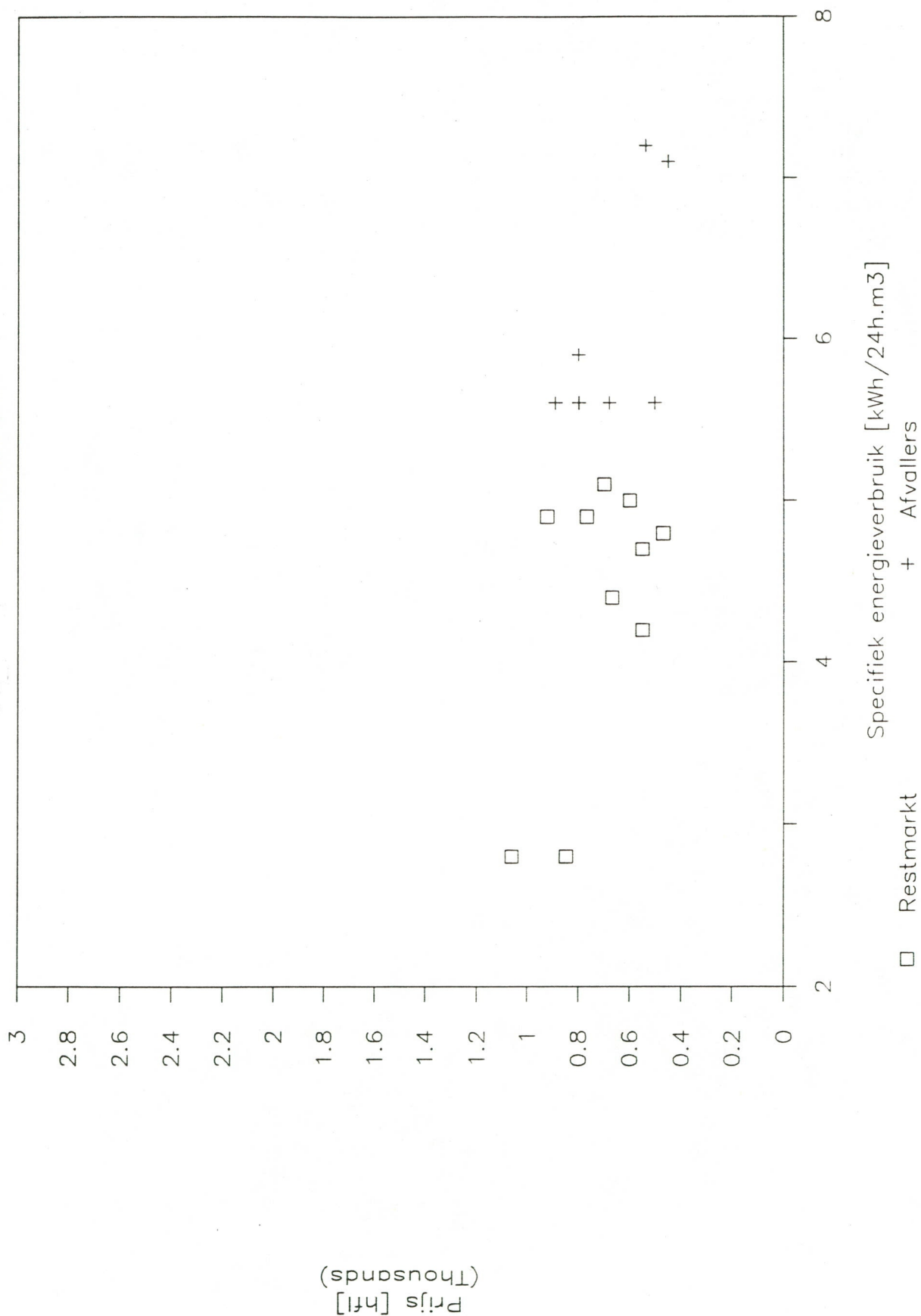
ENERGIEVERBRUIK VERSUS GECORRIGEERD VOLUME



Figuur 1 Grenslijn 1 en 2
Koelkasten zonder vriesvak

VRIJSTAANDE KOELKASTEN 90-91, 100 T/M 150 LITER

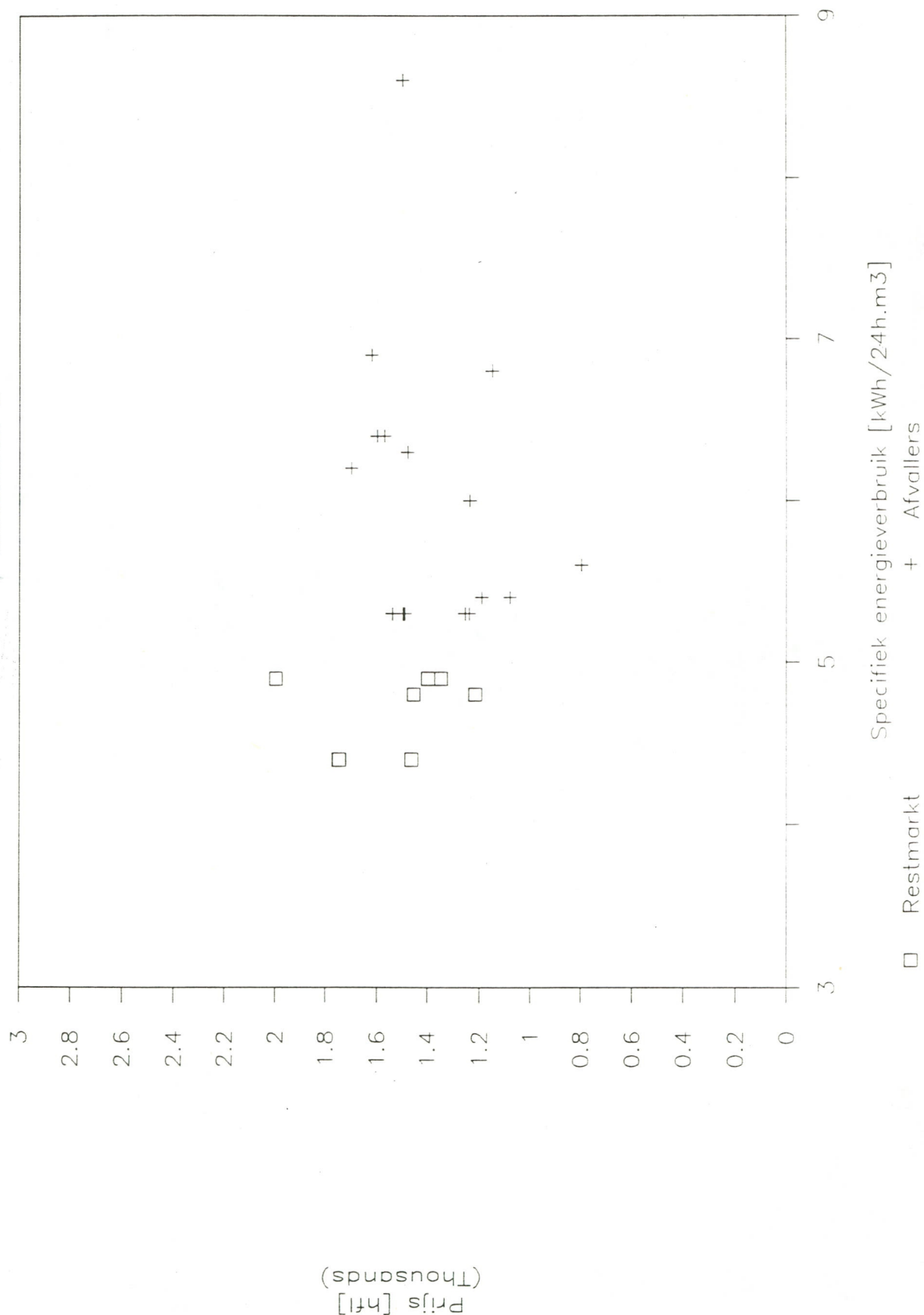
GRENSLIJN 1



Figuur 2 Economisch gevolg van grenslijn 1
Vrijstaande koelkasten, volumecategorie 100 t/m 150 liter

ONDERBOUW KOELKASTEN 90-91, 100 T/M 150 LITER

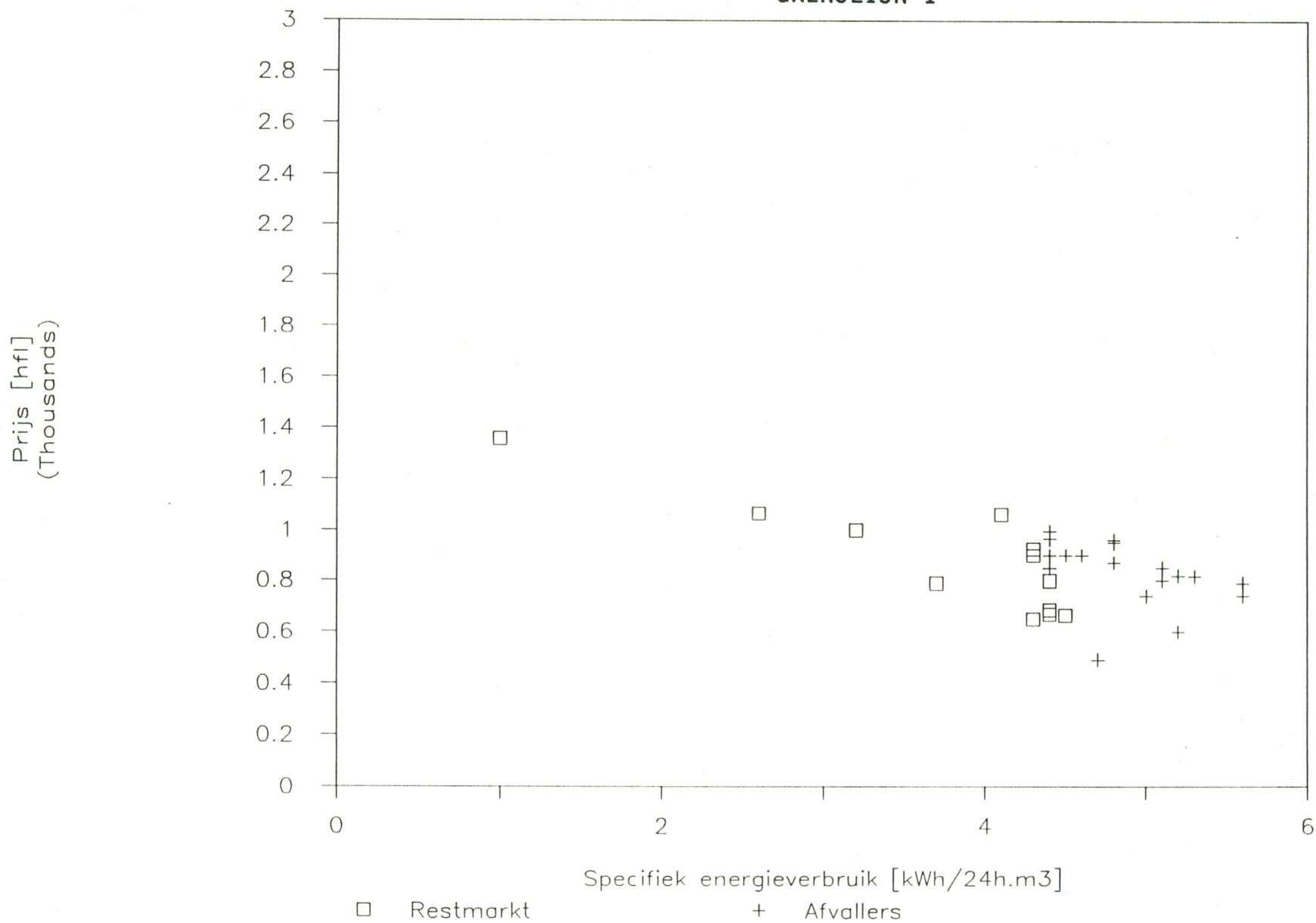
GRENSLIJN 1



Figuur 3 Economisch gevolg van grenslijn 1
Onderbouw koelkasten, volumecategorie 100 t/m 150 liter

VRIJSTAANDE KOELKASTEN 90-91, 151 T/M 200 LITER

GRENSLIJN 1

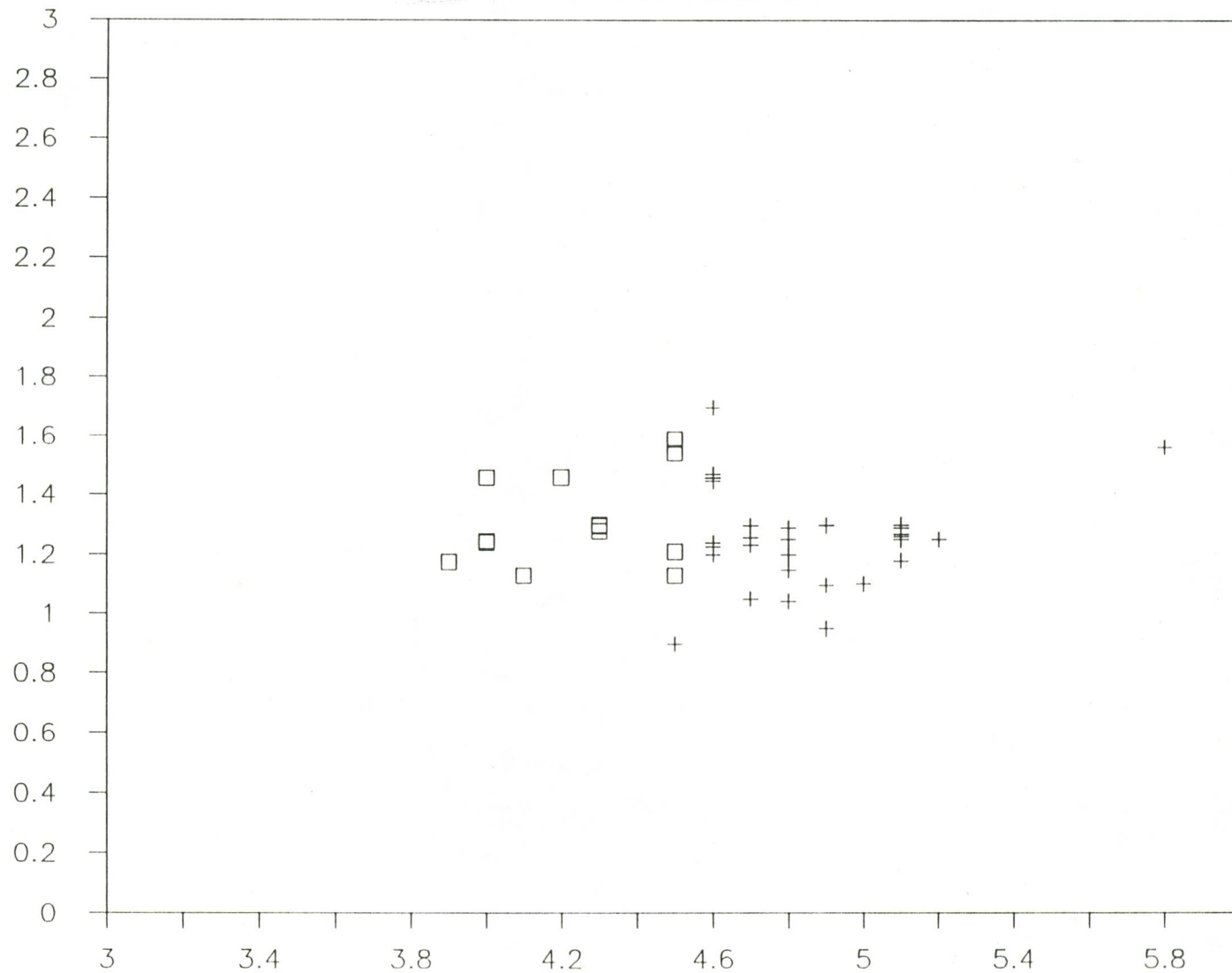


Figuur 4 Economisch gevolg van grenslijn 1
Vrijstaande koelkasten, volumecategorie 151 t/m 200 liter

ONDERBOUW KOELKASTEN 90-91, 151 T/M 200 LITER

GRENSLIJN 1

Prijs [hfl]
(Thousands)



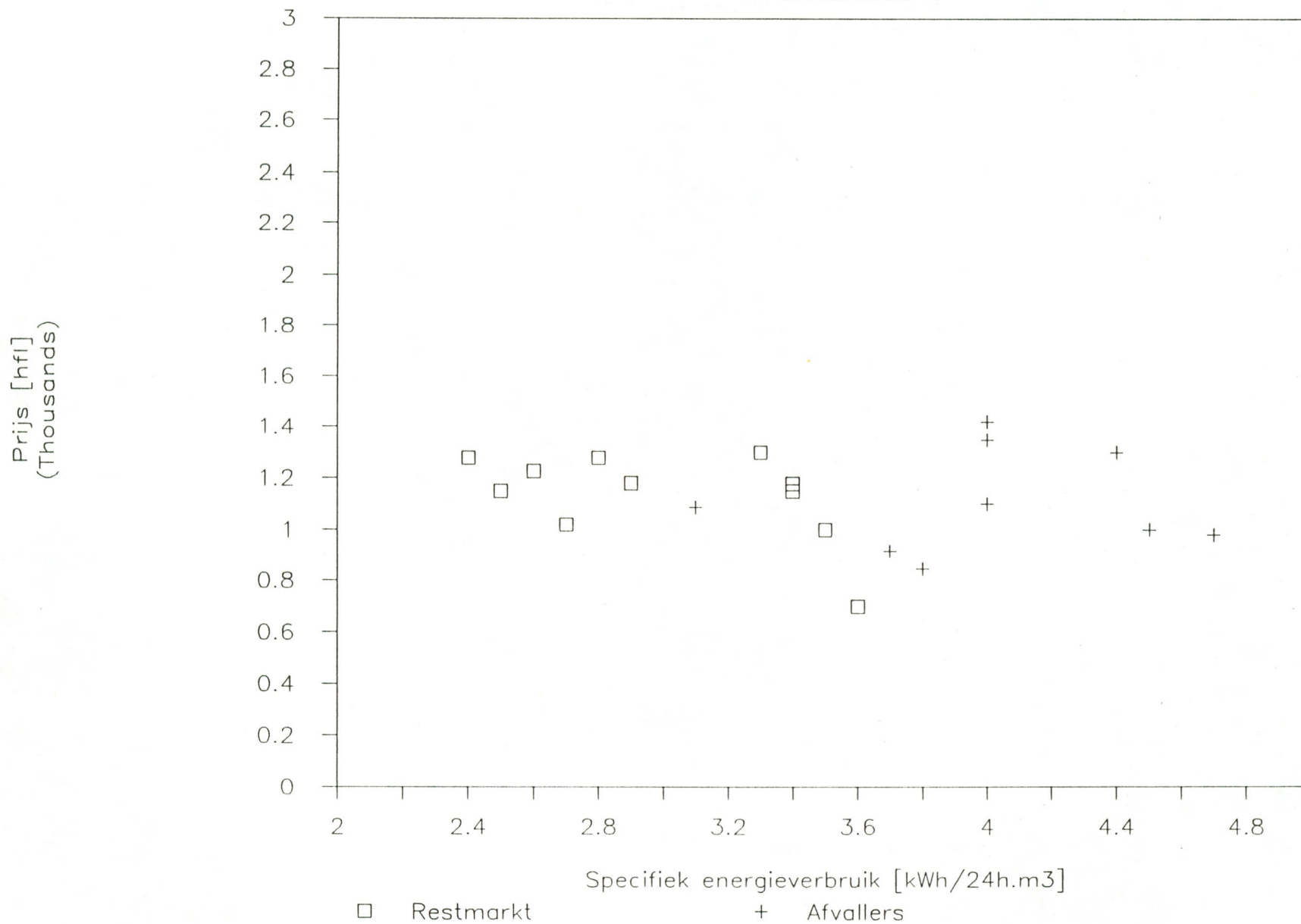
□ Restmarkt

+ Afvallers

Figuur 5 Economisch gevolg van grenslijn 1
Onderbouw koelkasten, volumecategorie 151 t/m 200 liter

VRIJSTAANDE KOELKASTEN 90-91, 201 T/M 300 LITER

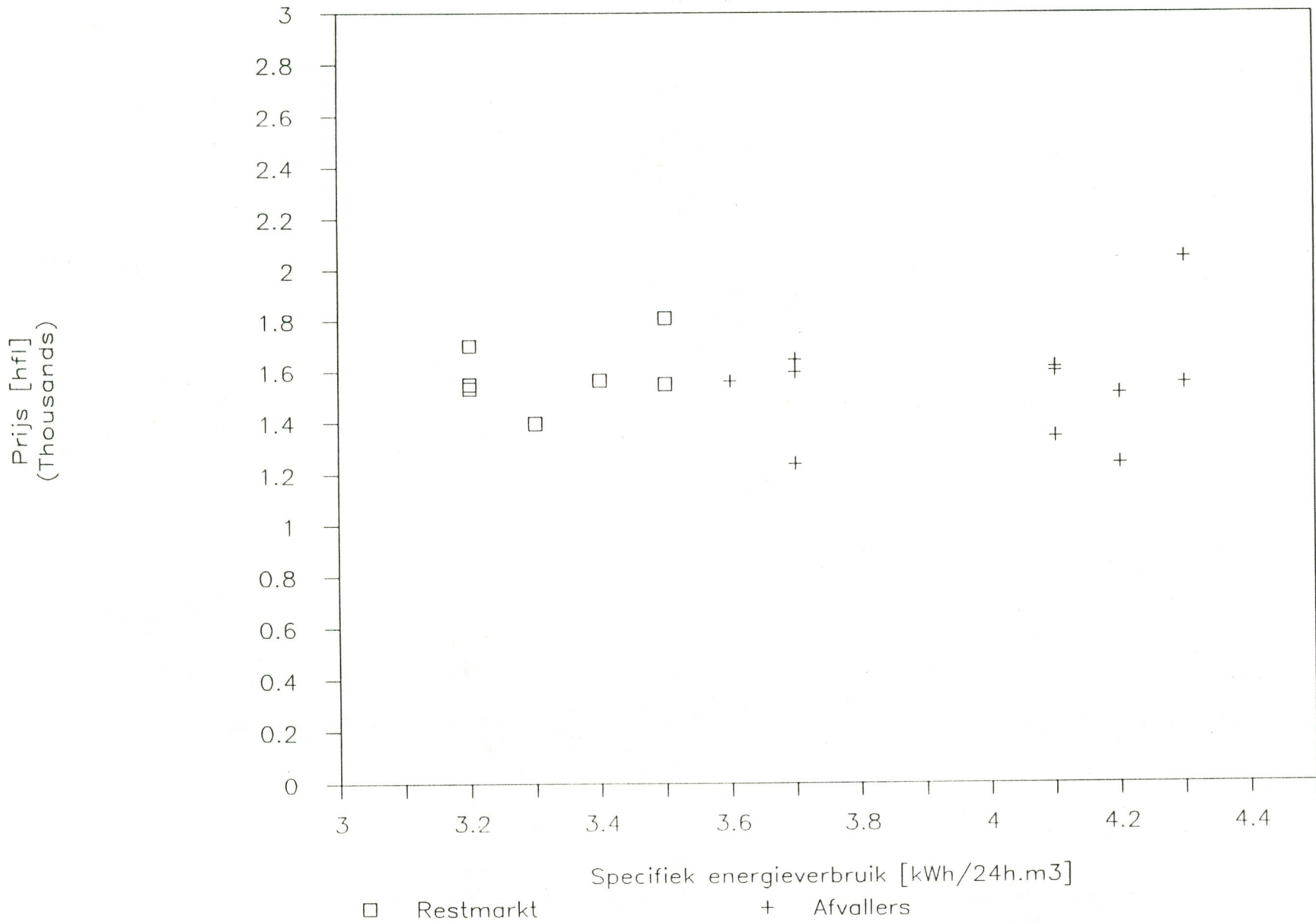
GRENSLIJN 1



Figuur 6 Economisch gevolg van grenslijn 1
Vrijstaande koelkasten, volumecategorie 201 t/m 300 liter

ONDERBOUW KOELKASTEN 90-91, 201 T/M 300 LITER

GRENSLIJN 1

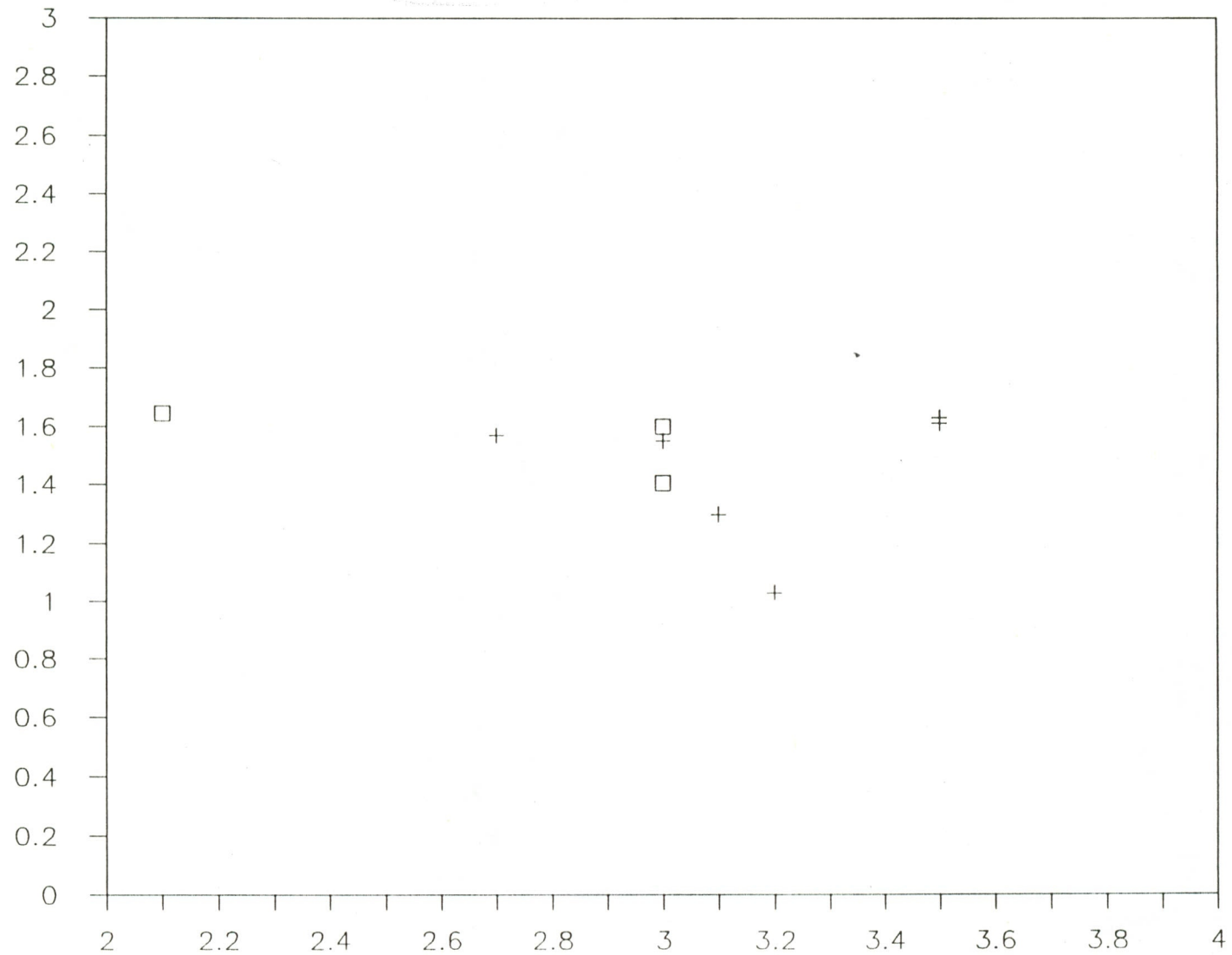


Figuur 7 Economisch gevolg van grenslijn 1
Onderbouw koelkasten, volumecategorie 201 t/m 300 liter

VRIJSTAANDE KOELKASTEN 90-91, 301 T/M 450 LITER

GRENSLIJN 1

Prijs [hfl]
(Thousands)



Specifiek energieverbruik [kWh/24h.m3]

□ Restmarkt

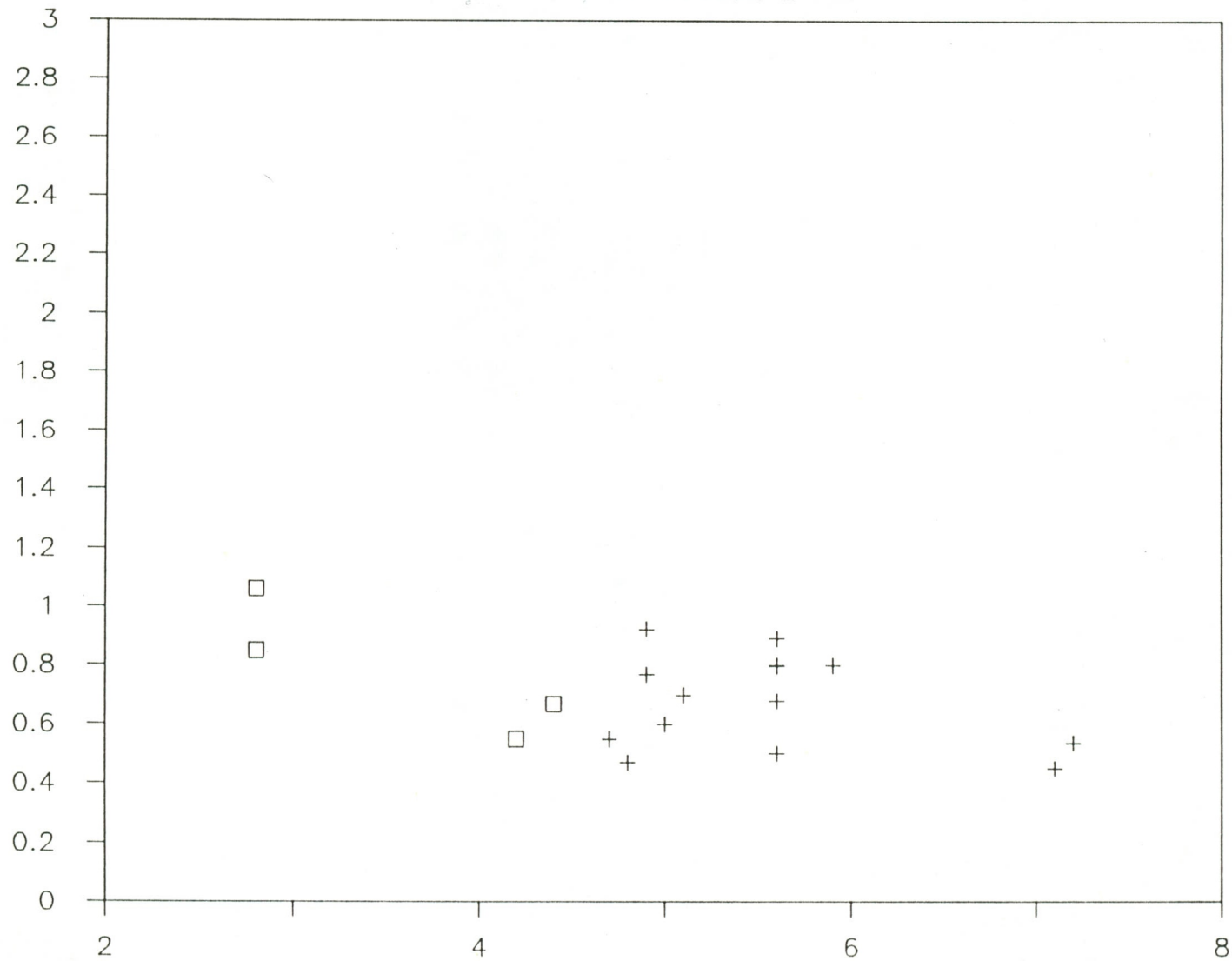
+ Afvallers

Figuur 8 Economisch gevolg van grenslijn 1
Vrijstaande koelkasten, volumecategorie 301 t/m 450 liter

VRIJSTAANDE KOELKASTEN 90-91, 100 T/M 150 LITER

GRENSLIJN 2

Prijs [hfl]
(Thousands)



Specifiek energieverbruik [kWh/24h.m3]

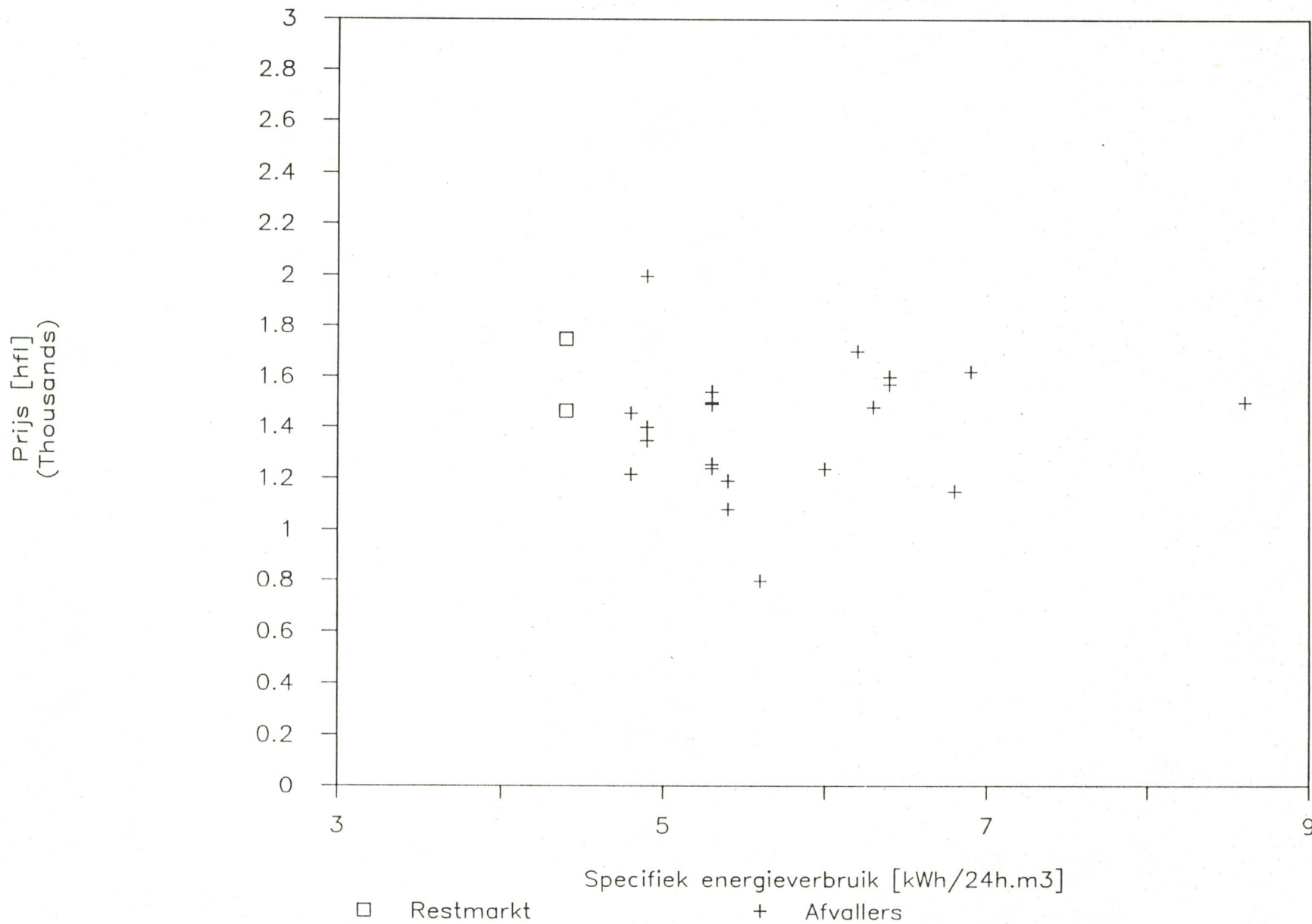
□ Restmarkt

+ Afvallers

Figuur 9 Economisch gevolg van grenslijn 2
Vrijstaande koelkasten, volumecategorie 100 t/m 150 liter

ONDERBOUW KOELKASTEN 90-91, 100 T/M 150 LITER

GRENSLIJN 2

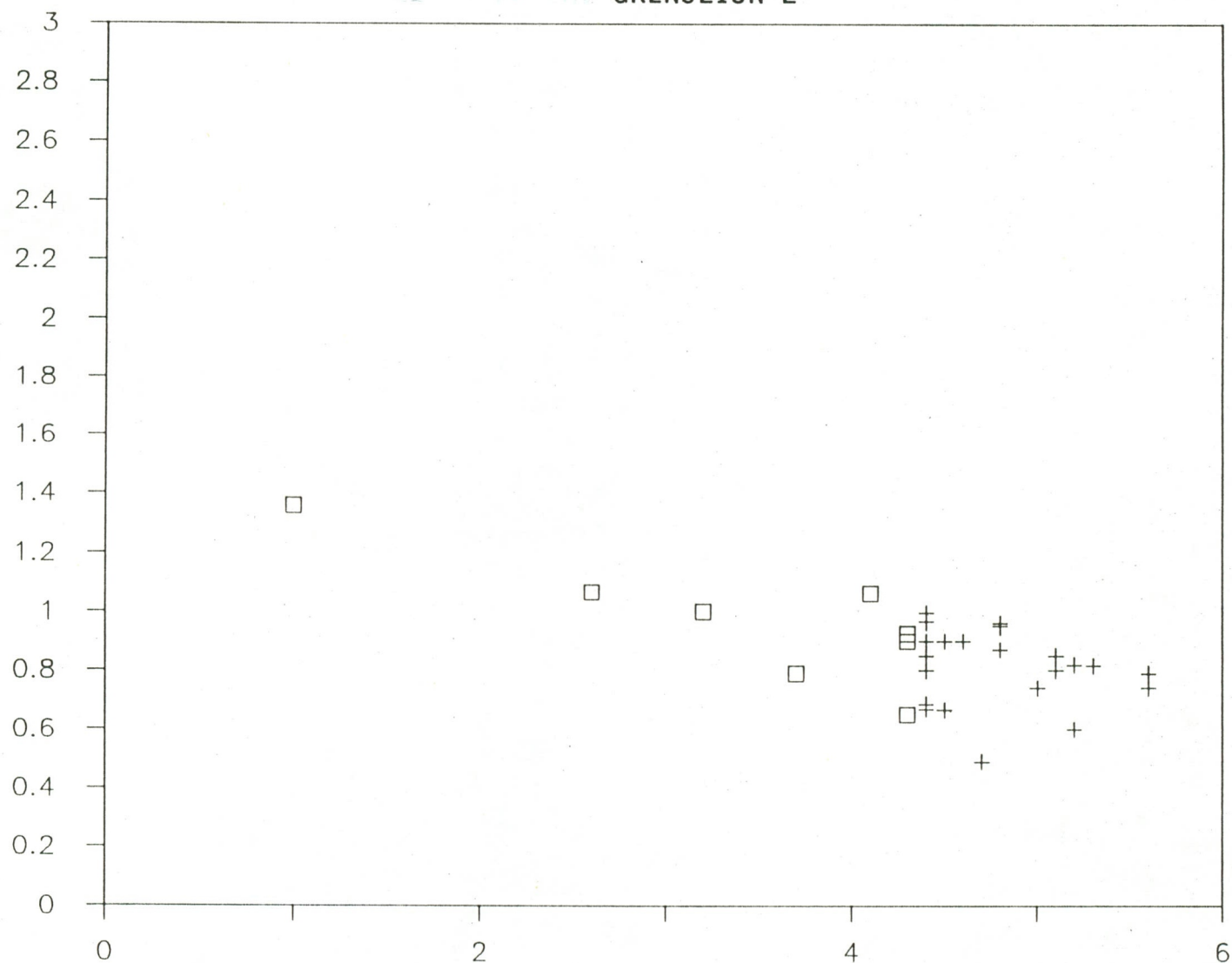


Figuur 10 Economisch gevolg van grenslijn 2
Onderbouw koelkasten, volumecategorie 100 t/m 150 liter

VRIJSTAANDE KOELKASTEN 90-91, 151 T/M 200 LITER

GRENSLIJN 2

Prijs [hfl]
(Thousands)



Specifiek energieverbruik [kWh/24h.m3]

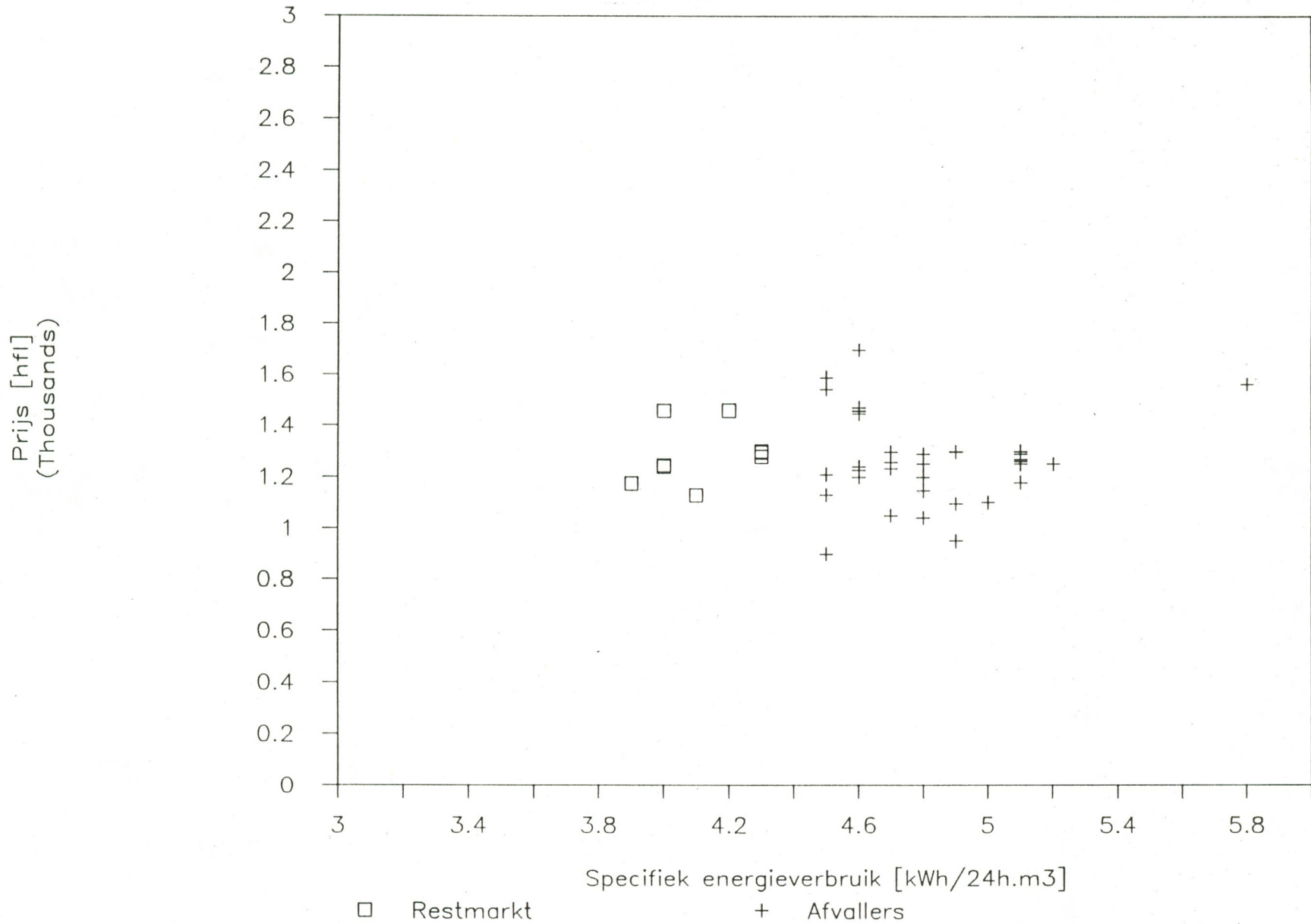
□ Restmarkt

+ Afvallers

Figuur 11 Economisch gevolg van grenslijn 2
Vrijstaande koelkasten, volumecategorie 151 t/m 200 liter

ONDERBOUW KOELKASTEN 90-91, 151 T/M 200 LITER

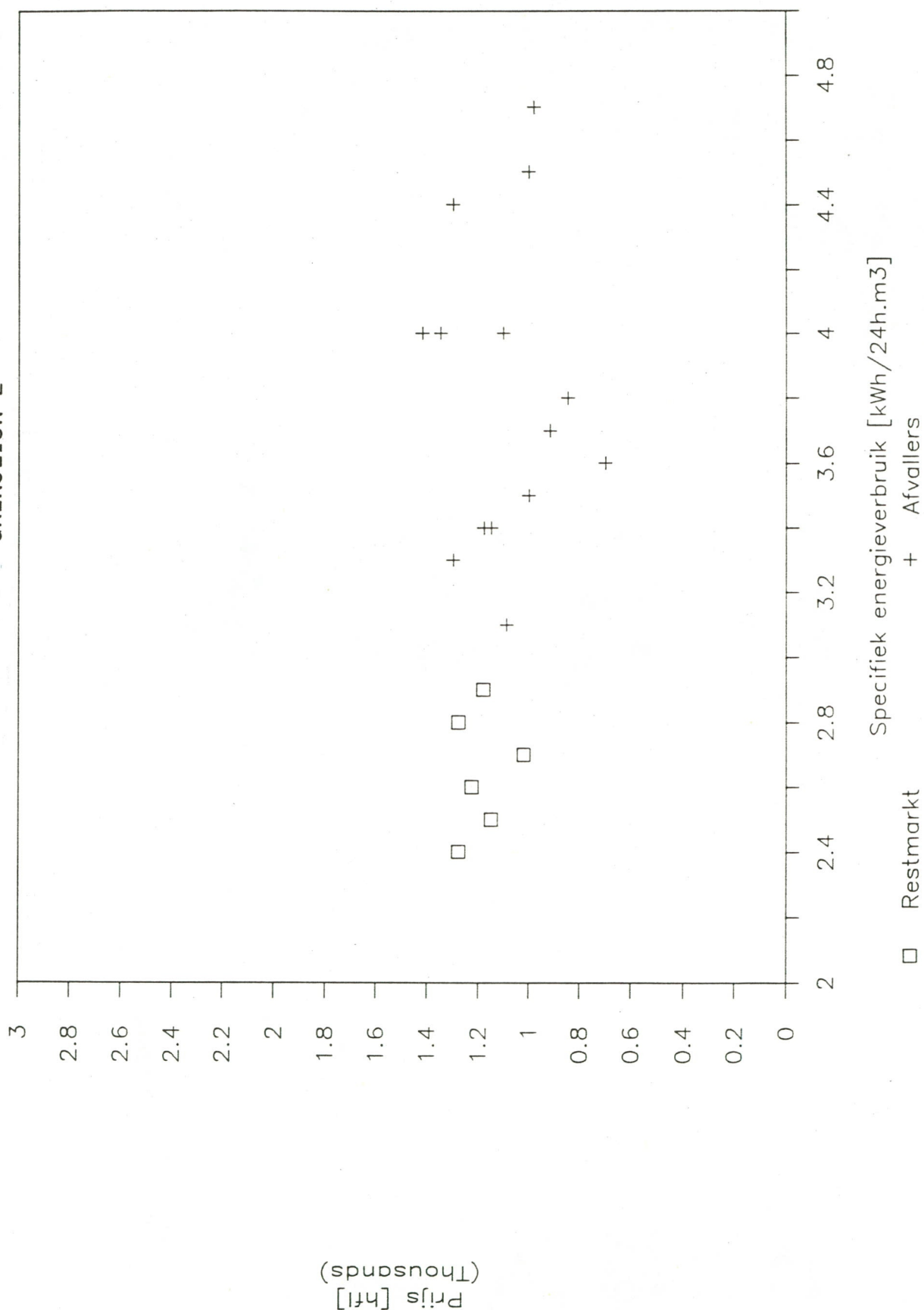
GRENSLIJN 2



Figuur 12 Economisch gevolg van grenslijn 2
Onderbouw koelkasten, volumecategorie 151 t/m 200 liter

VRIJSTAANDE KOELKASTEN 90-91, 201 T/M 300 LITER

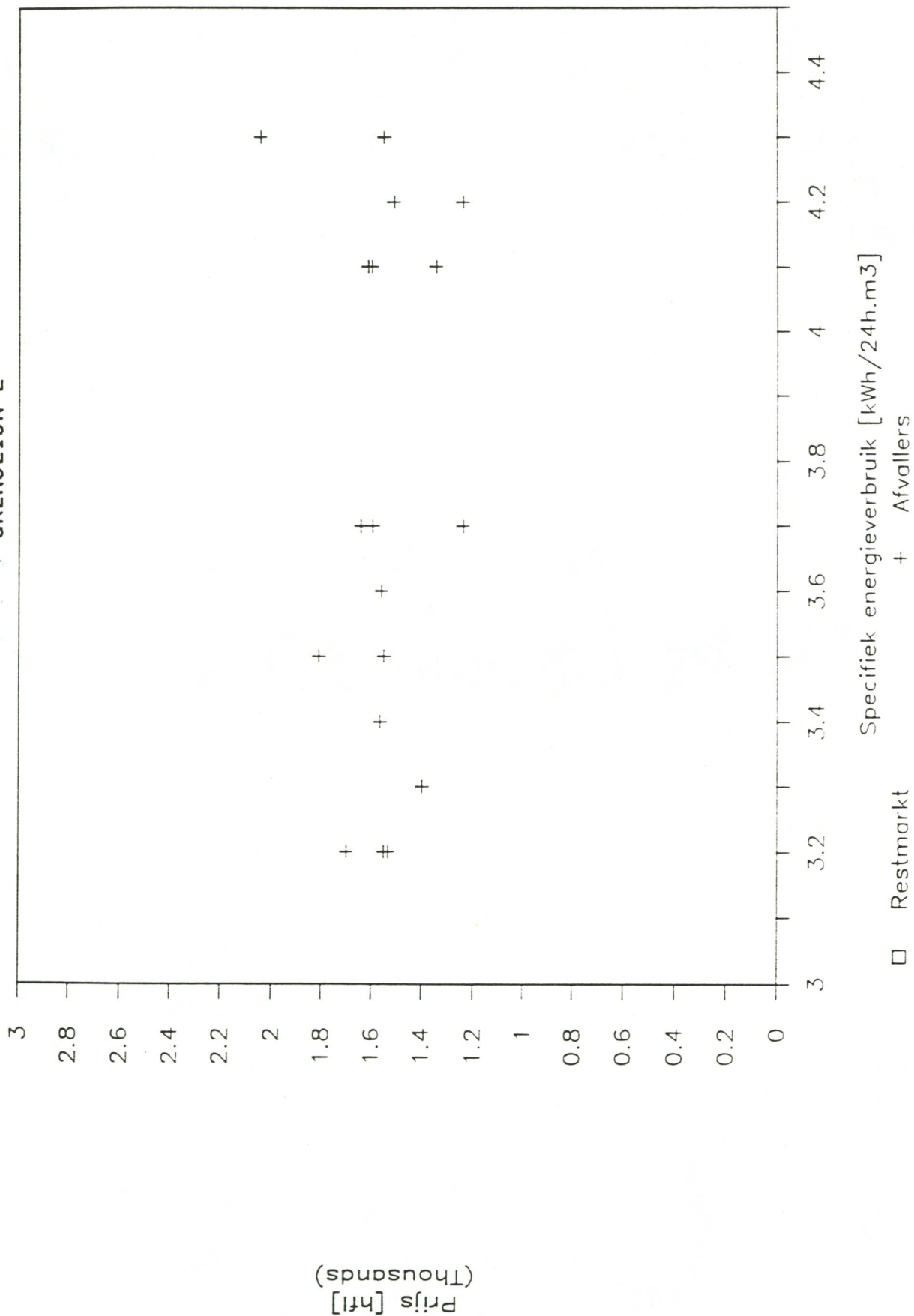
GRENSLIJN 2



Figuur 13 Economisch gevolg van grenslijn 2
Vrijstaande koelkasten, volumecategorie 201 t/m 300 liter

ONDERBOUW KOELKASTEN 90-91, 201 T/M 300 LITER

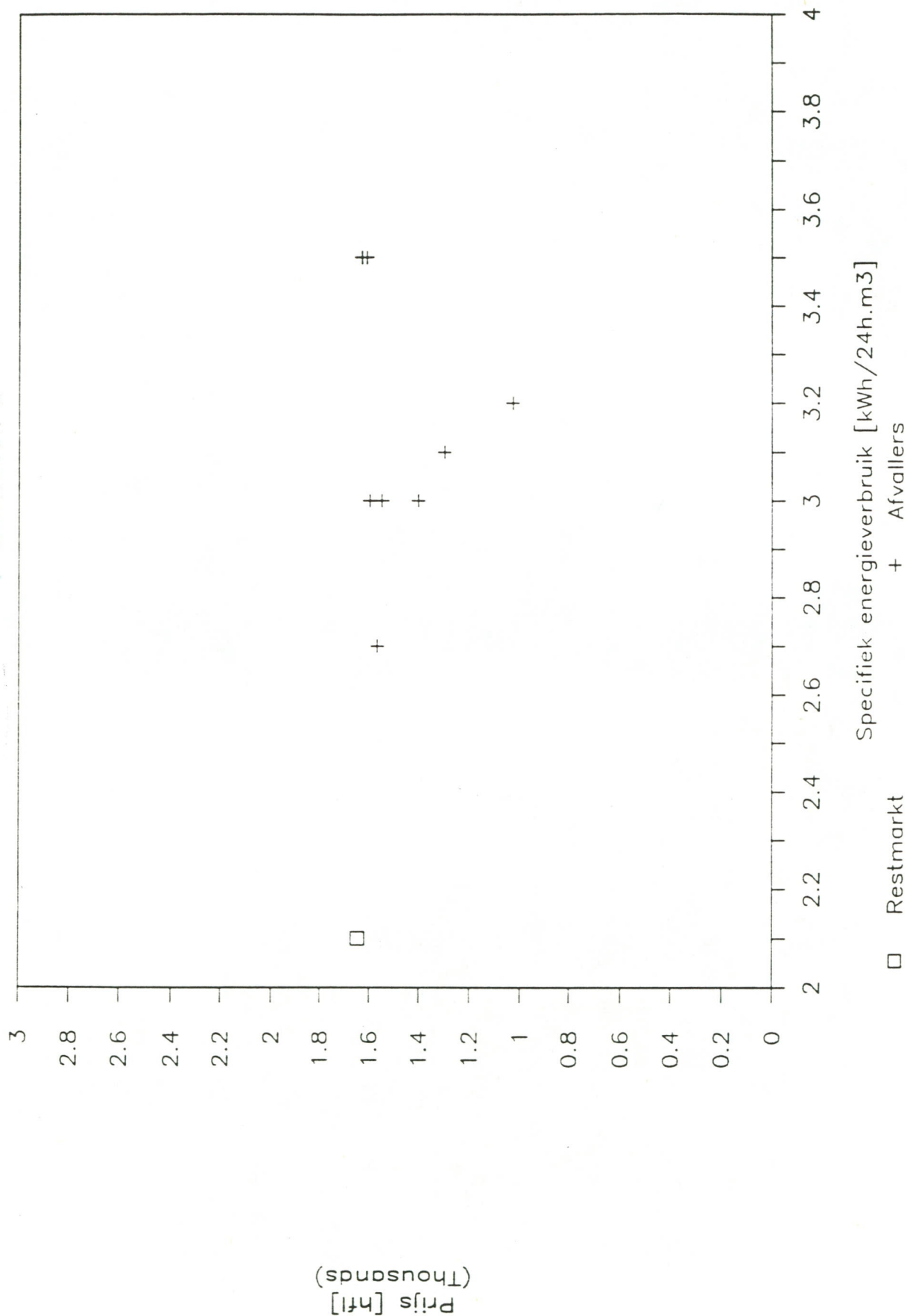
GRENSLIJN 2



Figuur 14 Economische gevolg van grenslijn 2
Onderbouw koelkasten, volumecategorie 201 t/m 300 liter

VRIJSTAANDE KOELKASTEN 90-91, 301 T/M 450 LITER

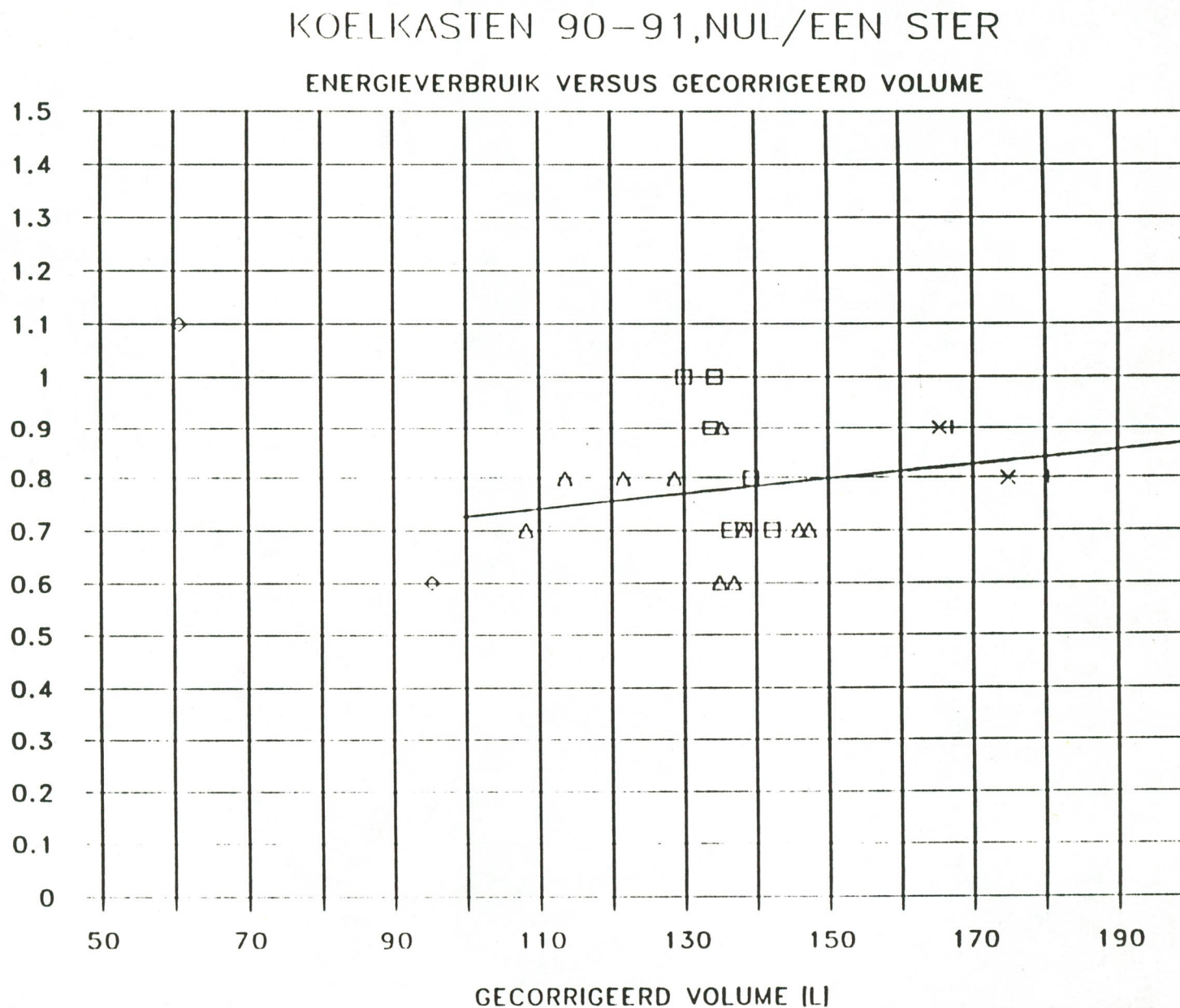
GRENSLIJN 2



Figuur 15 Economisch gevolg van grenslijn 2
Vrijstaande koelkasten, volumecategorie 301 t/m 450 liter

Figuur 16 Koelkasten met 0/1 sterren vriesvak: grenslijn 1

ENERGIEVERBRUIK [kWh/24h]



GRENSLIJN 1

□ 0*, 100 T/M 150 LITER

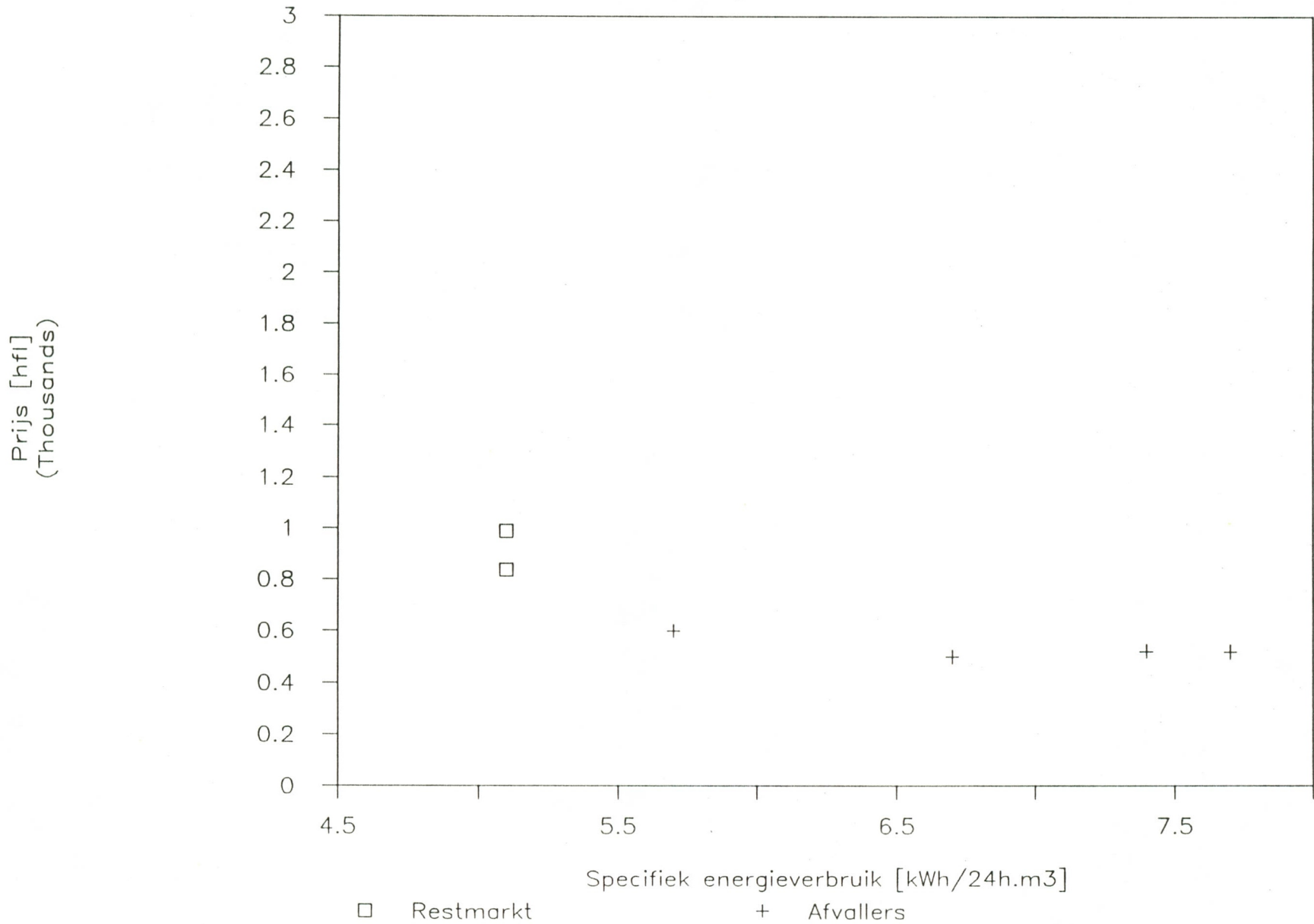
+ 0*, 151 T/M 200 LITER

◇ 1*, 0 TOT 100 LITER

Δ 1*, 100 T/M 150 LITER

× 1*, 151 T/M 200 LITER

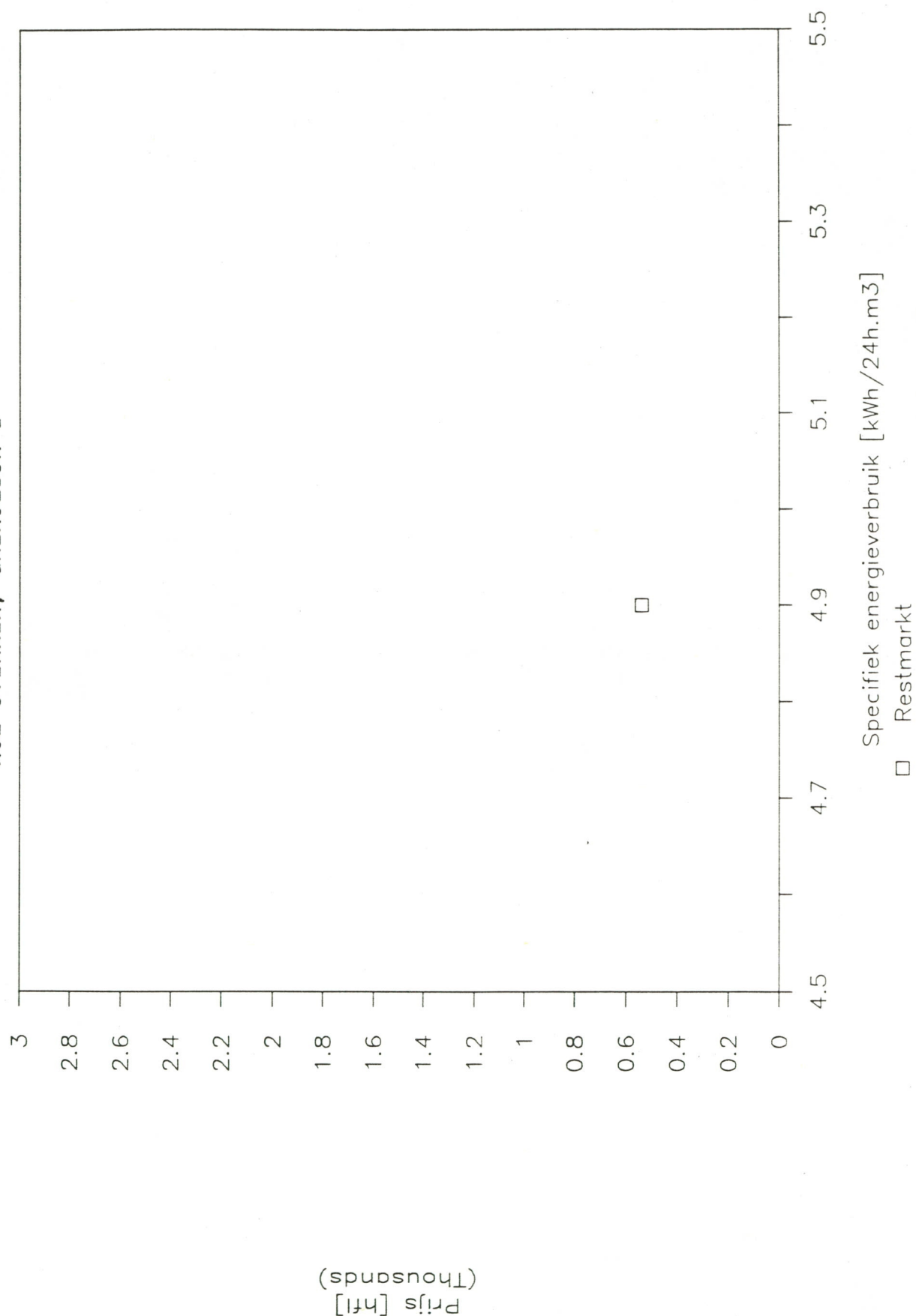
VRIJSTAANDE KOELKASTEN 90-91, 100 T/M 150 LITER NUL STERREN, GRENSLIJN 1



Figuur 17 Economisch gevolg van grenslijn 1
Vrijstaande koelkasten, 0*, volumecategorie 100 t/m 150 liter

ONDERBOUW KOELKASTEN 90-91, 100 T/M 150 LITER

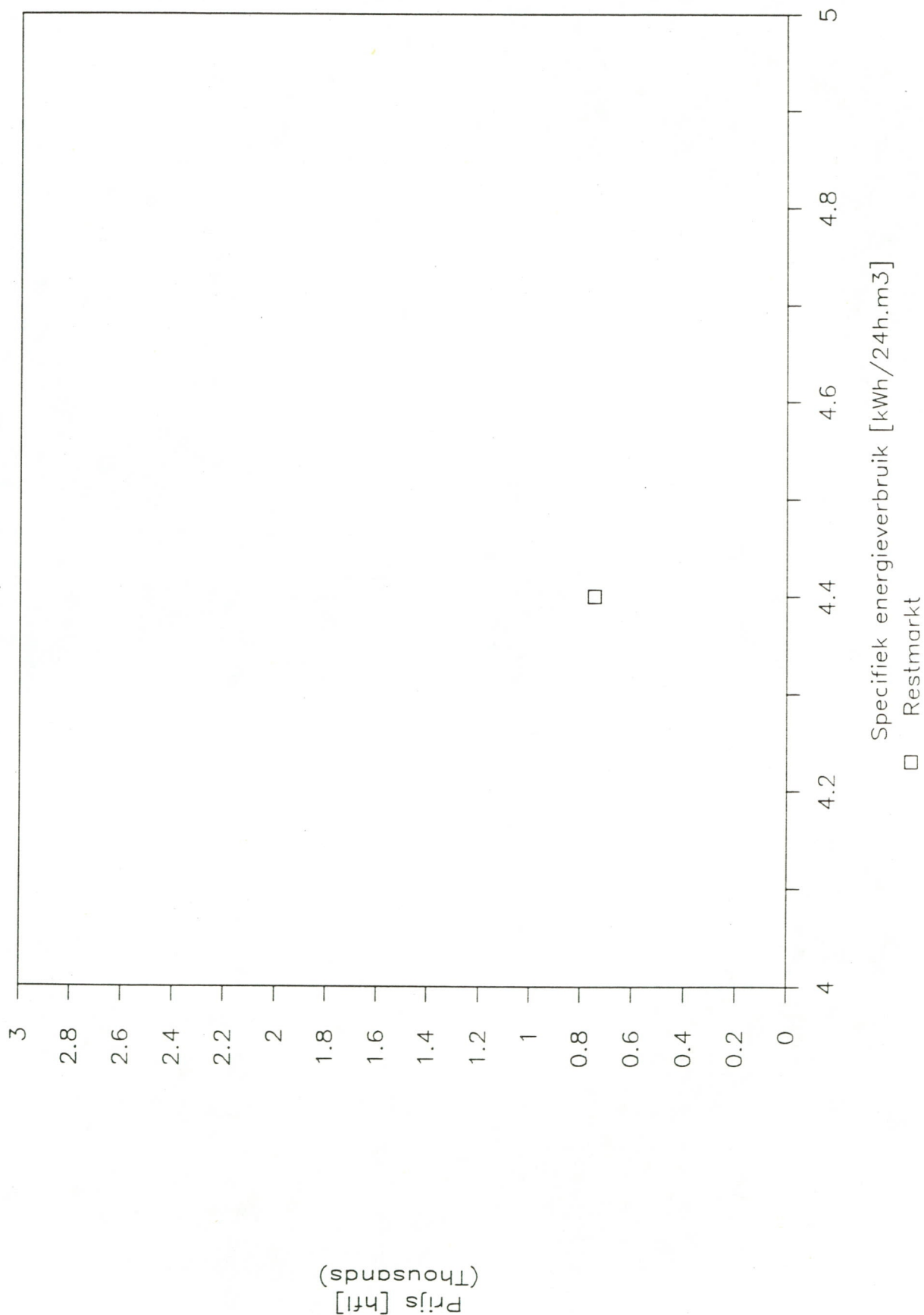
NUL STERREN, GRENSLIJN 1



Figuur 18 Economisch gevolg van grenslijn 1
Onderbouw koelkasten, 0*, volumecategorie 100 t/m 150 liter

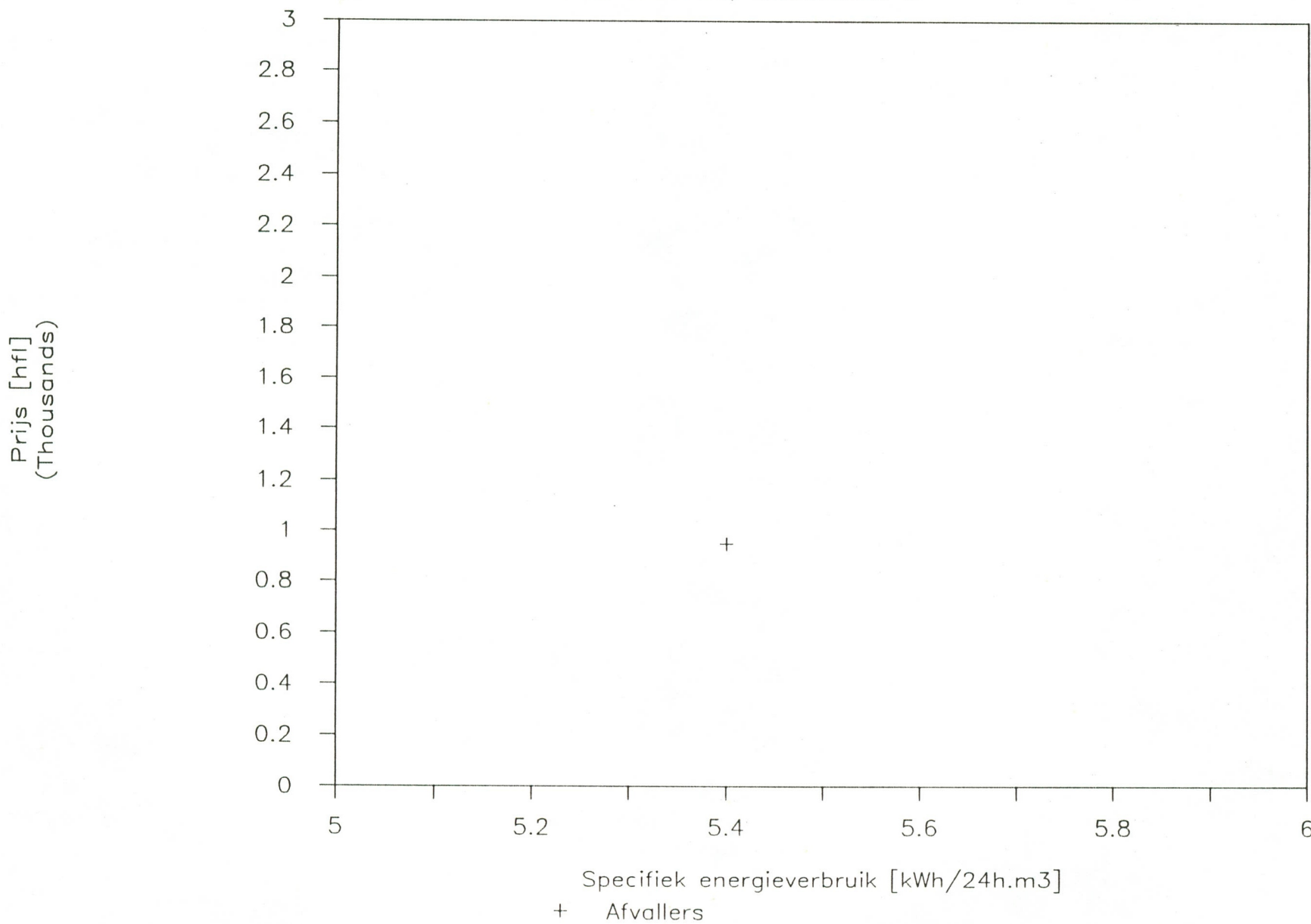
VRIJSTAANDE KOELKASTEN 90-91, 151 T/M 200 LITER

NUL STERREN, GRENSLIJN 1



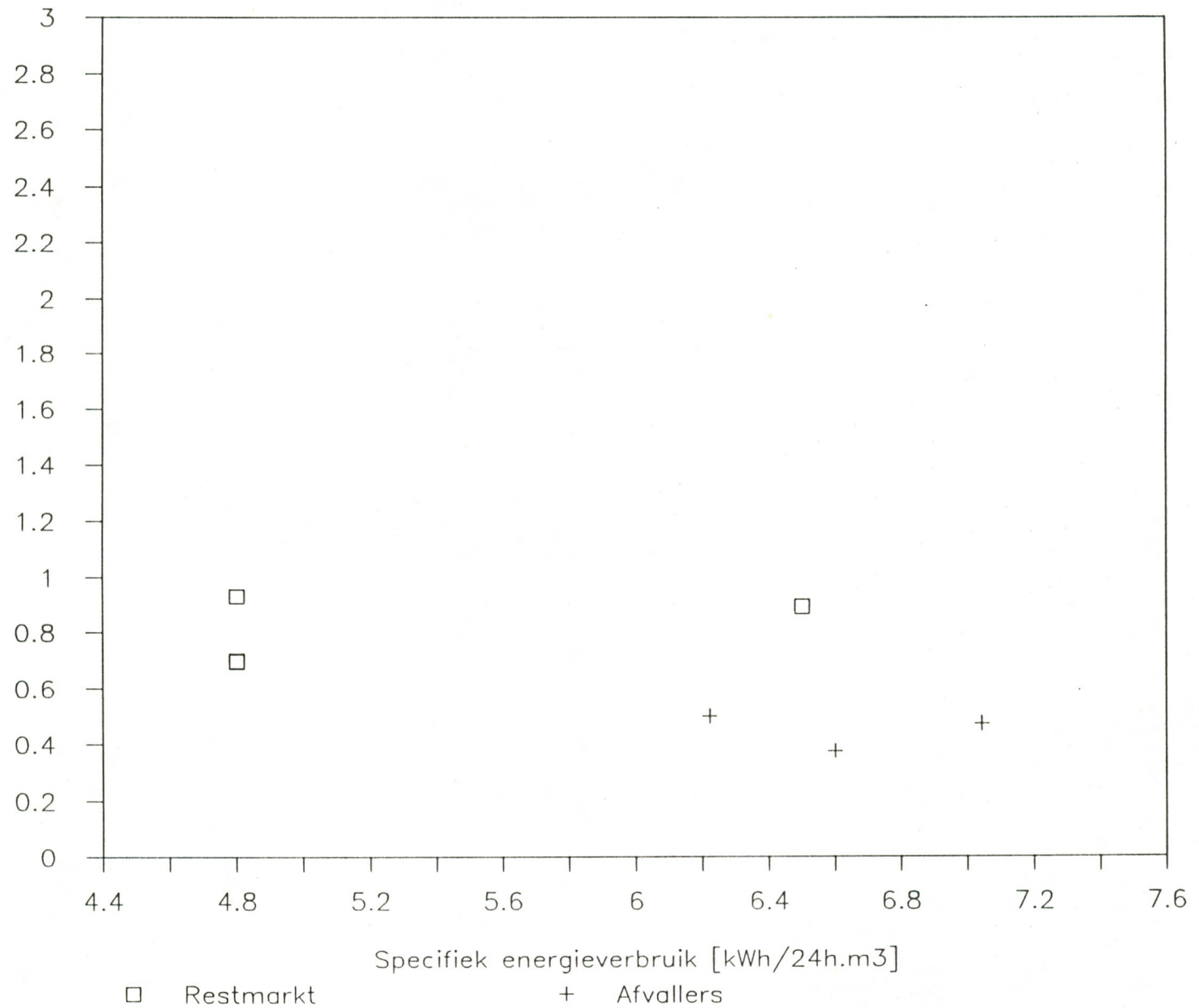
Figuur 19 Economisch gevolg van grenslijn 1
Vrijstaande koelkasten, 0*, volumecategorie 151 t/m 200 liter

ONDERBOUW KOELKASTEN 90-91, 151 T/M 200 LITER
NUL STERREN, GRENSLIJN 1



Figuur 20 Economisch gevolg van grenslijn 1
Onderbouw koelkasten, 0*, volumecategorie 151 t/m 200 liter

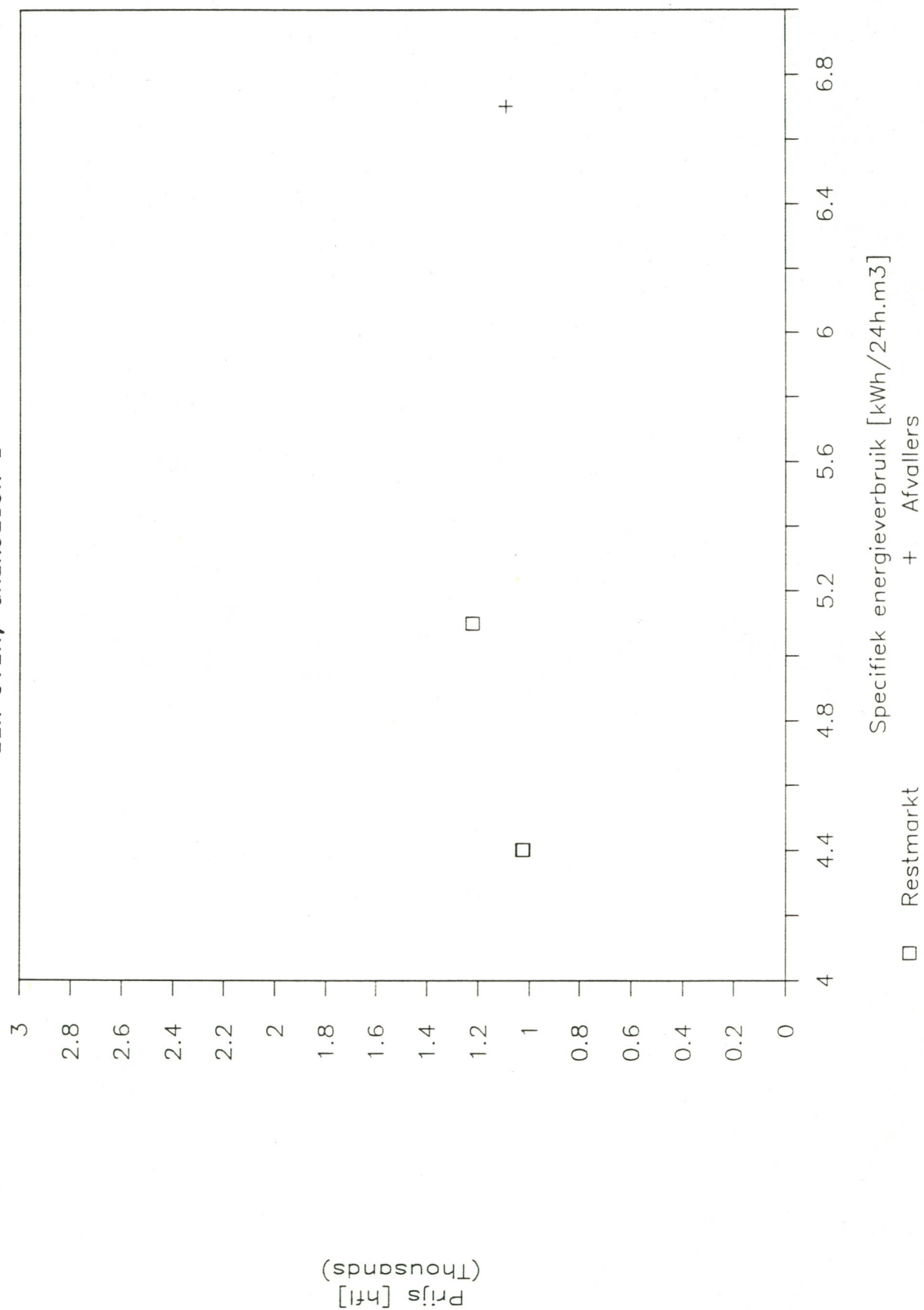
VRIJSTAANDE KOELKASTEN 90-91, 100 T/M 150 LITER EEN STER, GRENSLIJN 1



Figuur 21 Economisch gevolg van grenslijn 1
Vrijstaande koelkasten, 1*, volumecategorie 100 t/m 150 liter

ONDERBOUW KOELKASTEN 90-91, 100 T/M 150 LITER

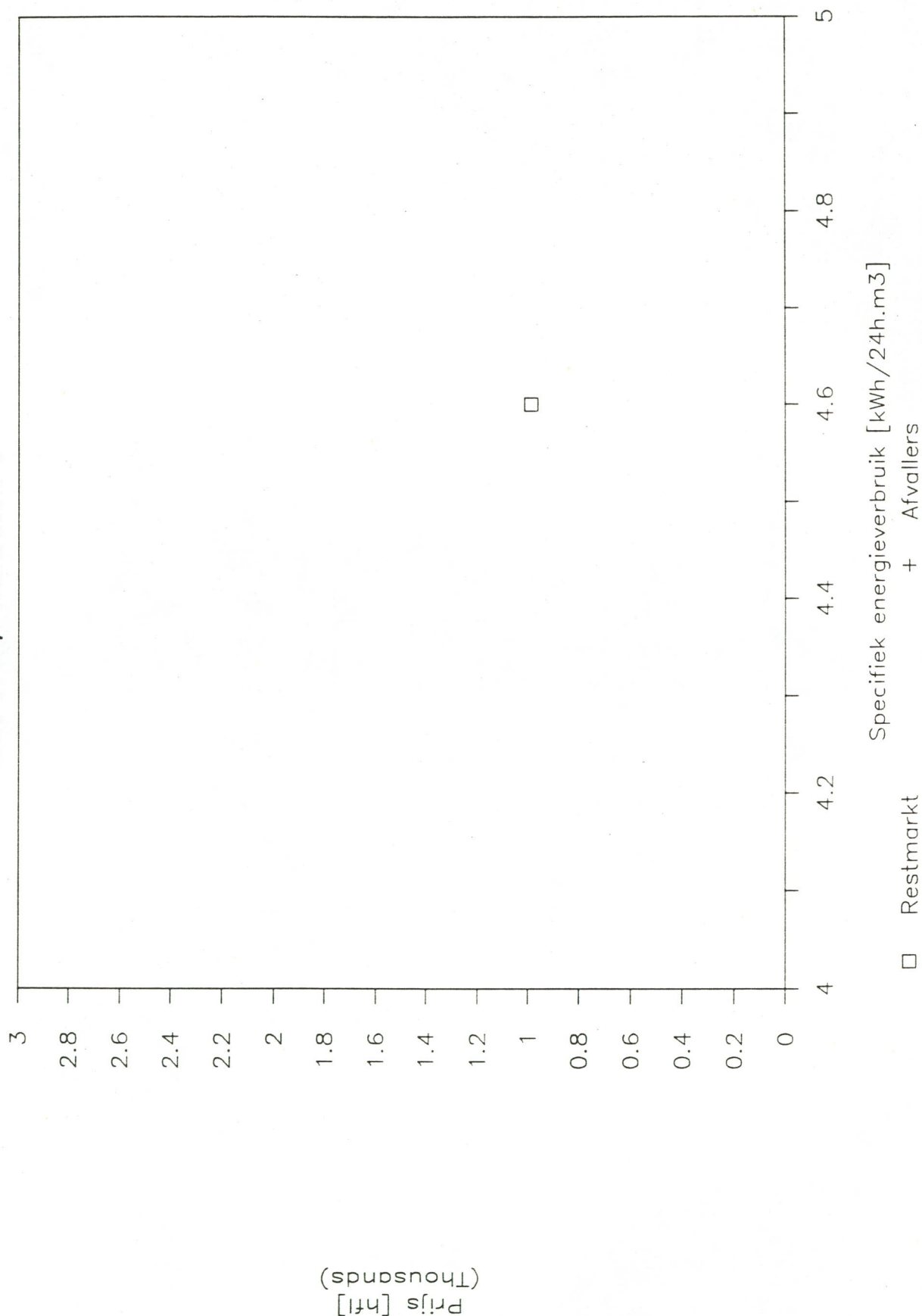
EEN STER, GRENSLIJN 1



Figuur 22 Economisch gevolg van grenslijn 1
Onderbouw koelkasten, 1*, volumecategorie 100 t/m 150 liter

VRIJSTAANDE KOELKASTEN 90-91, 151 T/M 200 LITER

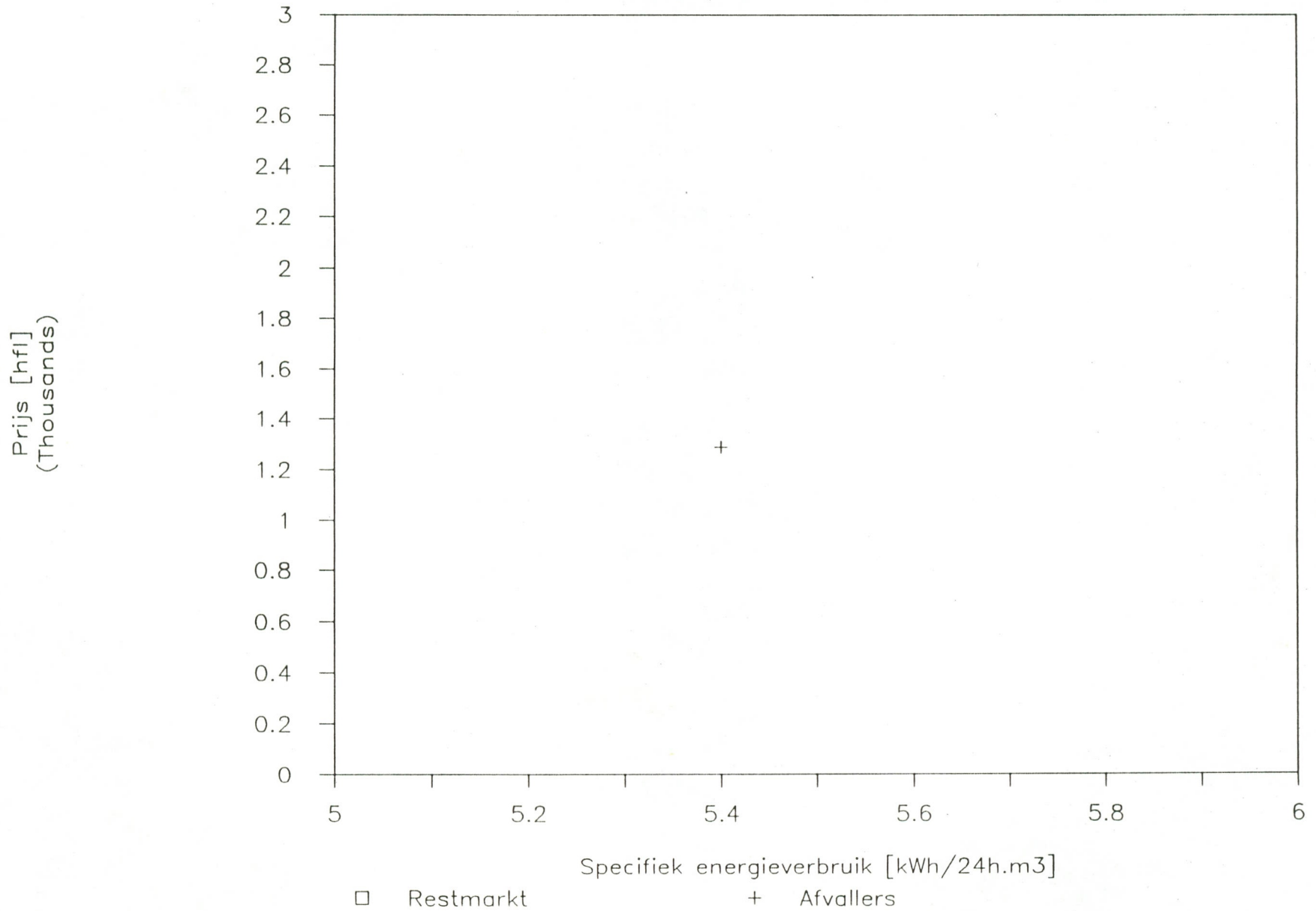
EEN STER, GRENSLIJN 1



Figuur 23 Economisch gevolg van grenslijn 1
Vrijstaande koelkasten, 1*, volumecategorie 151 t/m 200 liter

ONDERBOUW KOELKASTEN 90-91, 151 T/M 200 LITER

EEN STER, GRENSLIJN 1

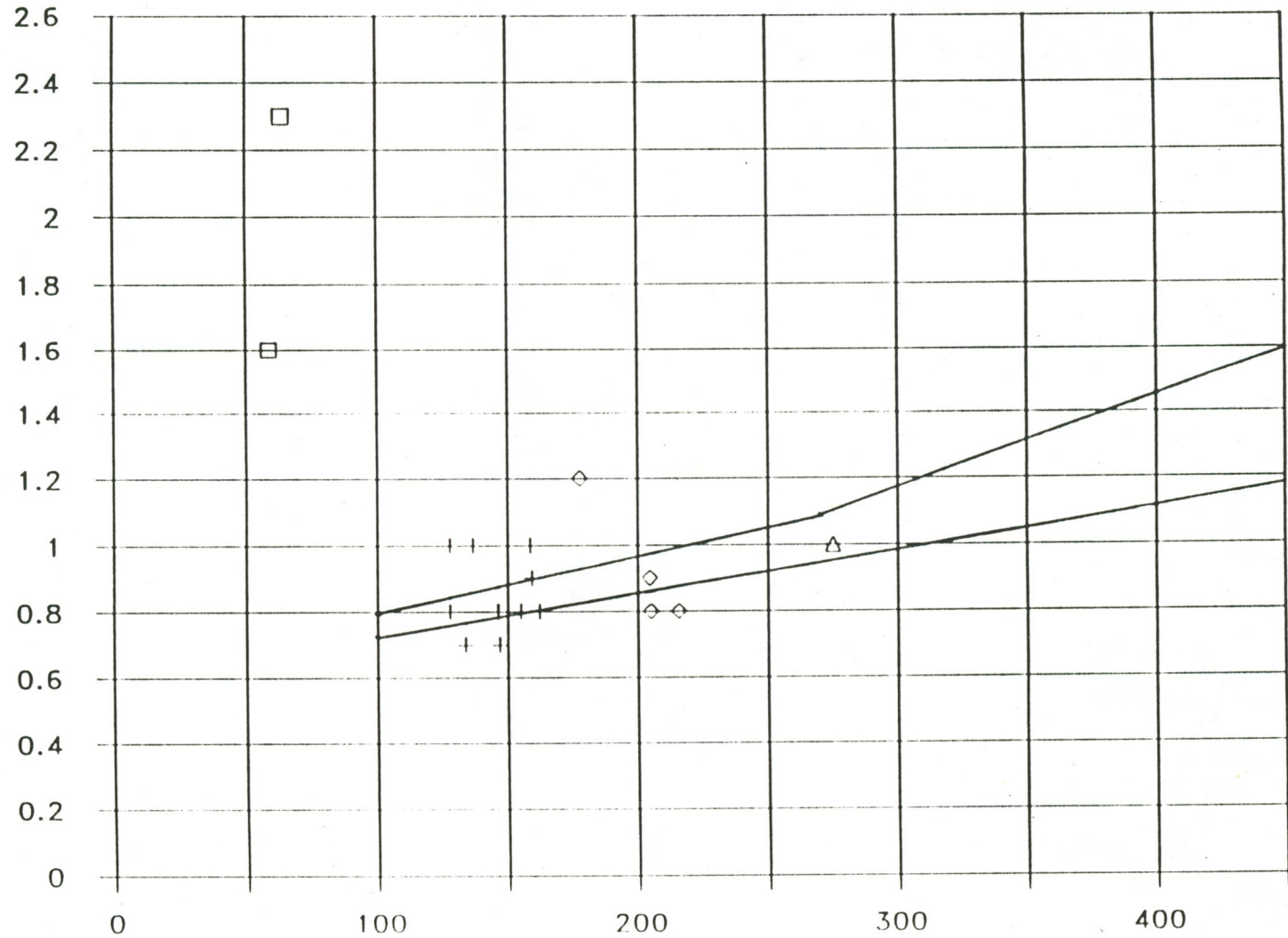


Figuur 24 Economisch gevolg van grenslijn 1
Onderbouw koelkasten, 1*, volumecategorie 151 t/m 200 liter

KOELKASTEN 90-91, TWEE STERREN

ENERGIEVERBRUIK VERSUS GECORRIGEERD VOLUME

ENERGIEVERBRUIK [kWh/24h]



GECORRIGEERD VOLUME [L]

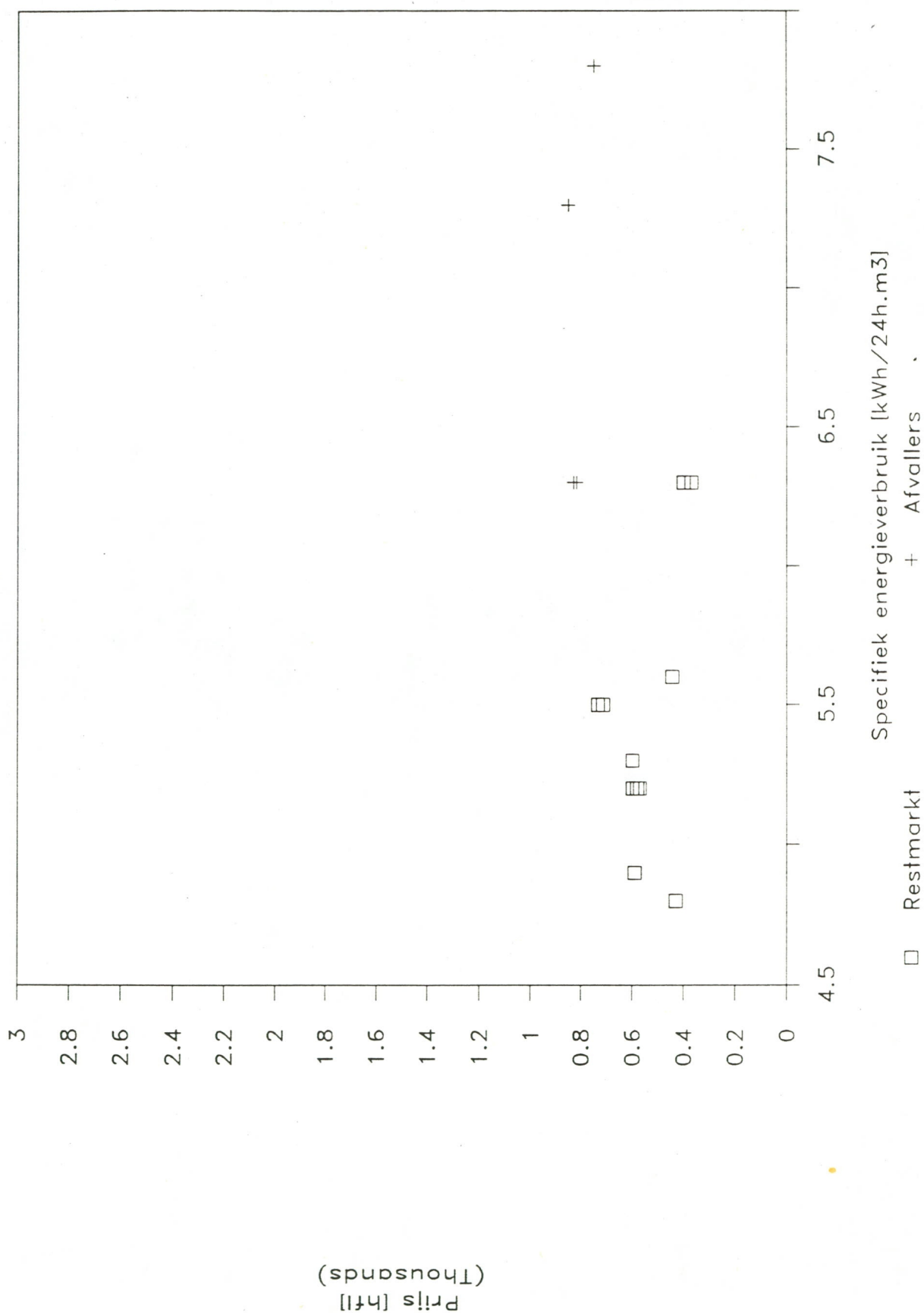
□ 0 TOT 100 LITER
 ◇ 151 T/M 200 LITER

+ 100 T/M 150 LITER
 △ 201 T/M 300 LITER

Figuur 25 Koelkasten met 2 sterren vriesvak: grenslijn 1 en 2

VRIJSTAANDE KOELKASTEN 90-91, 100 T/M 150 LITER

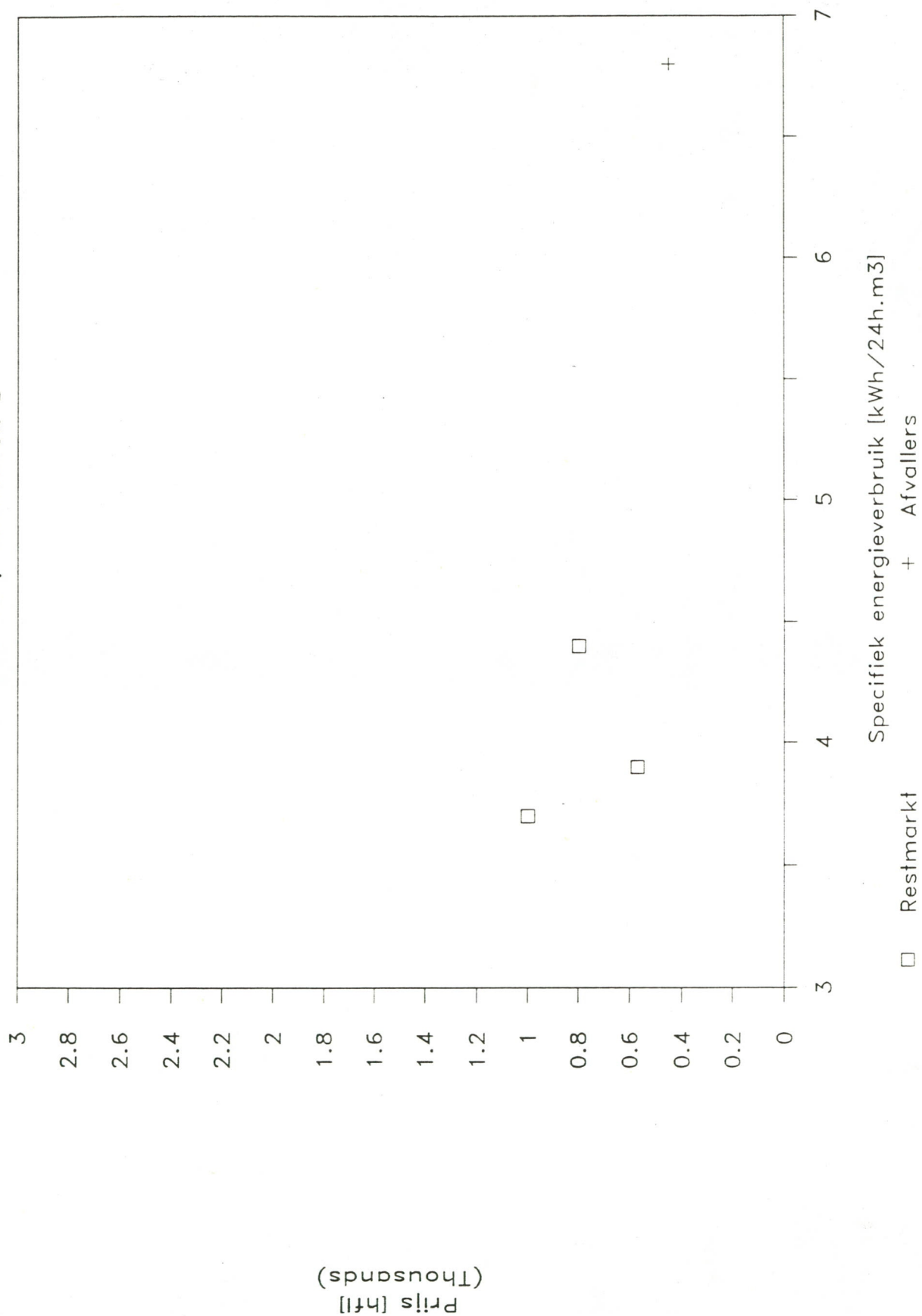
TWEE STERREN, GRENSLIJN 1



Figuur 26 Economisch gevolg van grenslijn 1
Vrijstaande koelkasten, 2*, volumecategorie 100 t/m 150 liter

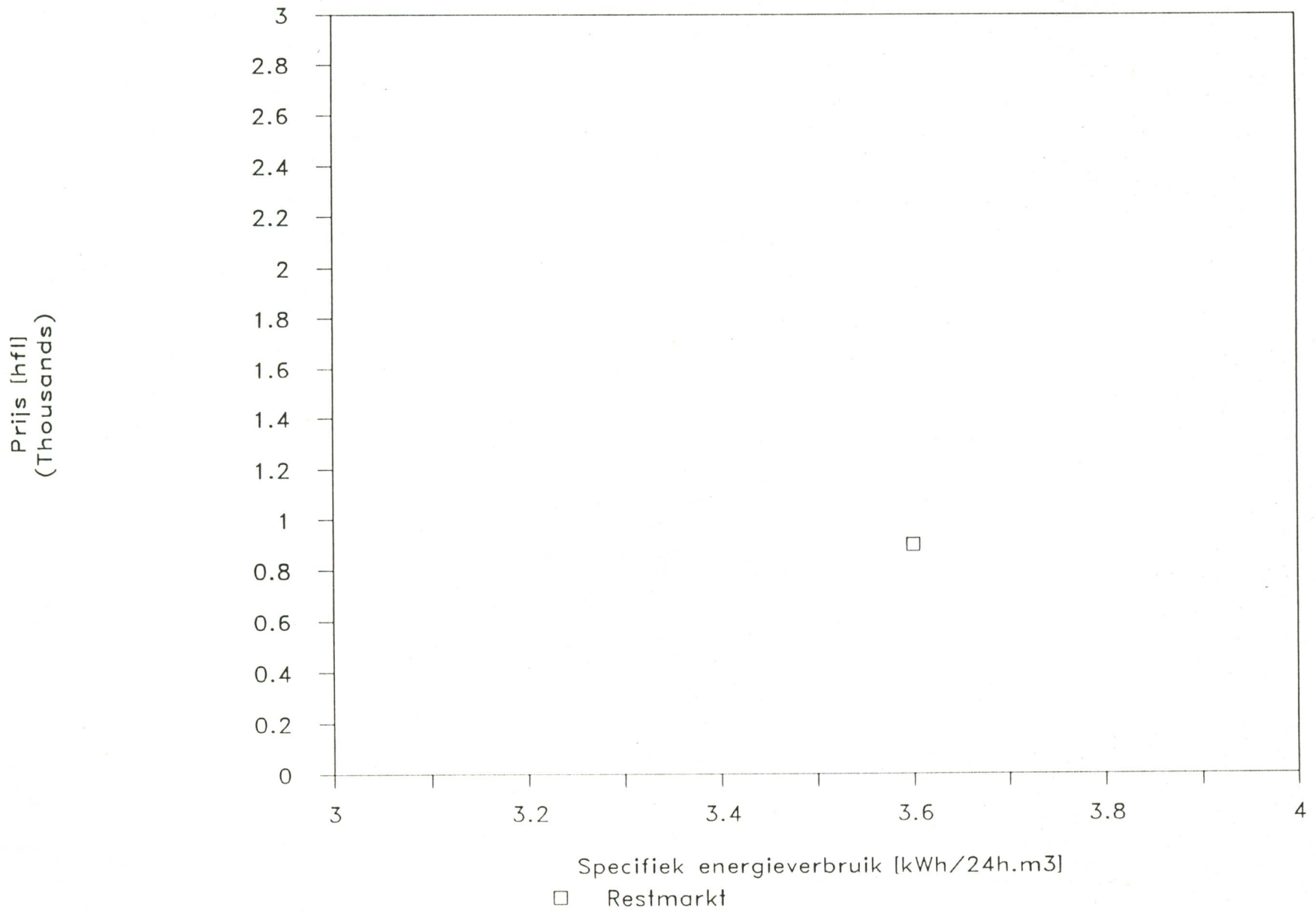
VRIJSTAANDE KOELKASTEN 90-91, 151 T/M 200 LITER

TWEE STERREN, GRENSLIJN 1



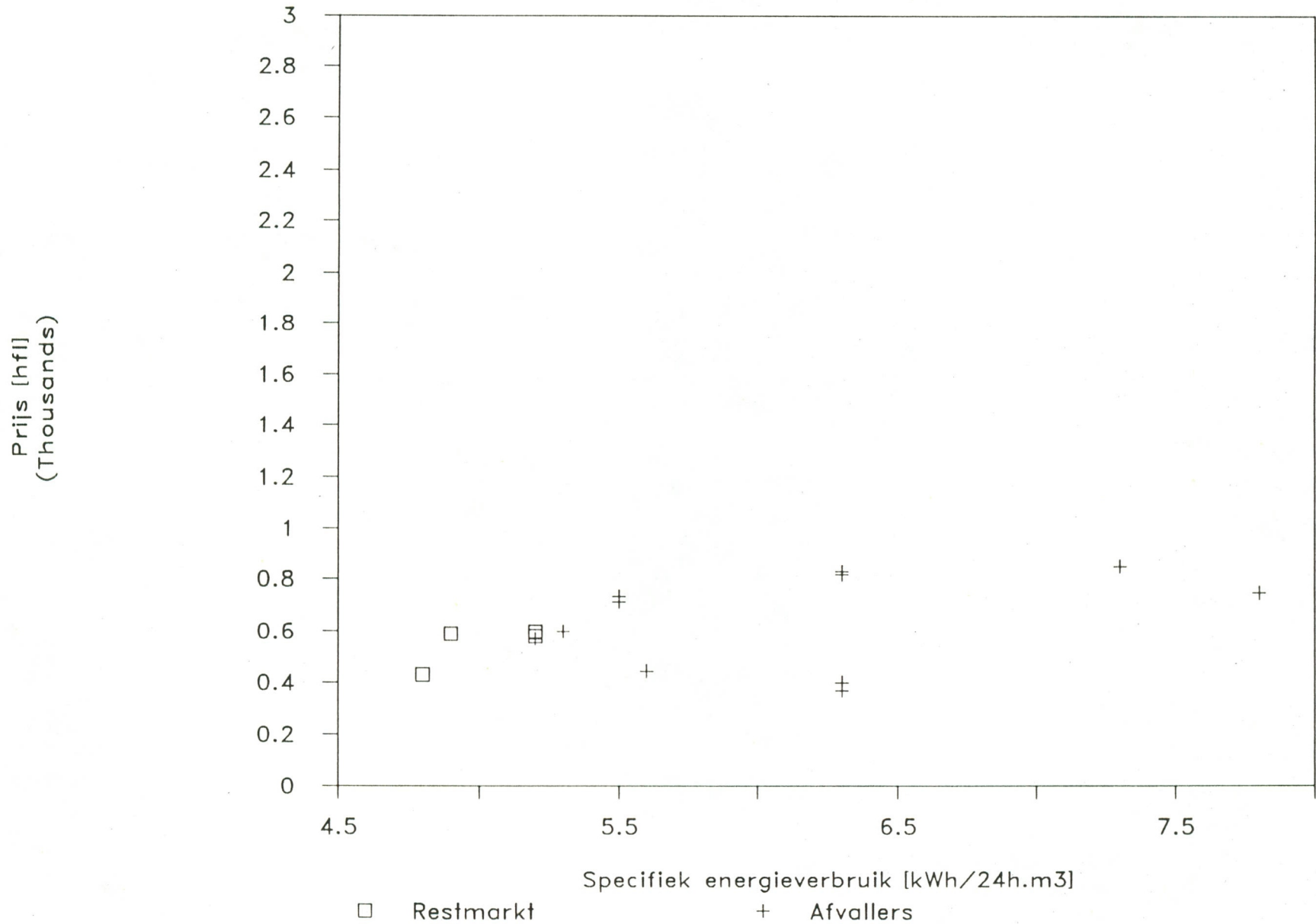
Figuur 27 Economisch gevolg van grenslijn 1
 Vrijstaande koelkasten, 2*, volumecategorie 151 t/m 200 liter

VRIJSTAANDE KOELKASTEN 90-91, 201 T/M 300 LITER
TWEE STERREN, GRENSLIJN 1



Figuur 28 Economisch gevolg van grenslijn 1
Vrijstaande koelkasten, 2*, volumecategorie 201 t/m 300 liter

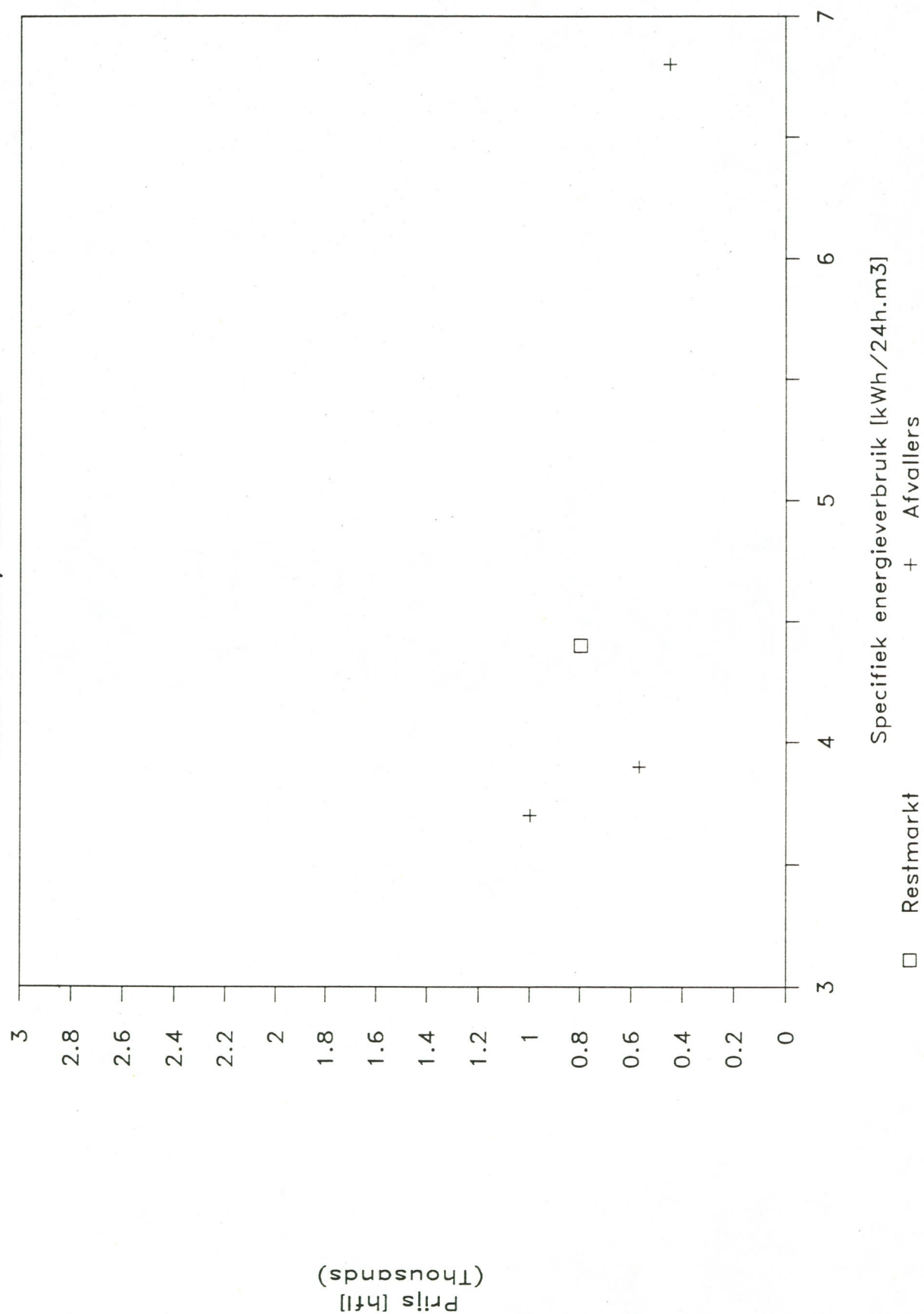
VRIJSTAANDE KOELKASTEN 90-91, 100 T/M 150 LITER TWEE STERREN, GRENSLIJN 2



Figuur 29 Economisch gevolg van grenslijn 2
Vrijstaande koelkasten, 2*, volumecategorie 100 t/m 150 liter

VRIJSTAANDE KOELKASTEN 90-91, 151 T/M 200 LITER

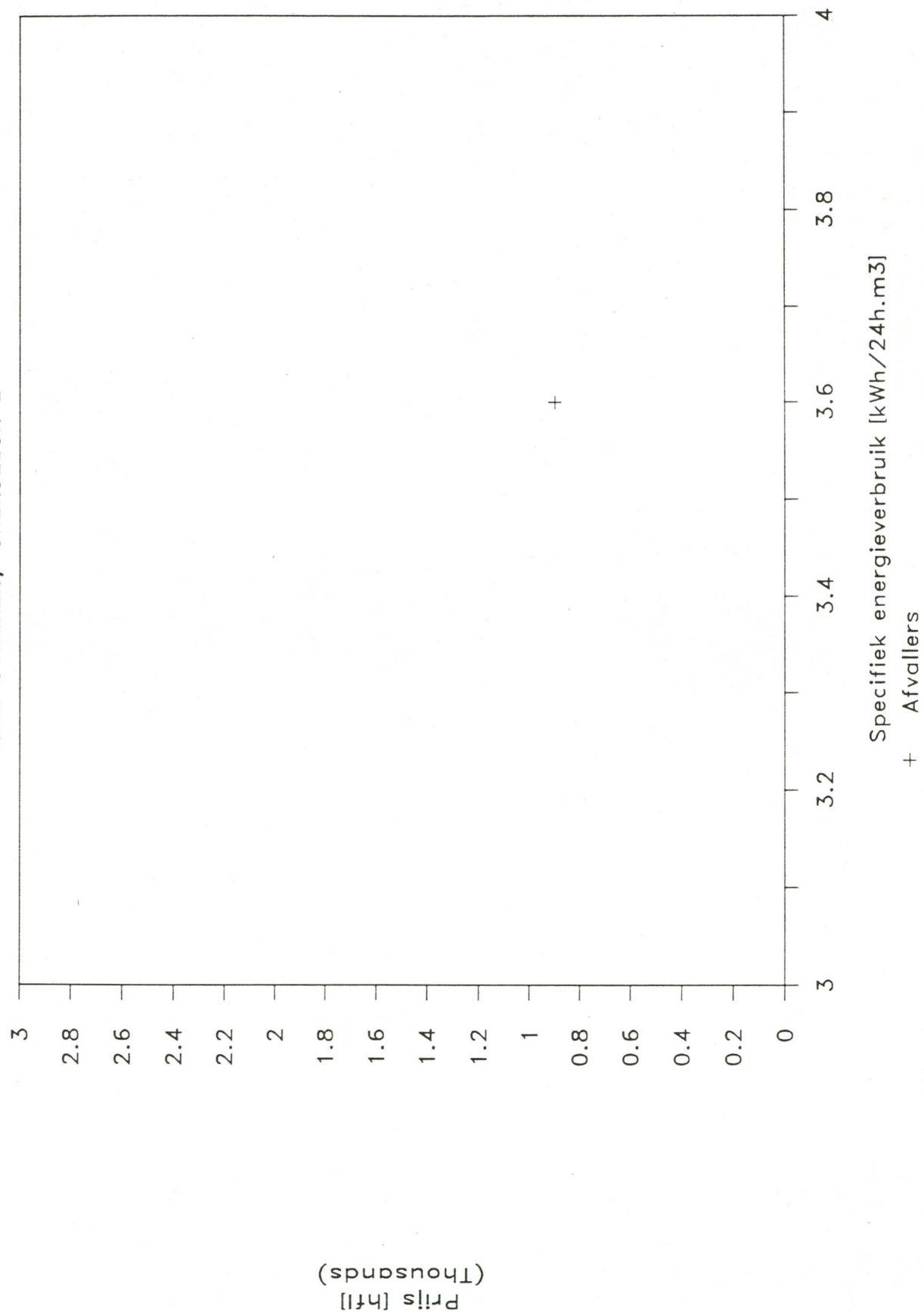
TWEE STERREN, GRENSLIJN 2



Figuur 30 Economisch gevolg van grenslijn 2
Vrijstaande koelkasten, 2*, volumecategorie 151 t/m 200 liter

VRIJSTAANDE KOELKASTEN 90-91, 201 T/M 300 LITER

TWEE STERREN, GRENSLIJN 2

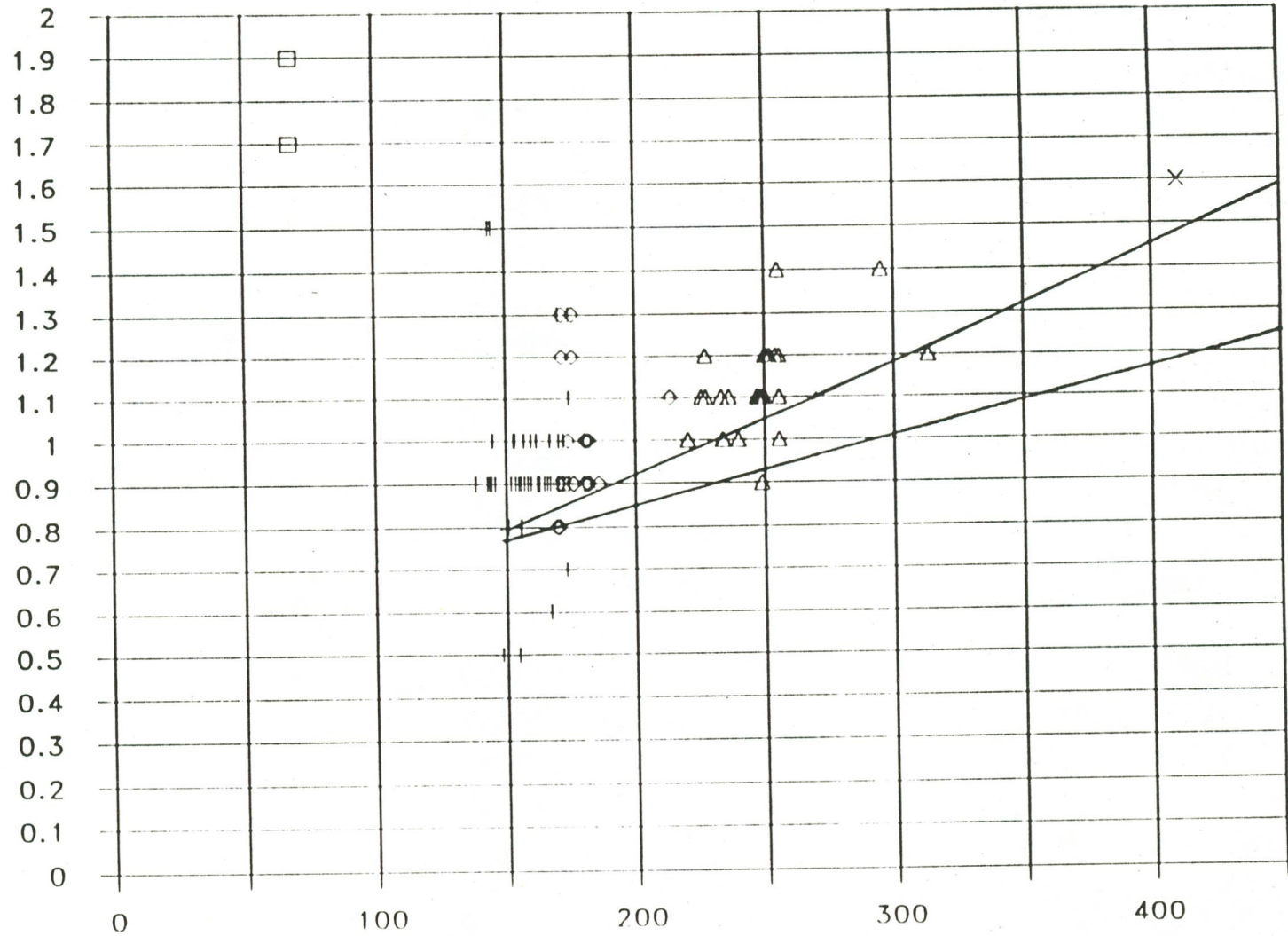


Figuur 31 Economisch gevolg van grenslijn 2
Vrijstaande koelkasten, 2*, volumecategorie 201 t/m 300 liter

KOELKASTEN 90-91, DRIE STERREN

ENERGIEVERBRUIK VERSUS GECORRIGEERD VOLUME

ENERGIEVERBRUIK [kWh/24h]



GRENSLIJN 1

GRENSLIJN 2

□ 0 TOT 100 LITER

+ 100 T/M 150 LITER

◇ 151 T/M 200 LITER

△ 201 T/M 300 LITER

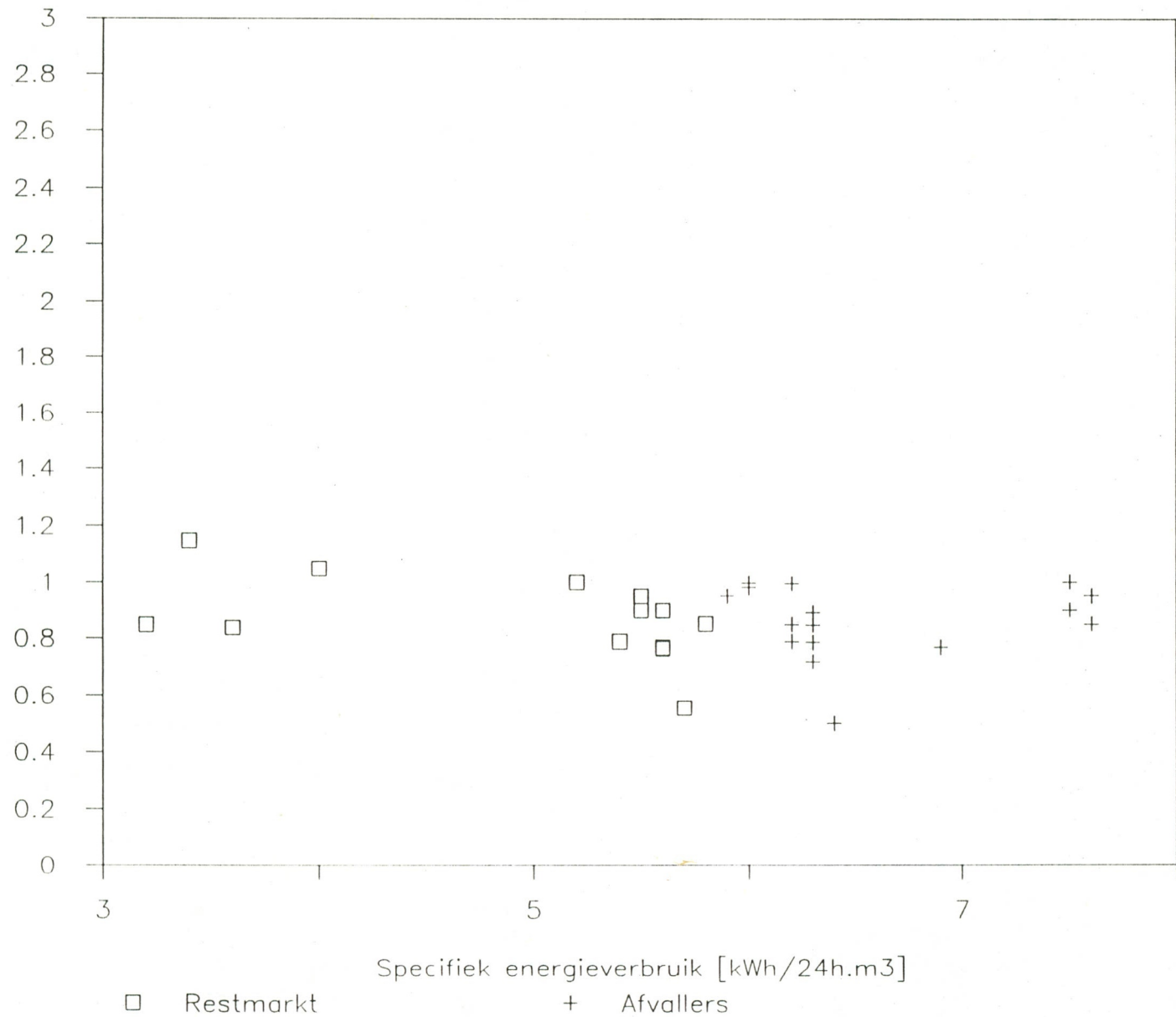
× 301 T/M 450 LITER

GE Corrigeerd VOLUME [l]

Figuur 32 Koelkasten met 3 sterren vriesvak: grenslijn 1 en 2

VRIJSTAANDE KOELKASTEN 90-91, 100 T/M 150 LITER DRIE STERREN, GRENSLIJN 1

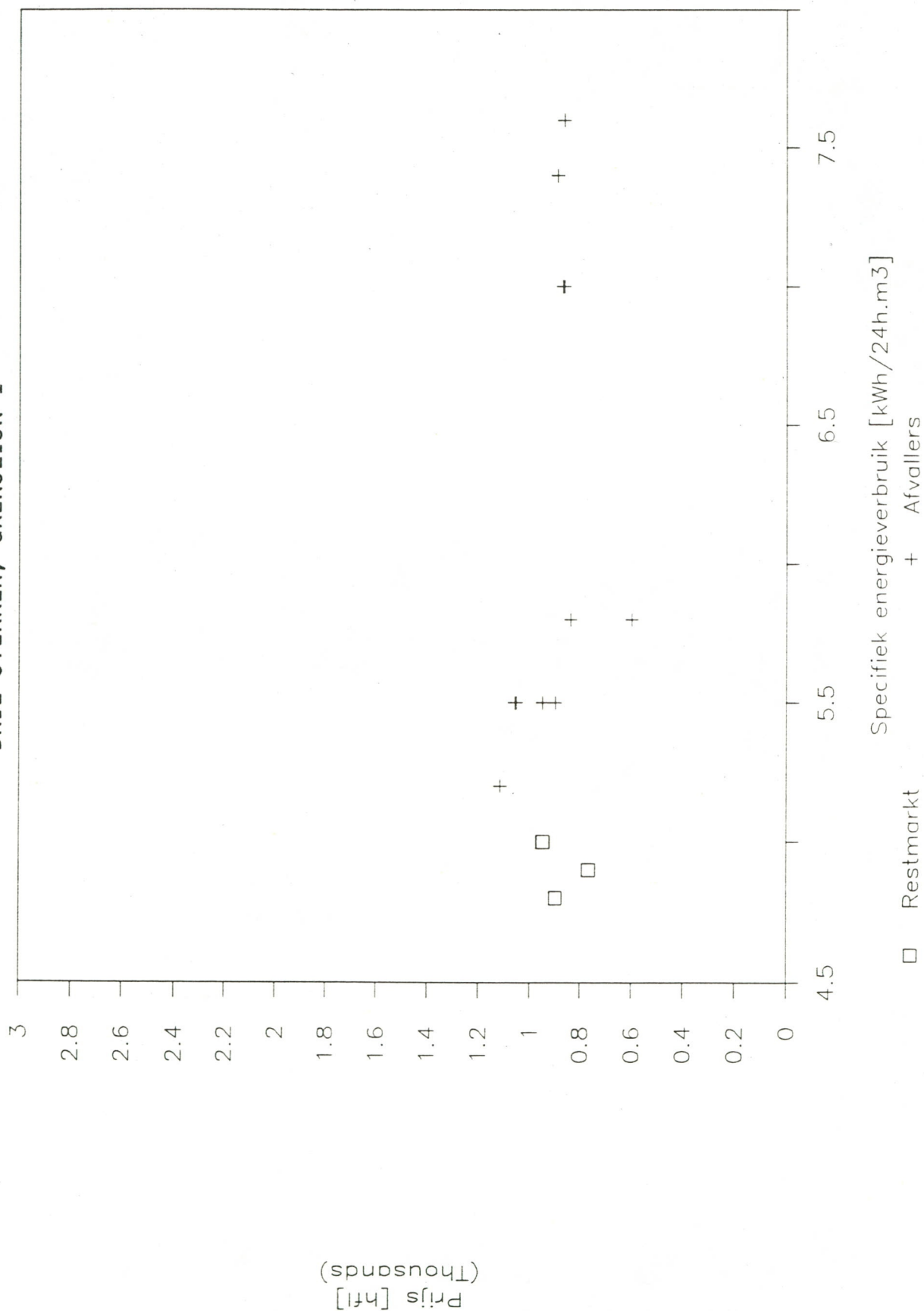
Prijs [hfl]
(Thousands)



Figuur 33 Economisch gevolg van grenslijn 1
Vrijstaande koelkasten, 3*, volumecategorie 100 t/m 150 liter

VRIJSTAANDE KOELKASTEN 90-91, 151 T/M 200 LITER

DRIE STERREN, GRENSLIJN 1

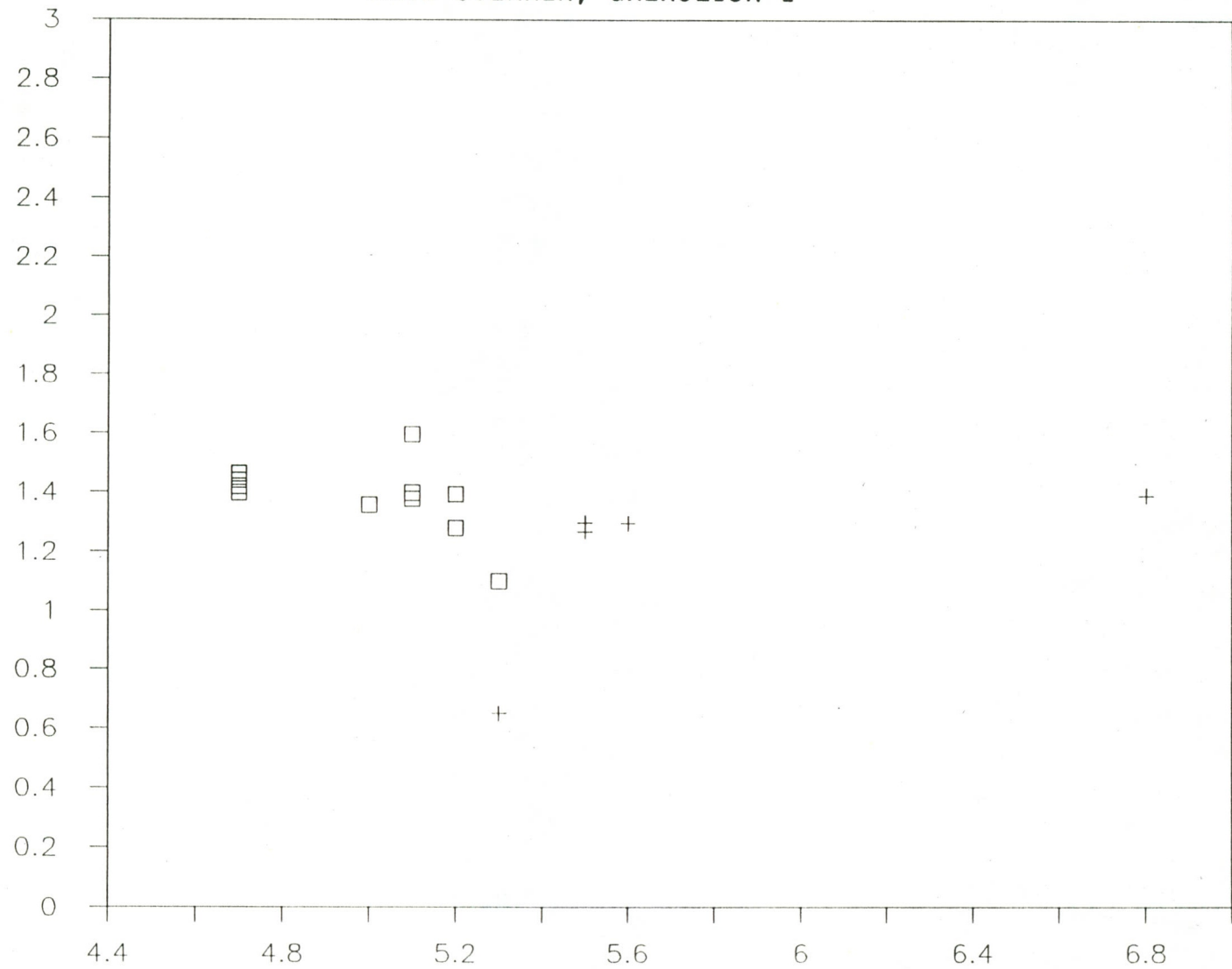


Figuur 35 Economisch gevolg van grenslijn 1
Vrijstaande koelkasten, 3*, volumecategorie 151 t/m 200 liter

ONDERBOUW KOELKASTEN 90-91, 151 T/M 200 LITER

DRIE STERREN, GRENSLIJN 1

Prijs
[hfl] s(h)dund(s)



Specifiek energieverbruik [kWh/24h.m3]

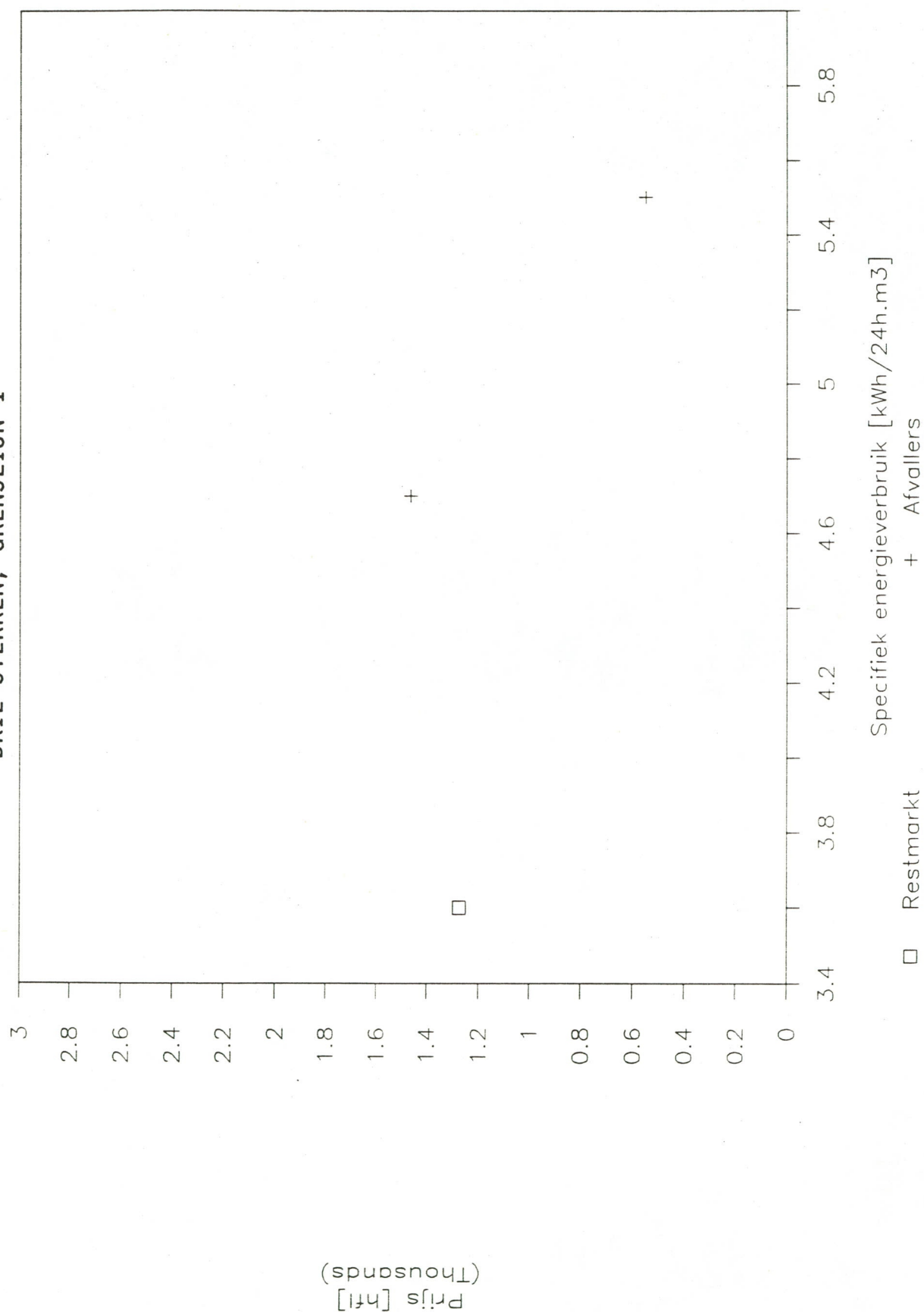
□ Restmarkt

+ Afvallers

Figuur 36 Economisch gevolg van grenslijn 1
Onderbouw koelkasten, 3*, volumecategorie 151 t/m 200 liter

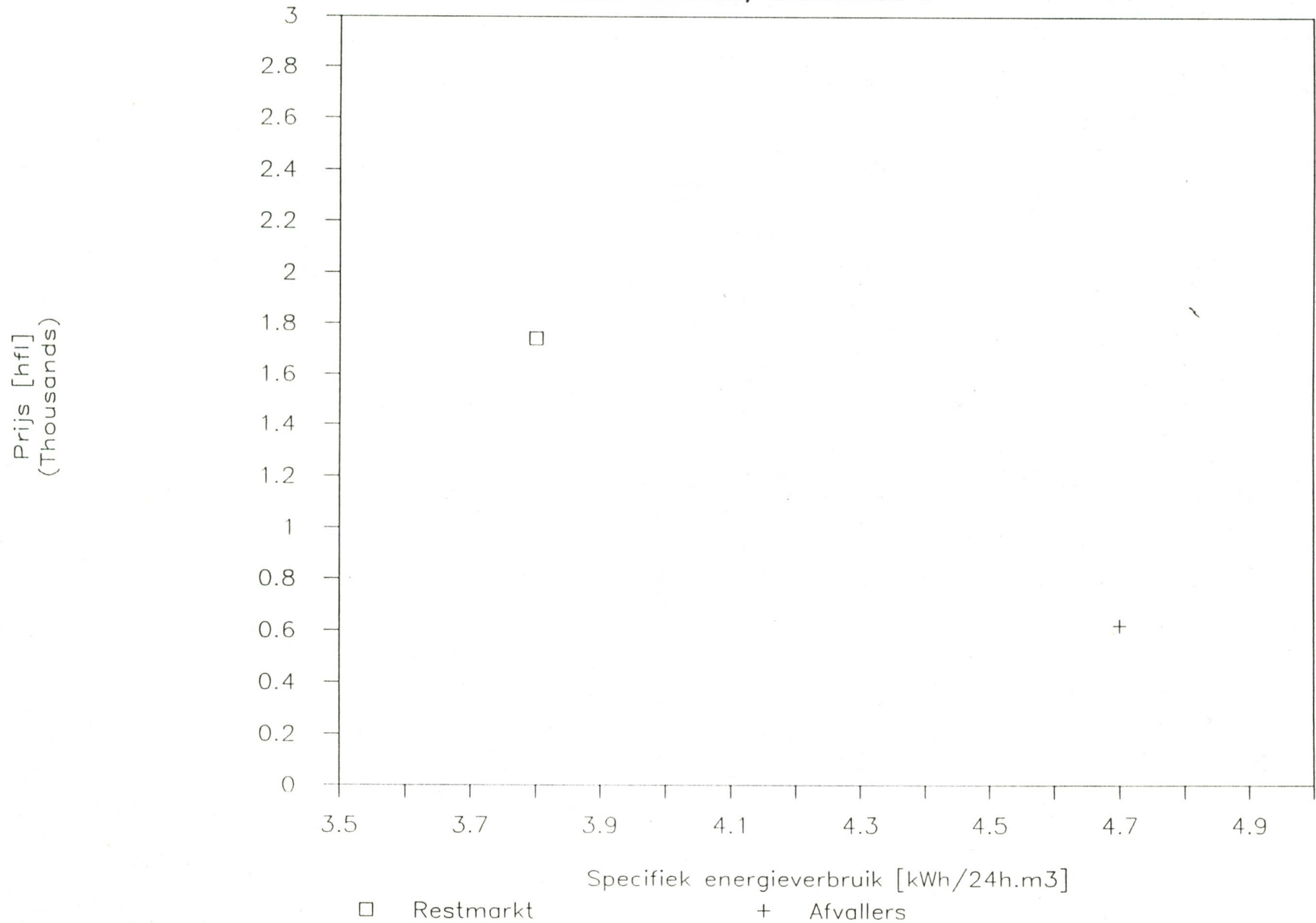
VRIJSTAANDE KOELKASTEN 90-91, 201 T/M 300 LITER

DRIE STERREN, GRENSLIJN 1



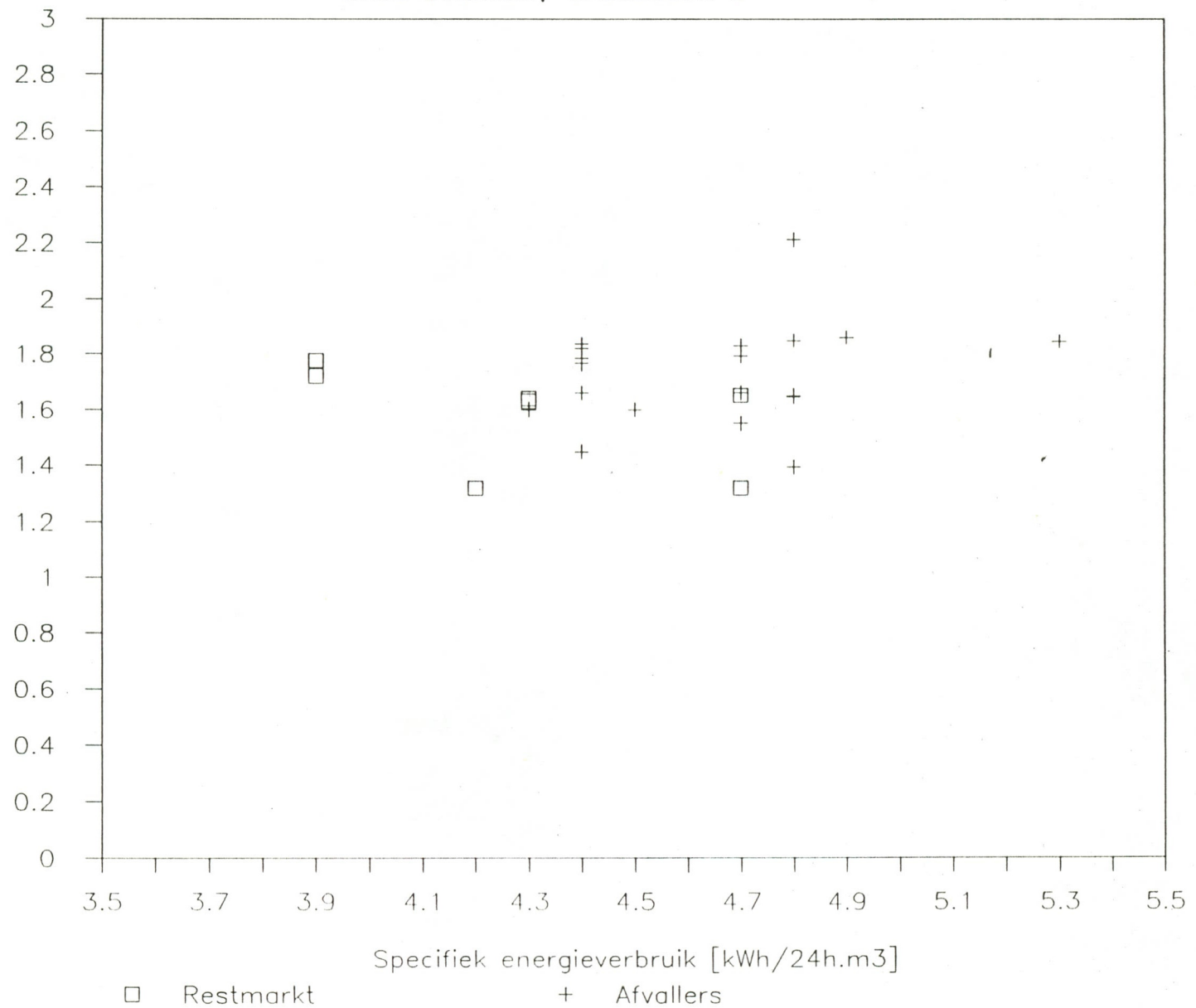
Figuur 37 Economisch gevolg van grenslijn 1
 Vrijstaande koelkasten, 3*, volumecategorie 201 t/m 300 liter
 $0 \leq V_{\text{gecorr.}} \leq 269$ liter

VRIJSTAANDE KOELKASTEN 90-91, 201 T/M 300 LITER DRIE STERREN, GRENSLIJN 1



Figuur 38 Economisch gevolg van grenslijn 1
Vrijstaande koelkasten, 3*, volumecategorie 201 t/m 300 liter
Vgecorr. $\approx$ 269 liter

ONDERBOUW KOELKASTEN 90-91, 201 T/M 300 LITER DRIE STERREN, GRENSLIJN 1

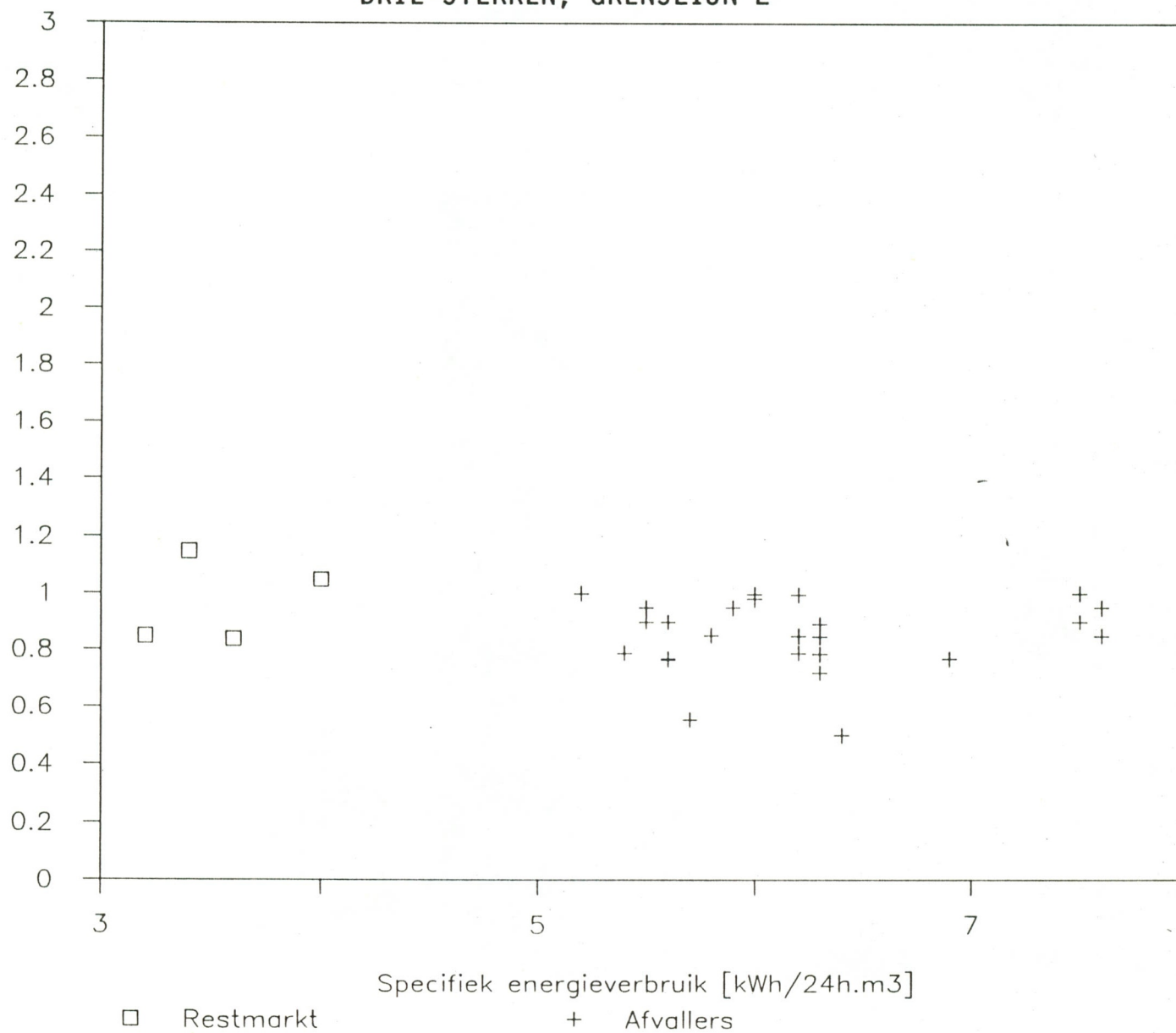


Figuur 39 Economisch gevolg van grenslijn 1
Onderbouw koelkasten, 3*, volumecategorie 201 t/m 300 liter
0 ≤ Vgecorr. ≤ 269 liter

Prijs [spuansnd]
[hfl]

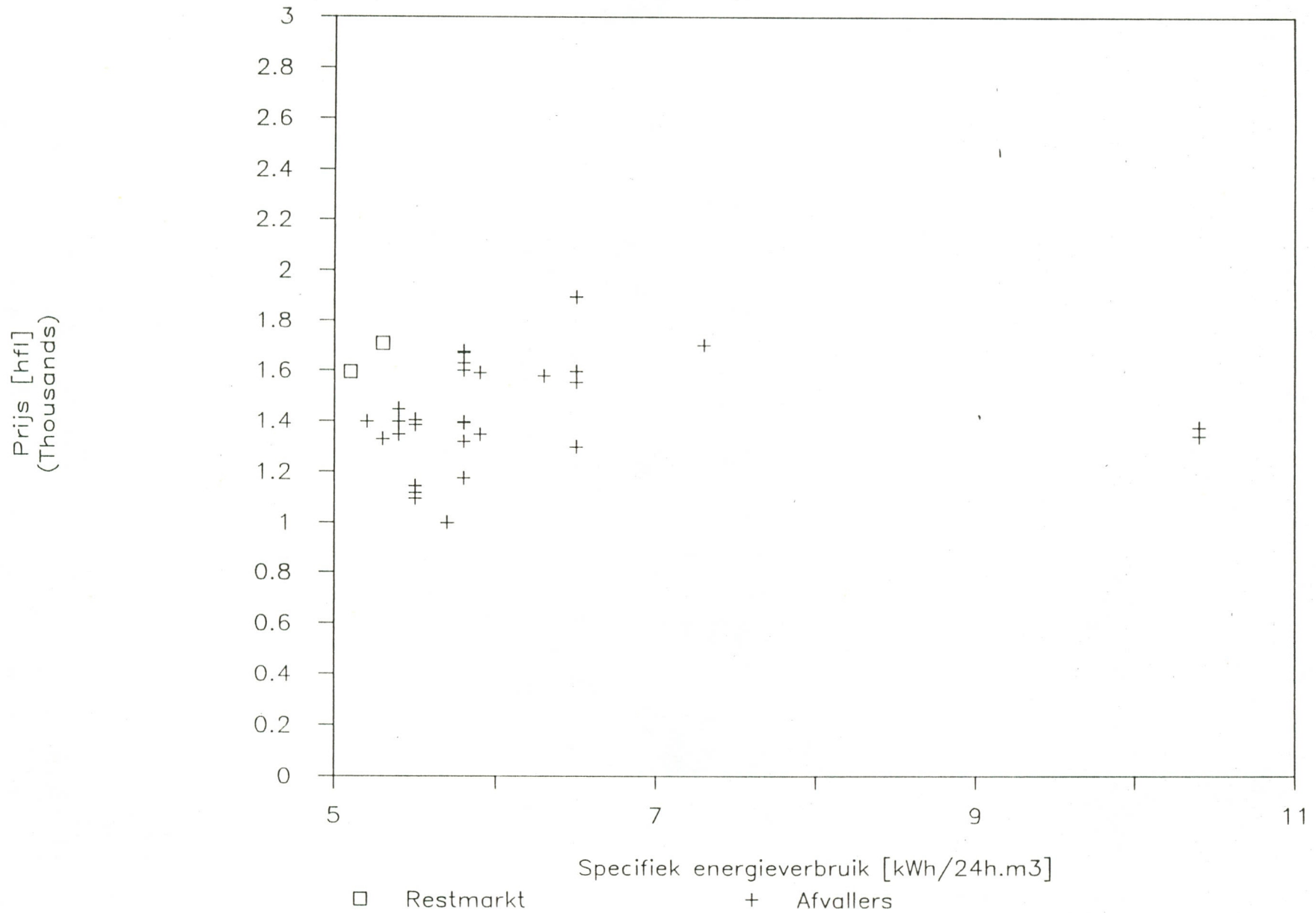
Specifiek energieverbruik [kWh/24h.m3]

VRIJSTAANDE KOELKASTEN 90-91, 100 T/M 150 LITER DRIE STERREN, GRENSLIJN 2



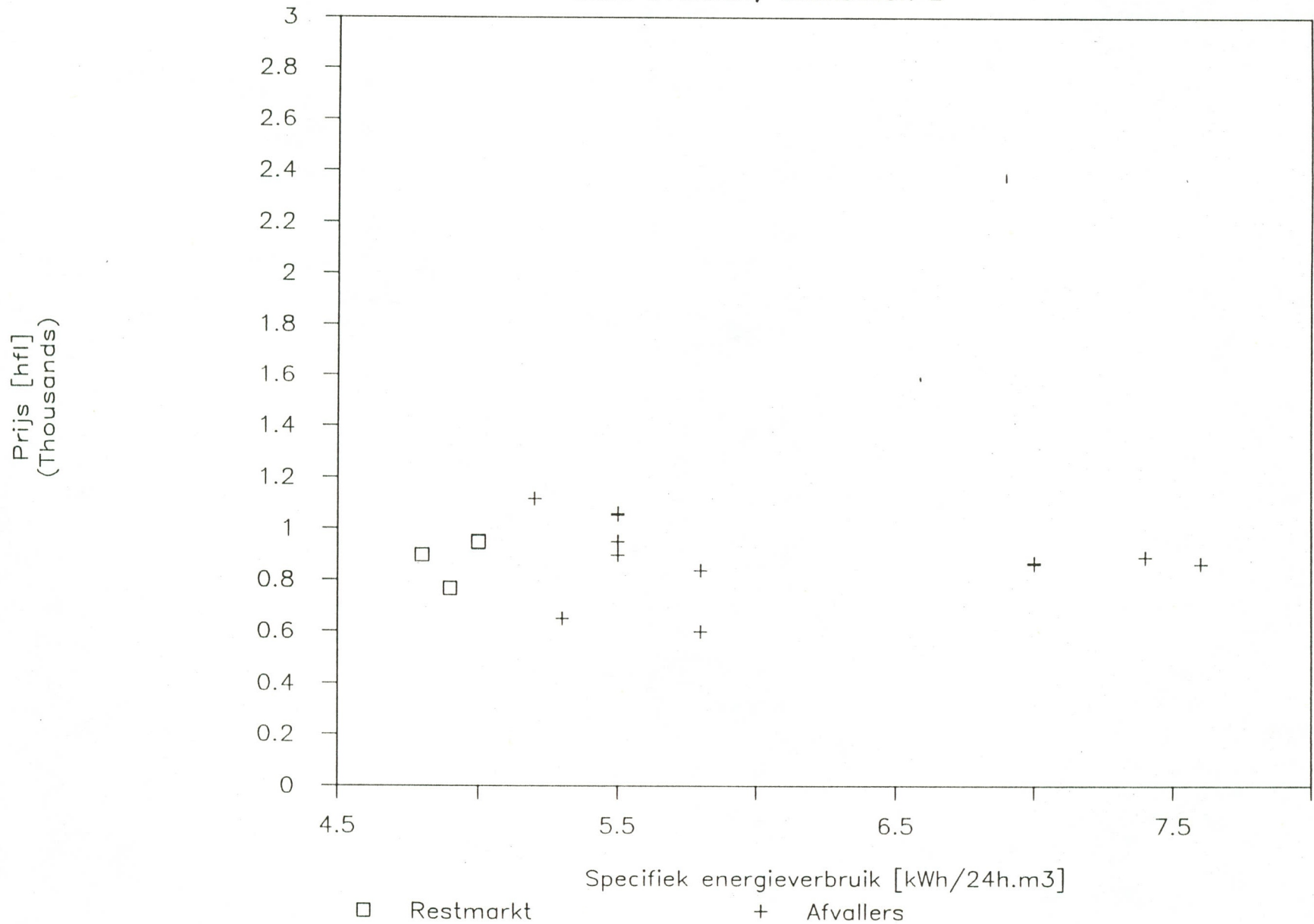
Figuur 40 Economisch gevolg van grenslijn 2
Vrijstaande koelkasten, 3*, volumecategorie 100 t/m 150 liter

ONDERBOUW KOELKASTEN 90-91, 100 T/M 150 LITER DRIE STERREN, GRENSLIJN 2



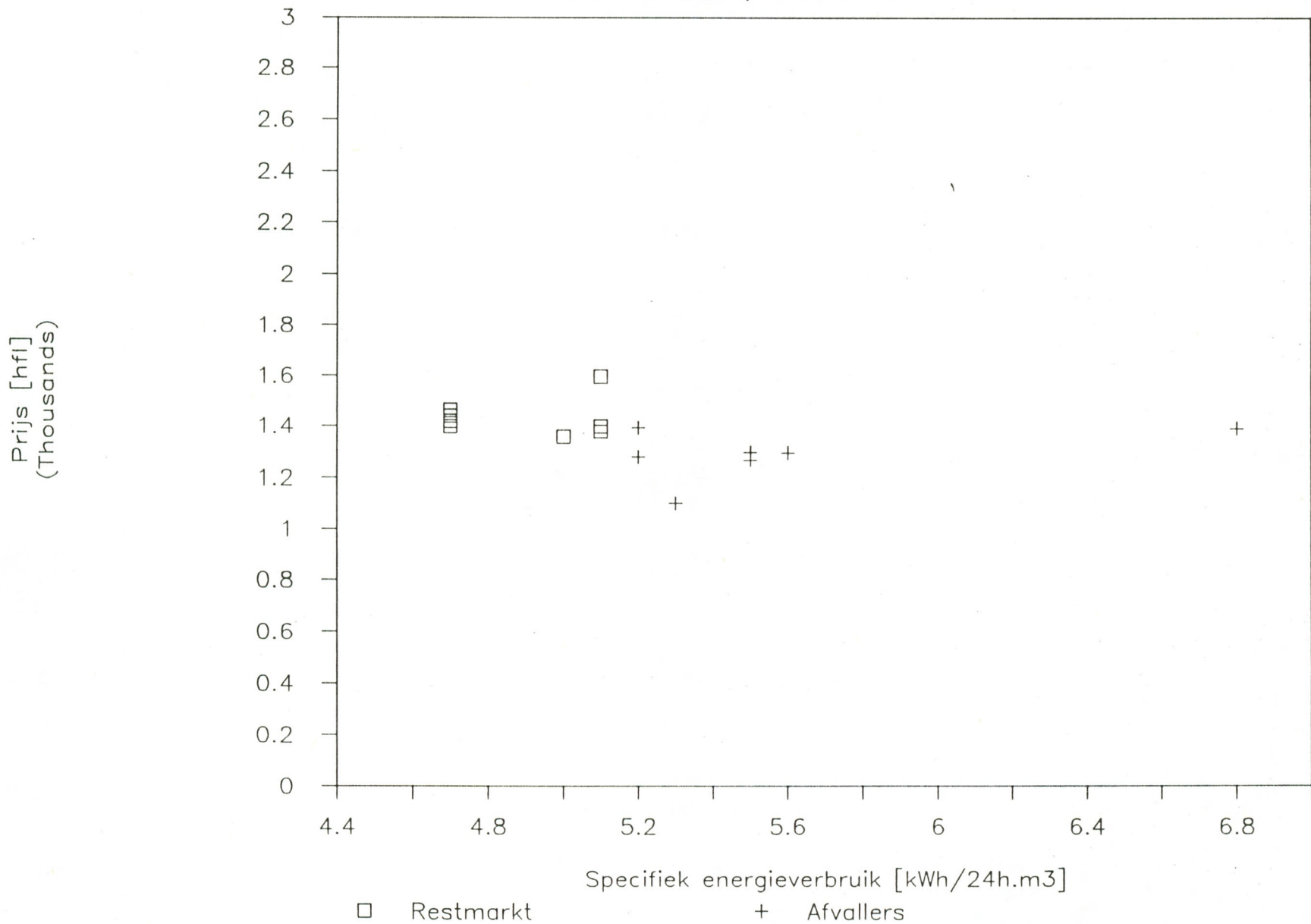
Figuur 41 Economisch gevolg van grenslijn 2.
Onderbouw koelkasten, 3*, volumecategorie 100 t/m 150 liter

VRIJSTAANDE KOELKASTEN 90-91, 151 T/M 200 LITER DRIE STERREN, GRENSLIJN 2



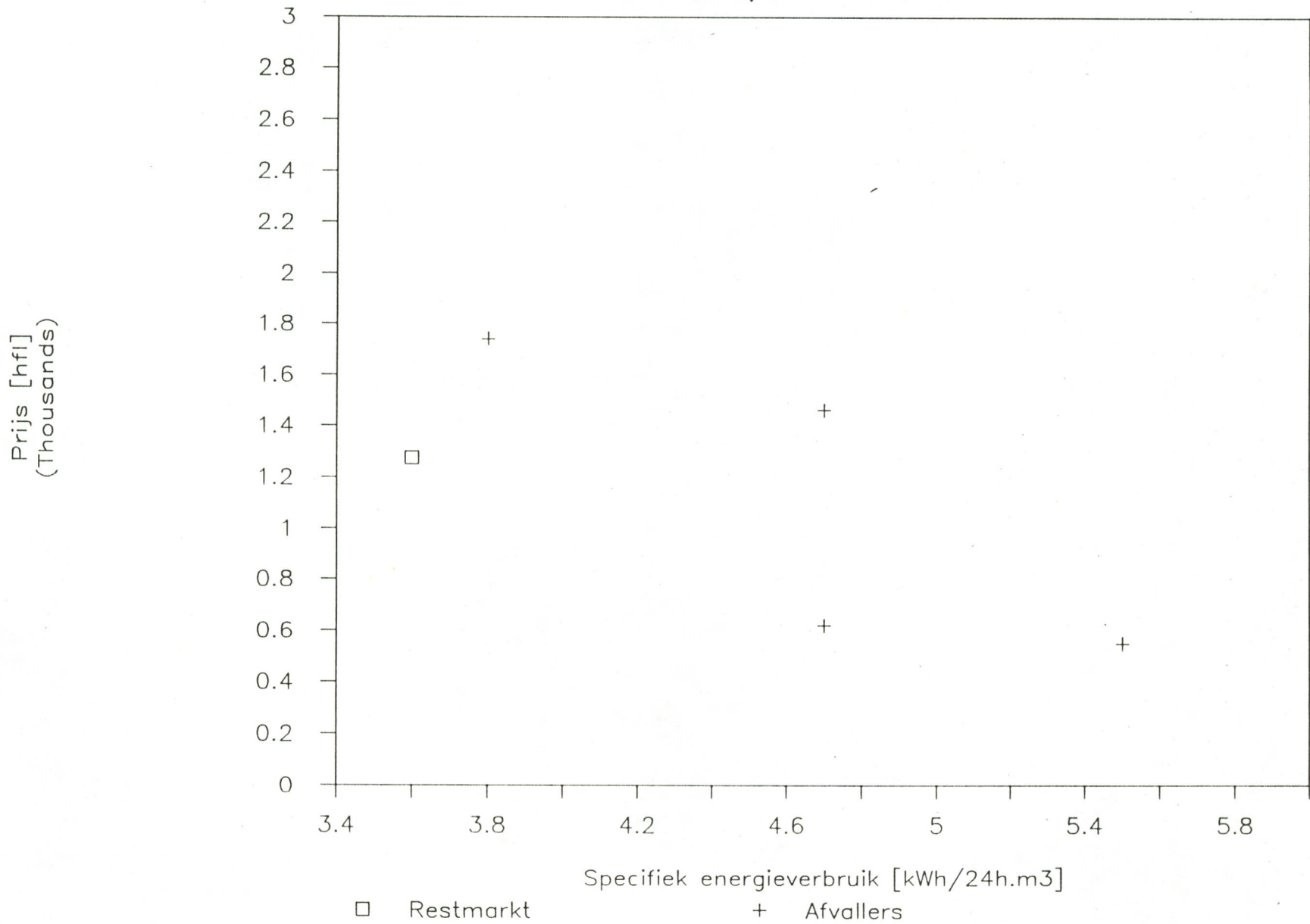
Figuur 42 Economisch gevolg van grenslijn 2
Vrijstaande koelkasten, 3*, volumecategorie 151 t/m 200 liter

1 ONDERBOUW KOELKASTEN 90-91, 151 T/M 200 LITER DRIE STERREN, GRENSLIJN 2



Figuur 43 Economisch gevolg van grenslijn 2
Onderbouw koelkasten, 3*, volumecategorie 151 t/m 200 liter

VRIJSTAANDE KOELKASTEN 90-91, 201 T/M 300 LITER DRIE STERREN, GRENSLIJN 2

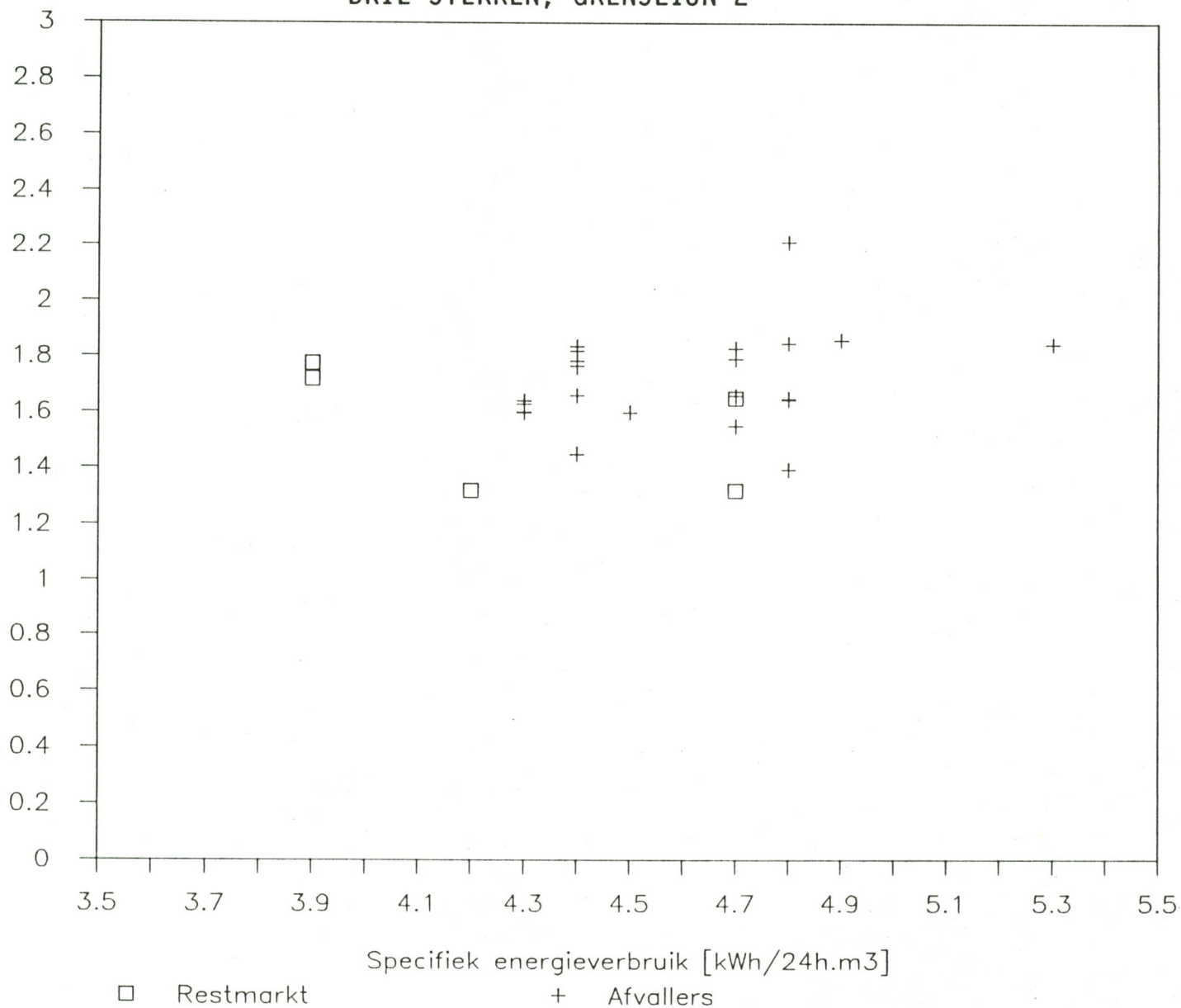


Figuur 44 Economisch gevolg van grenslijn 2
Vrijstaande koelkasten, 3*, volumecategorie 201 t/m 300 liter

ONDERBOUW KOELKASTEN 90-91, 201 T/M 300 LITER

DRIE STERREN, GRENSLIJN 2

Prijs [Thousd]
[hfl]

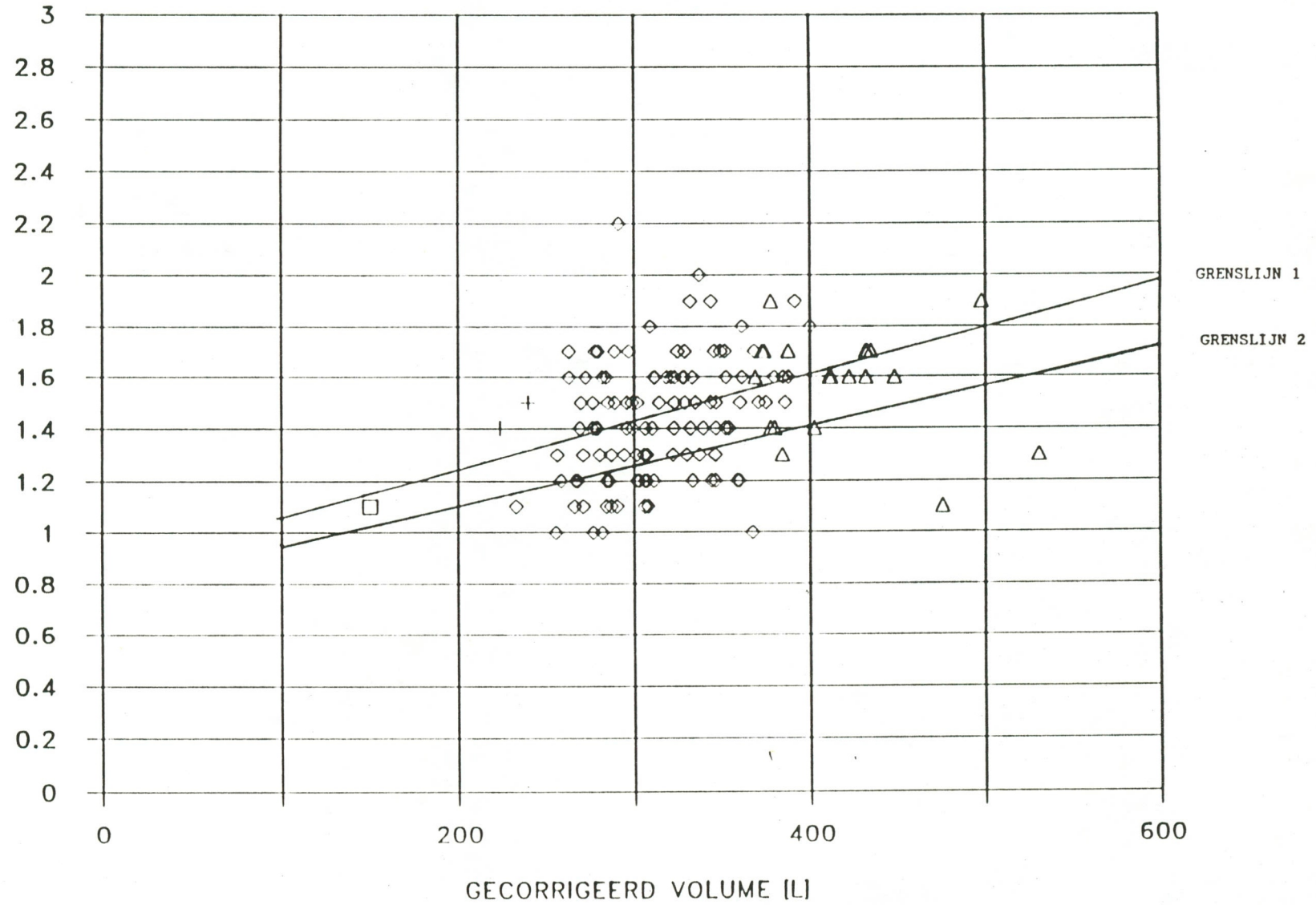


Figuur 45 Economisch gevolg van grenslijn 2
Onderbouw koelkasten, 3*, volumecategorie 201 t/m 300 liter

KOELKASTEN 90-91, VIER STERREN, 1 TEMPERATUURREGELAAR

ENERGIEVERBRUIK VERSUS GECORRIGEERD VOLUME

ENERGIEVERBRUIK [kWh/24h]



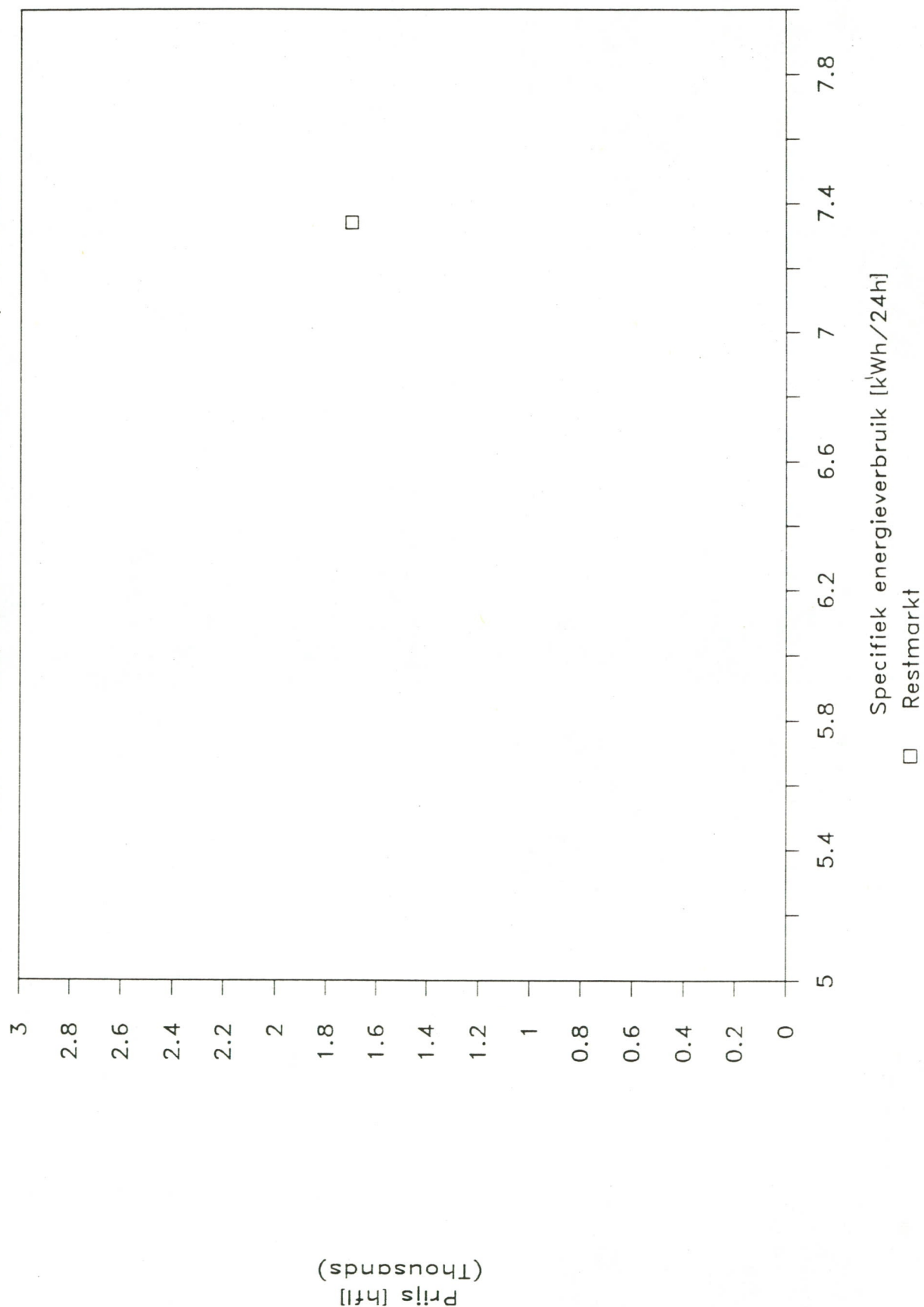
□ 100 T/M 150 LITER
◇ 201 T/M 300 LITER

+ 151 T/M 200 LITER
△ 301 T/M 450 LITER

Figuur 46 Koelkasten met 4 sterren vriesvak met één temperatuurregelaar:
grenslijn 1 en 2

ONDERBOUW KOELKASTEN 90-91, 100 T/M 150 LITER

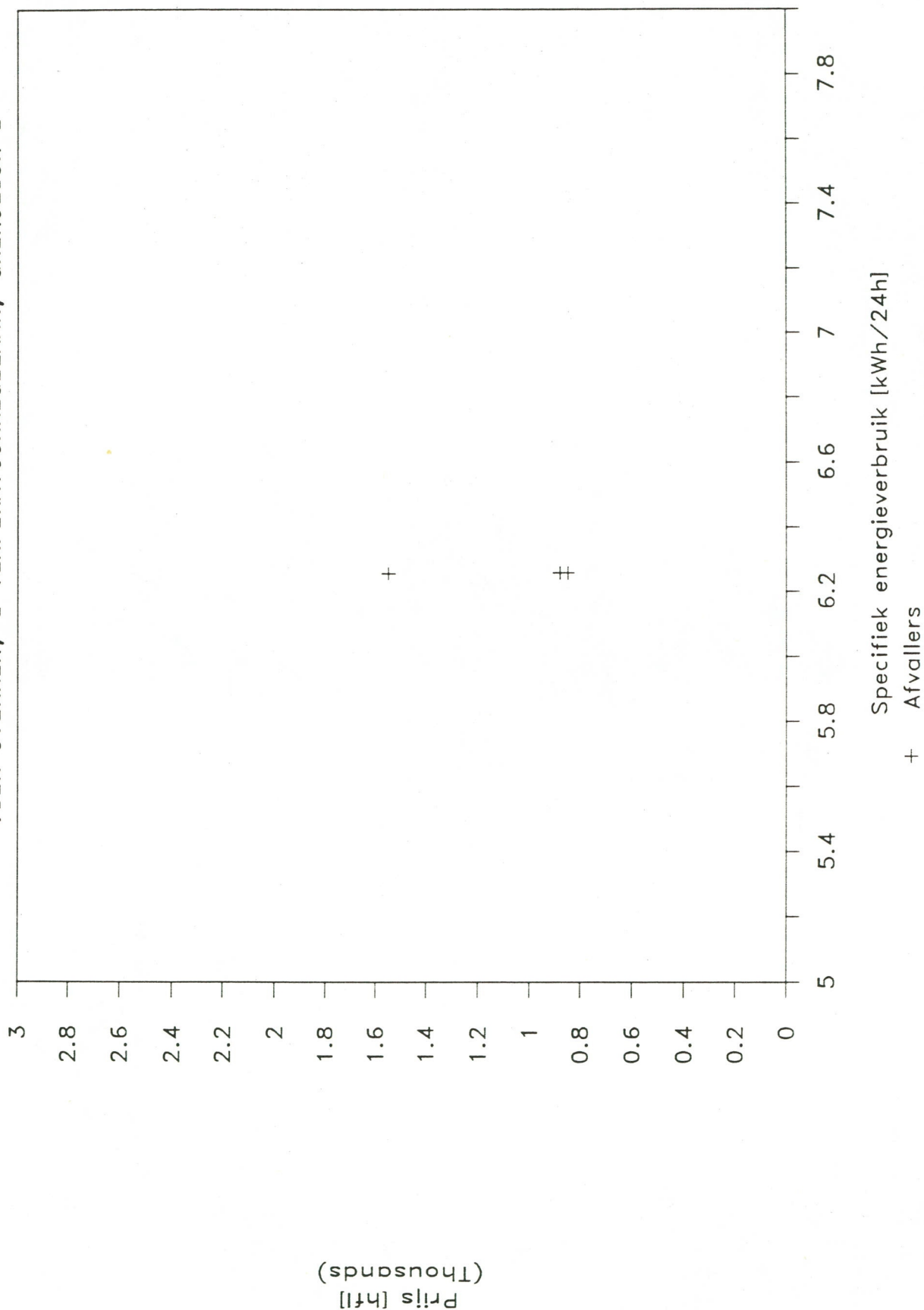
VIER STERREN, 1 TEMPERATUURREGELAAR, GRENSLIJN 1



Figuur 47 Economisch gevolg van grenslijn 1
Onderbouw koelkasten, 4*, 1 temperatuurregelaar,
volumecategorie 100 t/m 150 liter

VRIJSTAANDE KOELKASTEN 90-91, 151 T/M 200 LITER

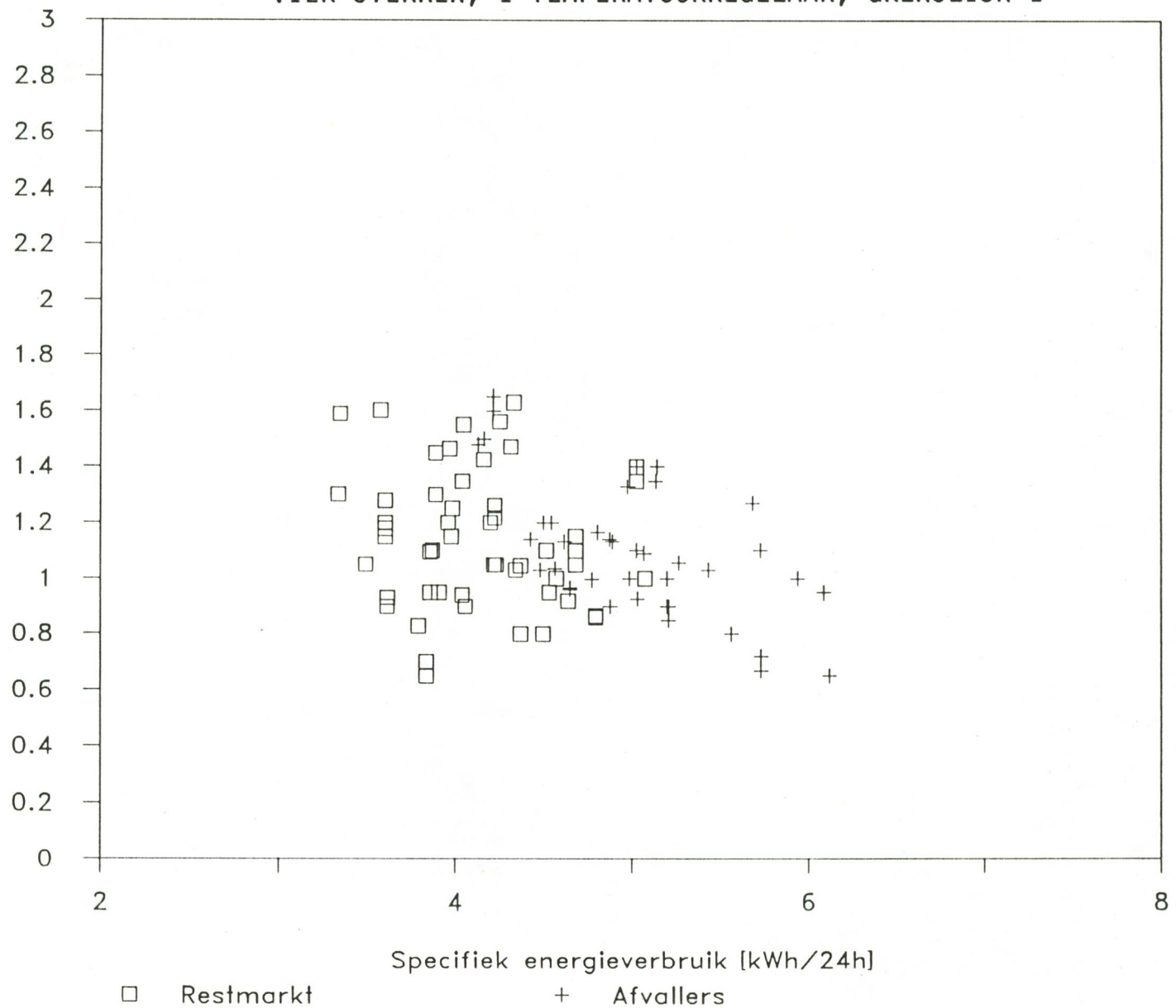
VIER STERREN, 1 TEMPERATUURREGELAAR, GRENSLIJN 1



Figuur 48 Economisch gevolg van grenslijn 1
Vrijstaande koelkasten, 4*, 1 temperatuurregelaar,
volumecategorie 151 t/m 200 liter

VRIJSTAANDE KOELKASTEN 90-91, 201 T/M 300 LITER

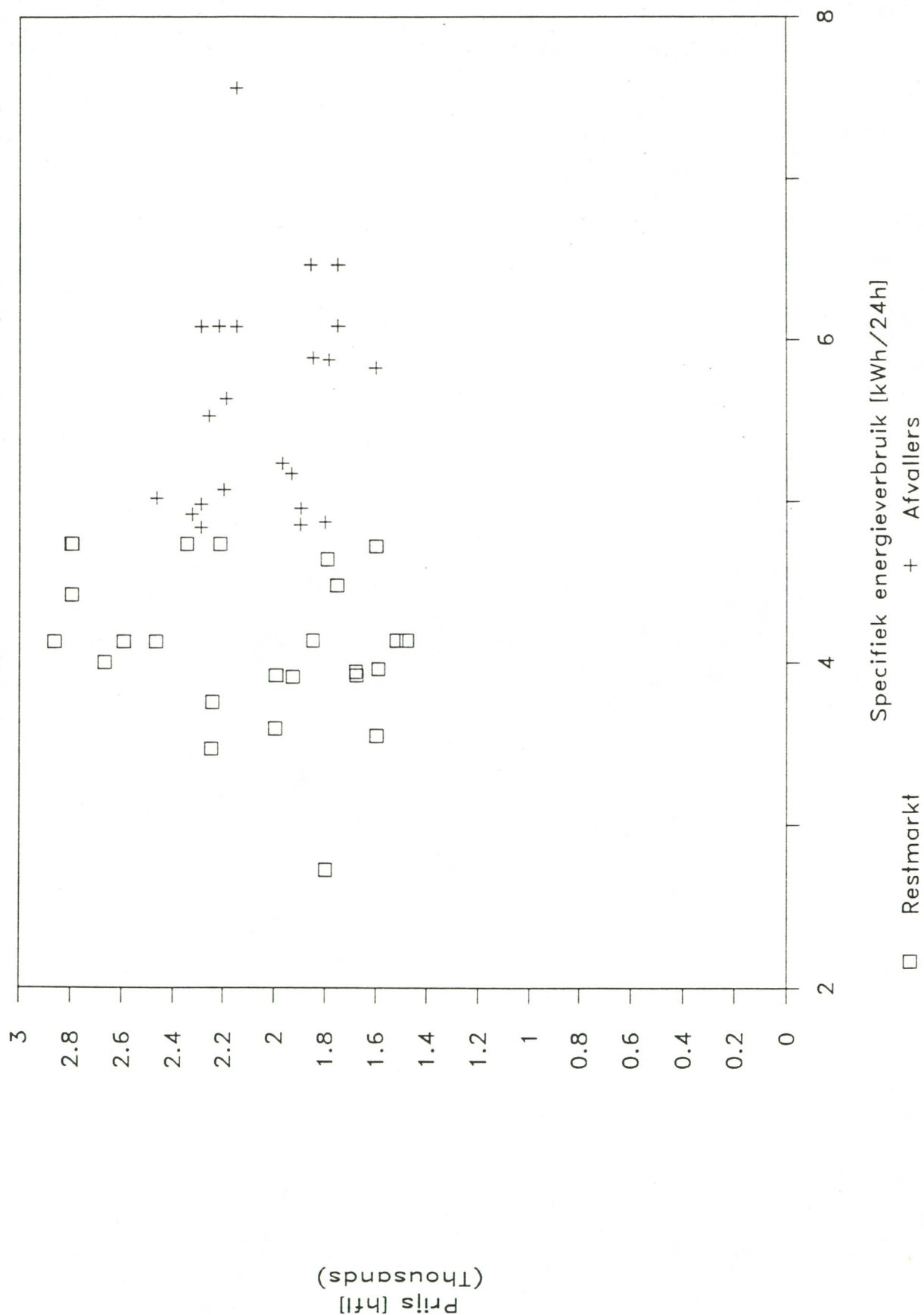
VIER STERREN, 1 TEMPERATUURREGELAAR, GRENSLIJN 1



Figuur 49 Economisch gevolg van grenslijn 1
Vrijstaande koelkasten, 4*, 1 temperatuurregelaar,
volumecategorie 201 t/m 300 liter

ONDERBOUW KOELKASTEN 90-91, 201 T/M 300 LITER

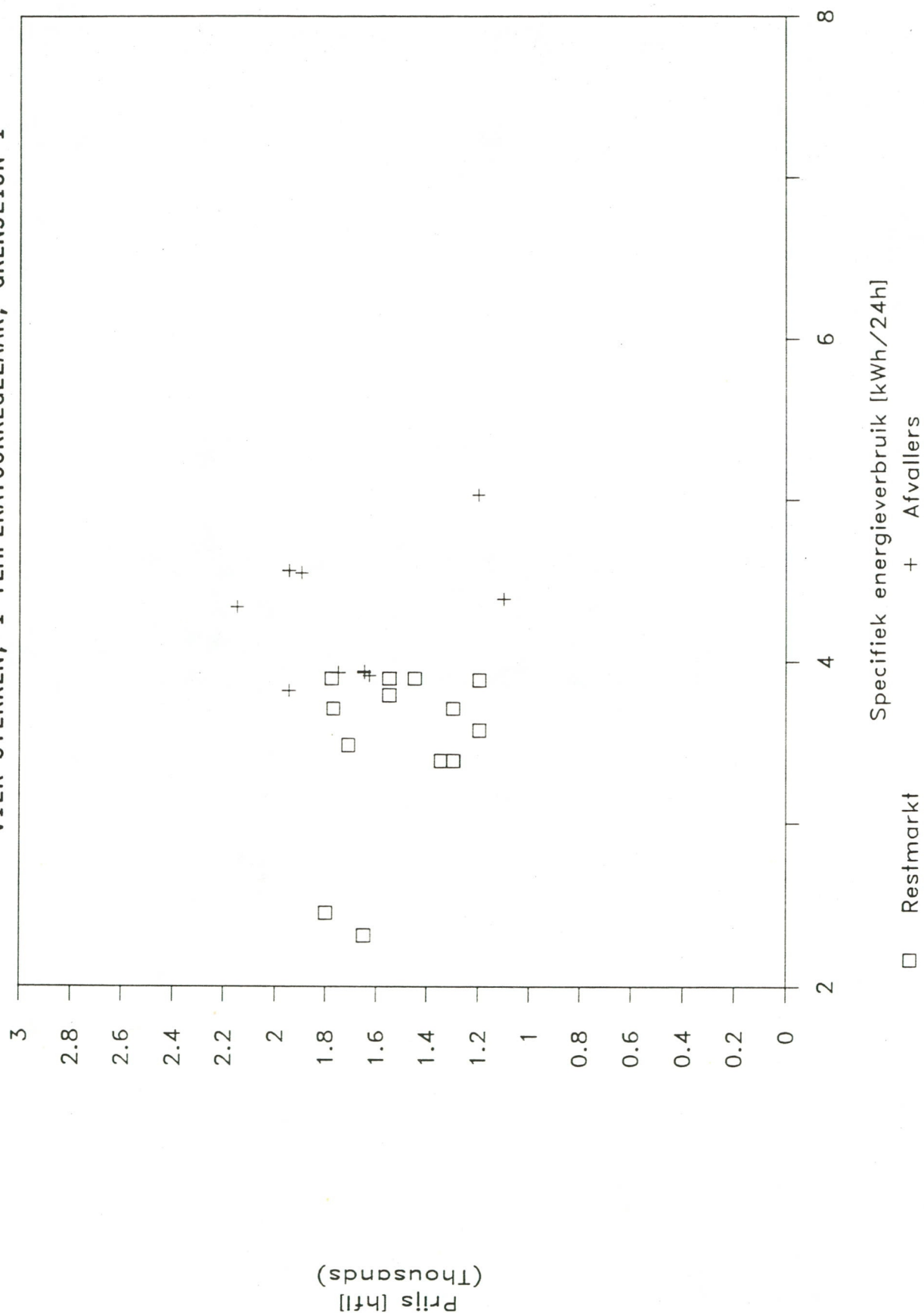
VIER STERREN, 1 TEMPERATUURREGELAAR, GRENSLIJN 1



Figuur 50 Economisch gevolg van grenslijn 1
Onderbouw koelkasten, 4*, 1 temperatuurregelaar,
volume categorie 201 t/m 300 liter

VRIJSTAANDE KOELKASTEN 90-91, 301 T/M 450 LITER

VIER STERREN, 1 TEMPERATUURREGELAAR, GRENSLIJN 1

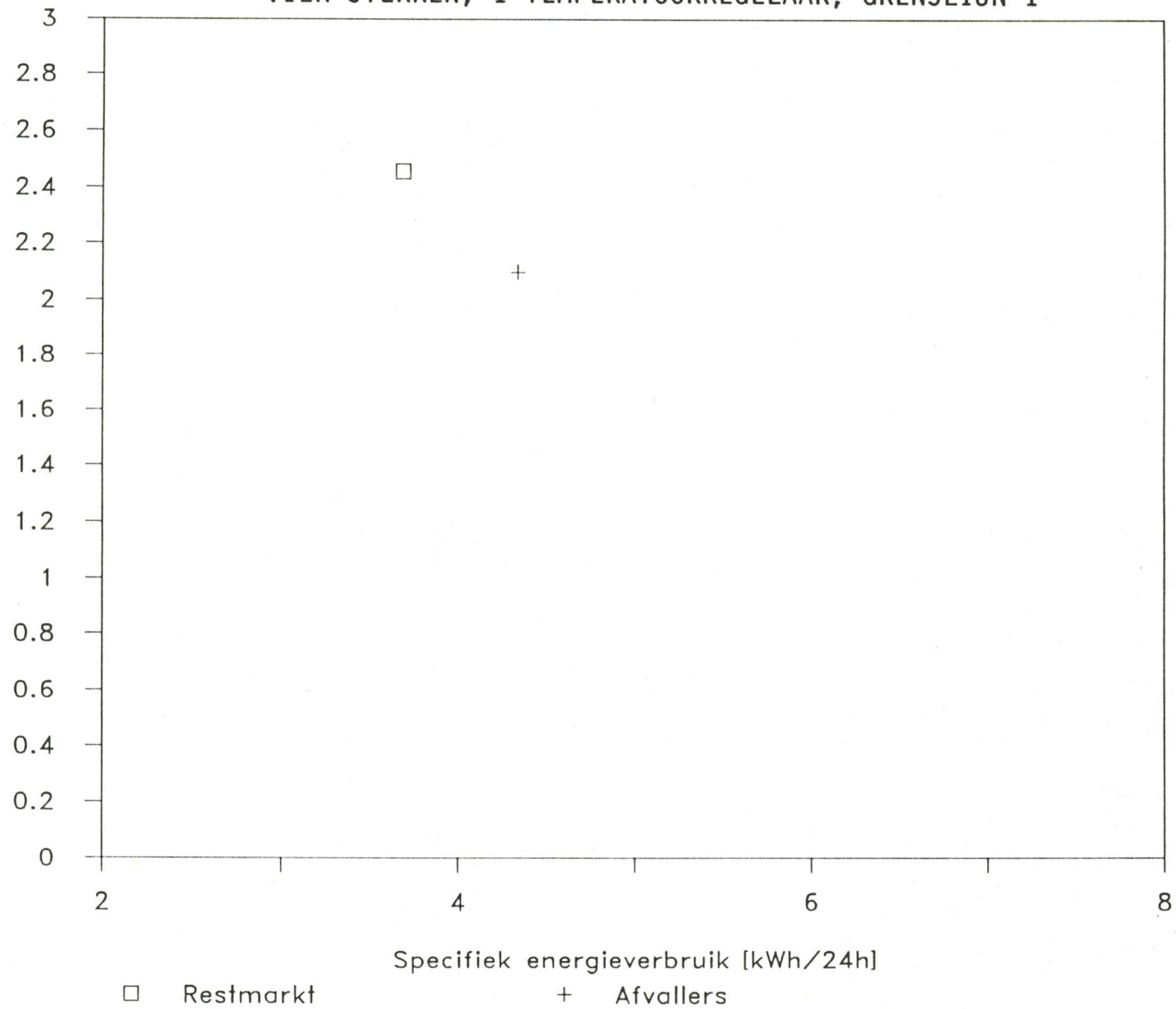


Figuur 51 Economisch gevolg van grenslijn 1
Vrijstaande koelkasten, 4*, 1 temperatuurregelaar,
volumecategorie 301 t/m 450 liter

ONDERBOUW KOELKASTEN 90-91, 300 T/M 450 LITER

VIER STERREN, 1 TEMPERATUURREGELAAR, GRENSLIJN 1

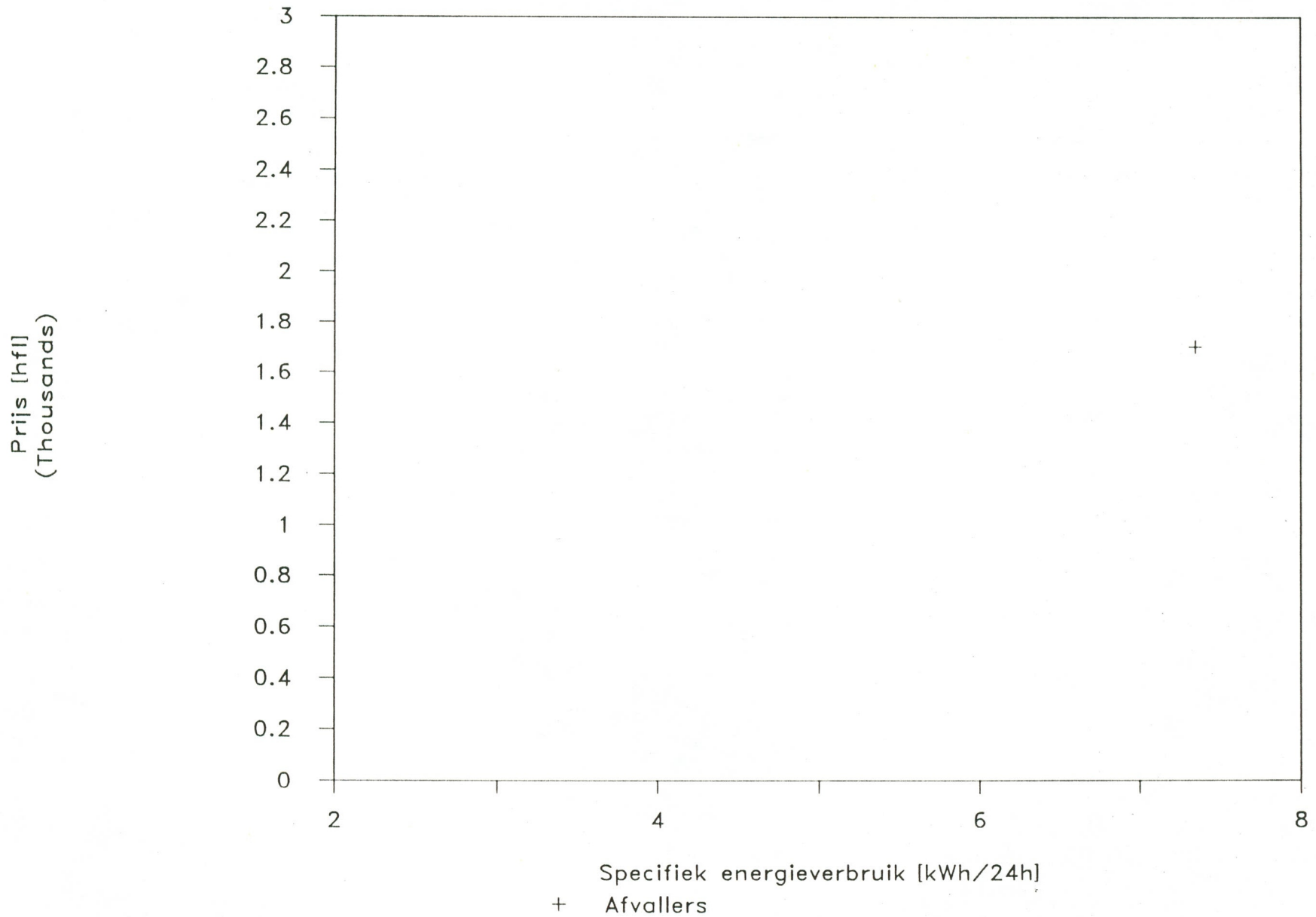
Prijs [hfl]
(Thousands)



Figuur 52 Economisch gevolg van grenslijn 1
Onderbouw koelkasten, 4*, 1 temperatuurregelaar,
volumecategorie 301 t/m 450 liter

1

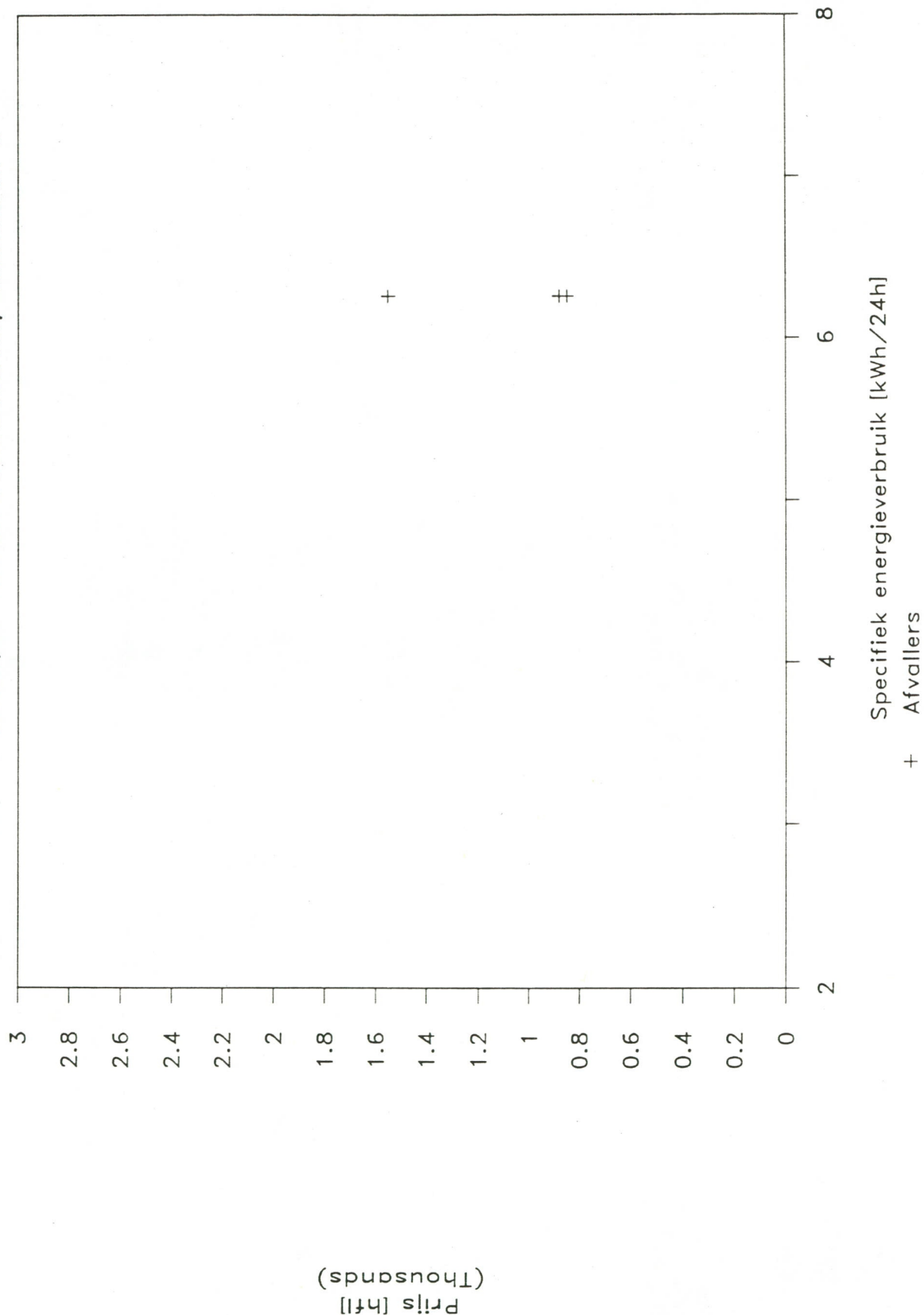
ONDERBOUW KOELKASTEN 90-91, 100 T/M 150 LITER
VIER STERREN, 1 TEMPERATUURREGELAAR, GRENSLIJN 2



Figuur 53 Economisch gevolg van grenslijn 2
Onderbouw koelkasten, 4*, 1 temperatuurregelaar,
volumecategorie 100 t/m 150 liter

VRIJSTAANDE KOELKASTEN 90-91, 151 T/M 200 LITER

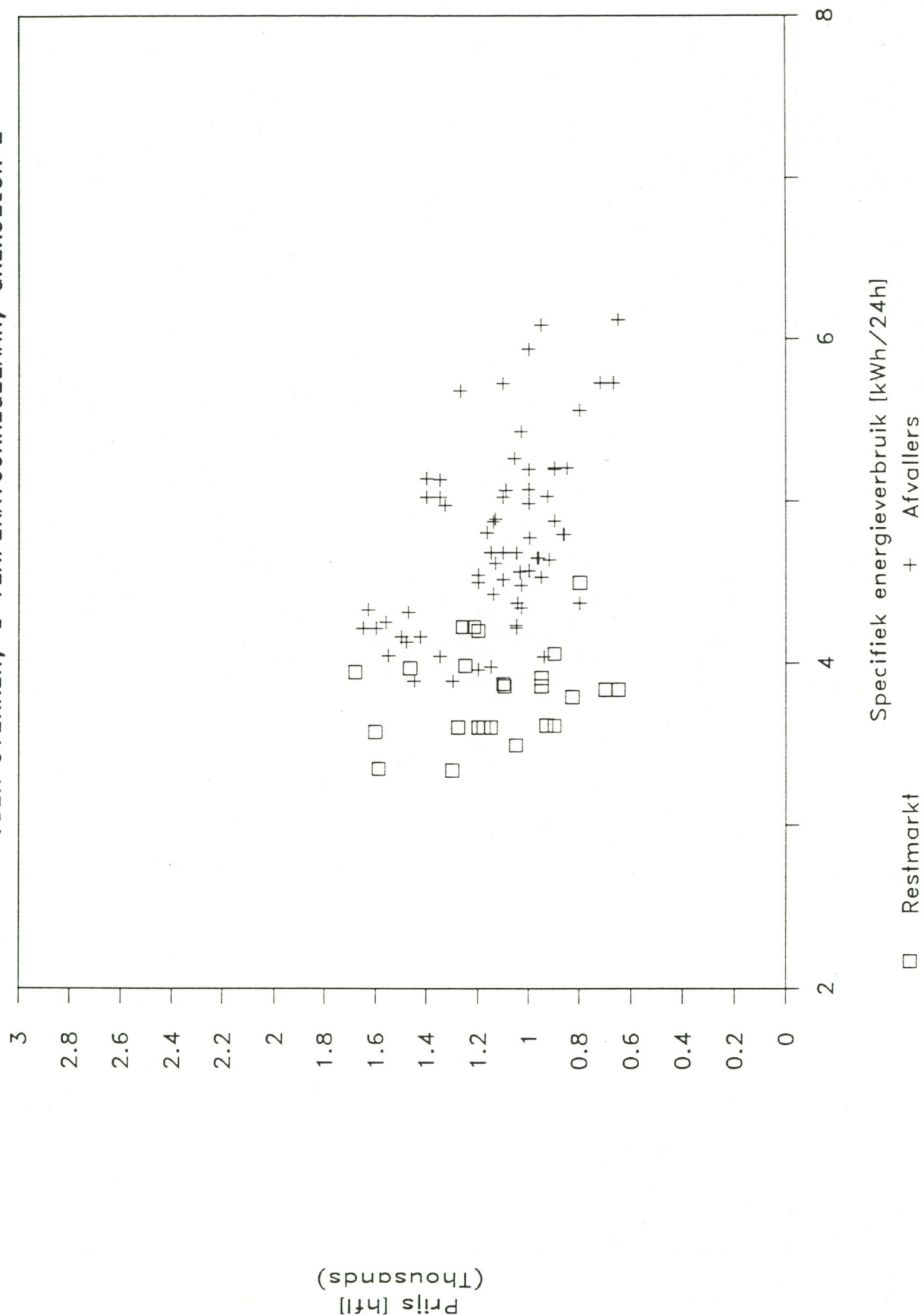
VIER STERREN, 1 TEMPERATUURREGELAAR, GRENSLIJN 2



Figuur 54 Economisch gevolg van grenslijn 2
 Vrijstaande koelkasten, 4*, 1 temperatuurregelaar,
 volumecategorie 151 t/m 200 liter

VRIJSTAANDE KOELKASTEN 90-91, 201 T/M 300 LITER

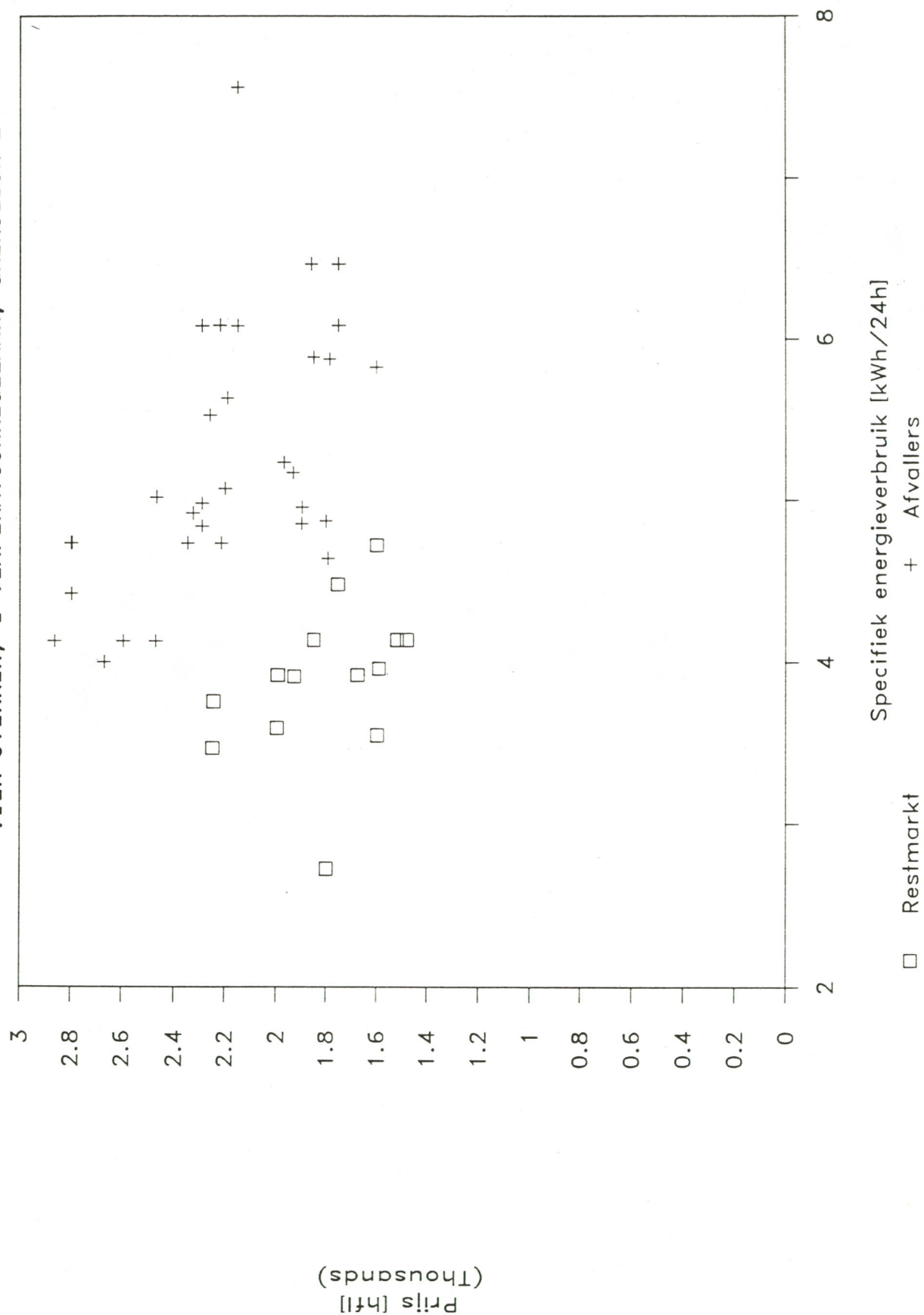
VIER STERREN, 1 TEMPERATUURREGELAAR, GRENSLIJN 2



Figuur 55 Economisch gevolg van grenslijn 2
 Vrijstaande koelkasten, 4*, 1 temperatuurregelaar,
 volumecategorie 201 t/m 300 liter

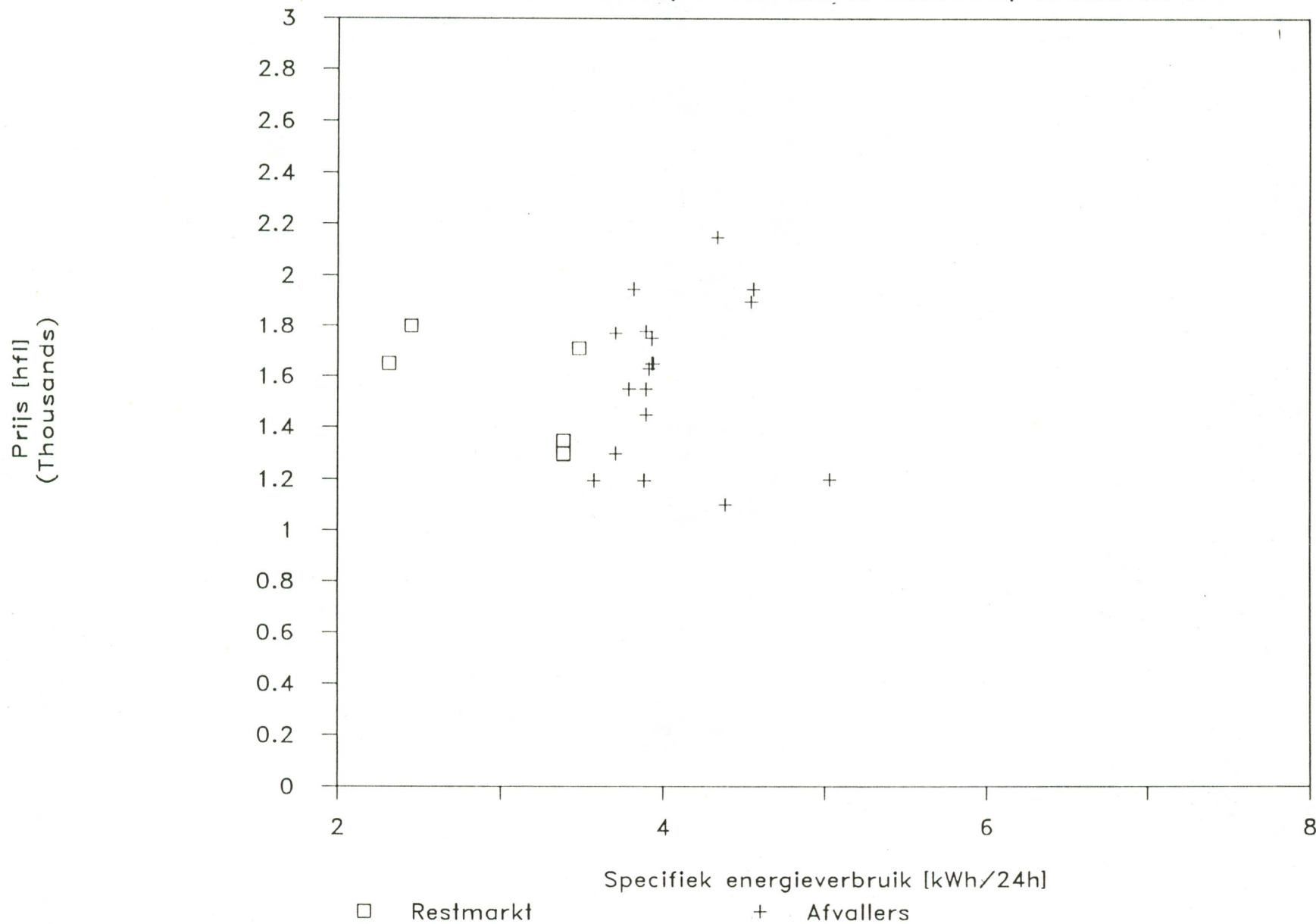
ONDERBOUW KOELKASTEN 90-91, 201 T/M 300 LITER

VIER STERREN, 1 TEMPERATUURREGELAAR, GRENSLIJN 2



Figuur 56 Economisch gevolg van grenslijn 2
Onderbouw koelkasten, 4*, 1 temperatuurregelaar,
volumecategorie 201 t/m 300 liter

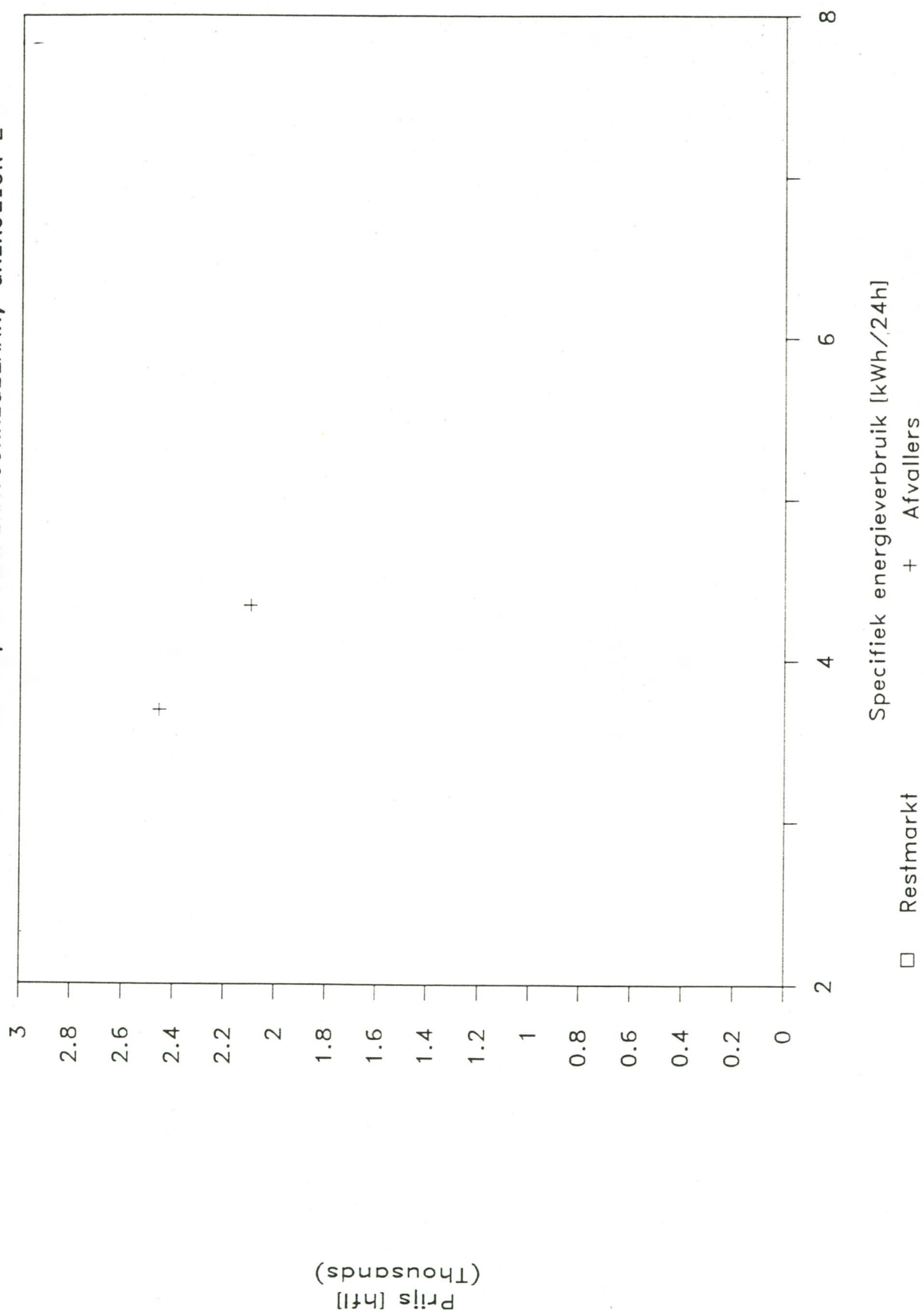
VRIJSTAANDE KOELKASTEN 90-91, 301 T/M 450 LITER VIER STERREN, 1 TEMPERATUURREGELAAR, GRENSLIJN 2



Figuur 57 Economisch gevolg van grenslijn 2
Vrijstaande koelkasten, 4*, 1 temperatuurregelaar,
volumecategorie 301 t/m 450 liter

ONDERBOUW KOELKASTEN 90-91, 300 T/M 450 LITER

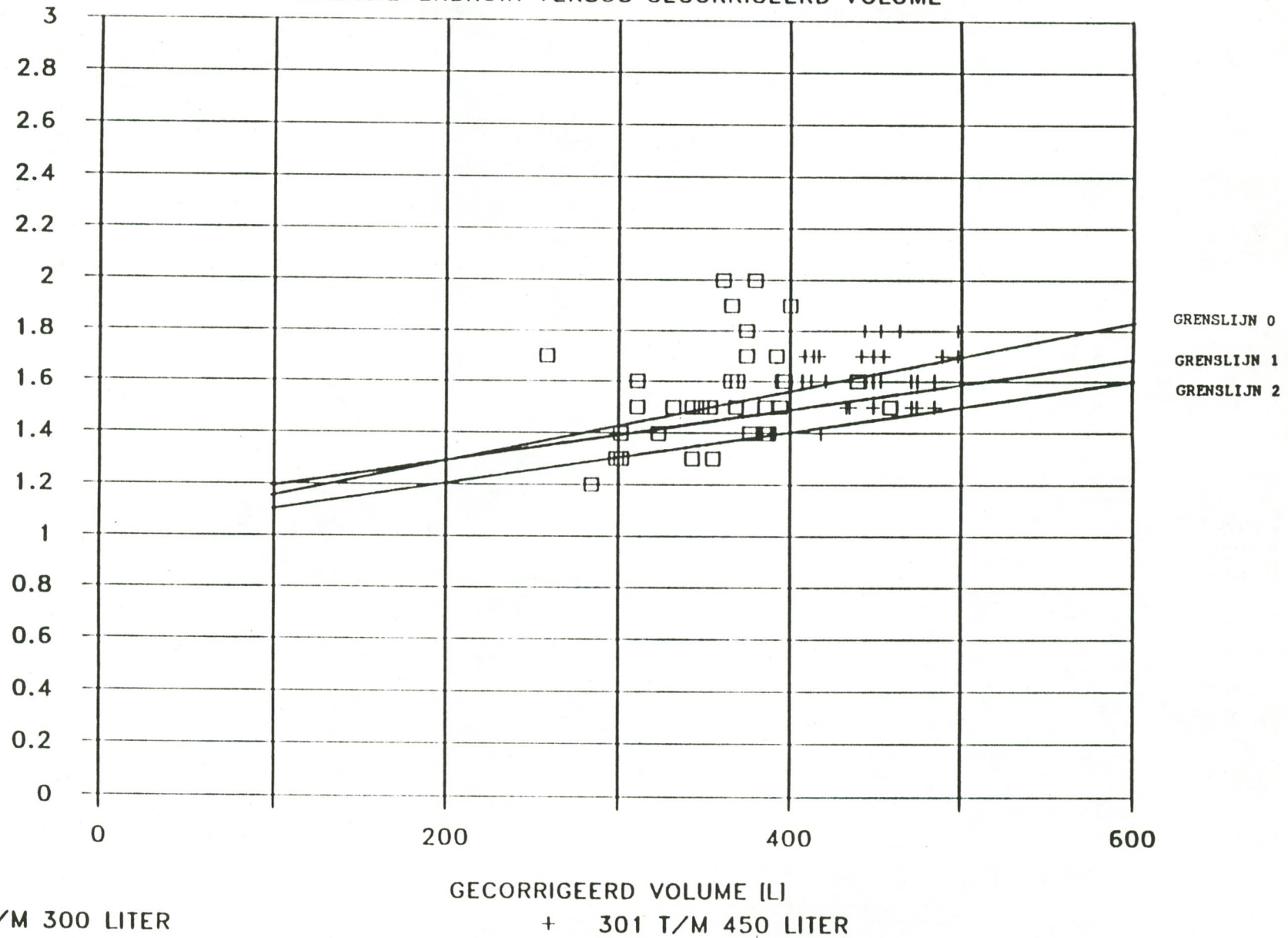
VIER STERREN, 1 TEMPERATUURREGELAAR, GRENSLIJN 2



Figuur 58 Economisch gevolg van grenslijn 2
Onderbouw koelkasten, 4*, 1 temperatuurregelaar,
volumecategorie 301 t/m 450 liter

KOELKASTEN 90-91, VIER STERREN, 2 TEMPERATUURREGELAARS

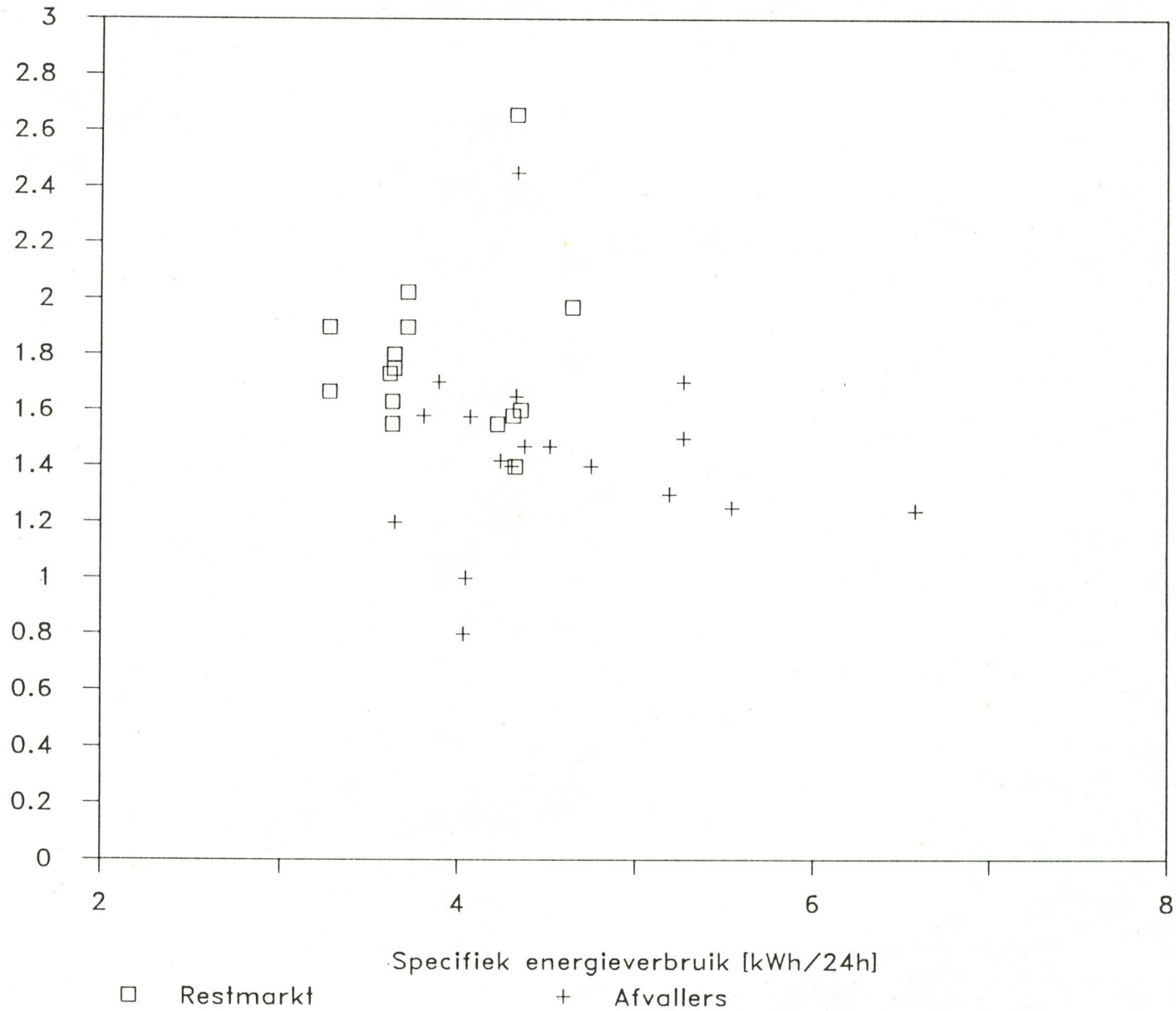
ENERGIEVERBRUIK VERSUS GECORRIGEERD VOLUME



Figuur 59 Koelkasten met 4 sterren vriesvak met twee temperatuur-regelaars: grenslijn 1 en 2

VRIJSTAANDE KOELKASTEN 90-91, 201 T/M 300 LITER VIER STERREN, 2 TEMPERATUURREGELAARS, GRENSLIJN 1

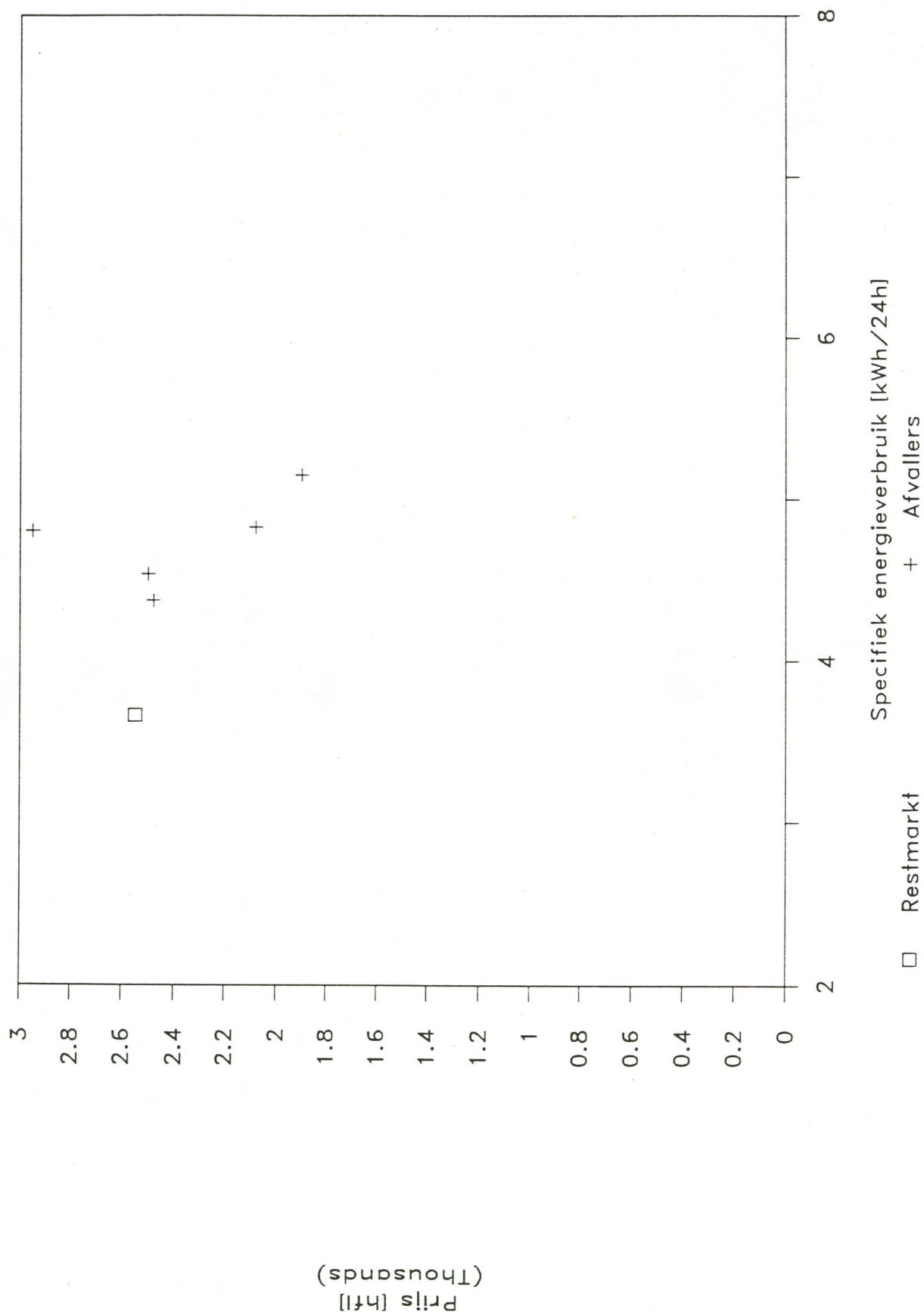
Prijs [hfl]
(Thousands)



Figuur 60 Economisch gevolg van grenslijn 1
Vrijstaande koelkasten, 4*, 2 temperatuurregelaars,
volumecategorie 201 t/m 300 liter

1

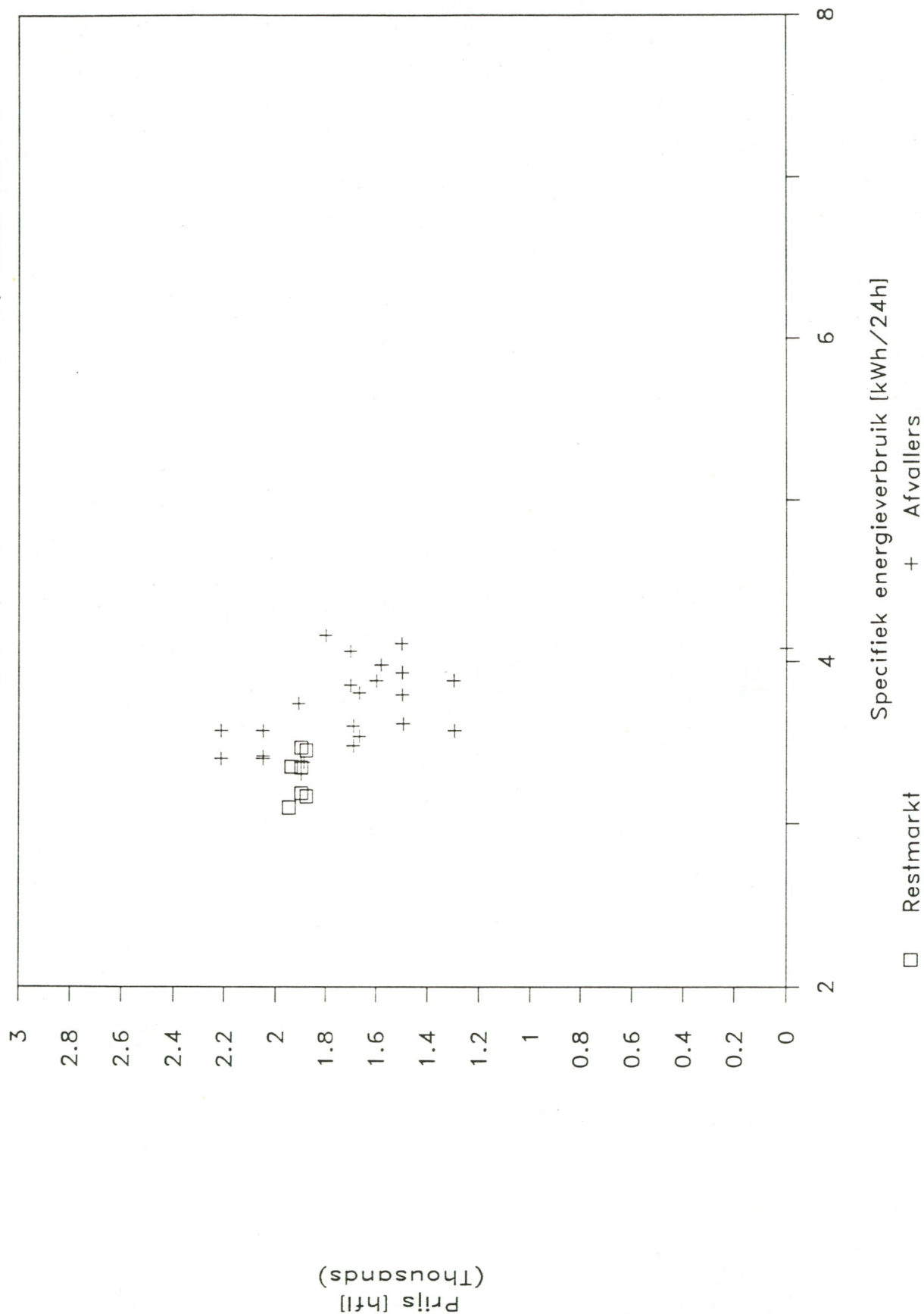
ONDERBOUW KOELKASTEN 90-91, 201 T/M 300 LITER
 VIER STERREN, 2 TEMPERATUURREGELAARS, GRENSLIJN 1



Figuur 61 Economisch gevolg van grenslijn 1
 Onderbouw koelkasten, 4*, 2 temperatuurregelaars,
 volumecategorie 201 t/m 300 liter

VRIJSTAANDE KOELKASTEN 90-91, 301 T/M 450 LITER

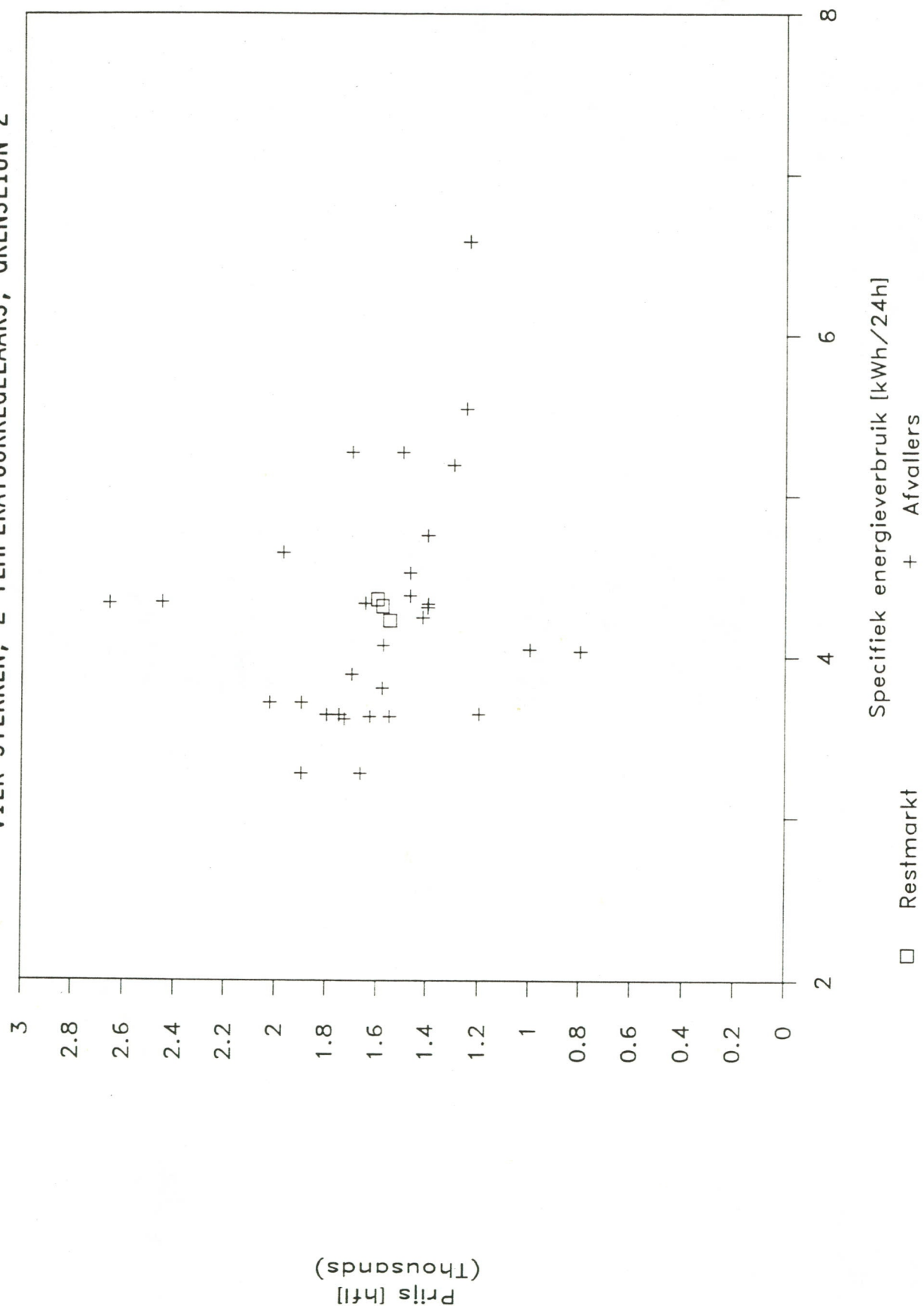
VIER STERREN, 2 TEMPERATUURREGELAARS, GRENSLIJN 1



Figuur 62 Economisch gevolg van grenslijn 1
Vrijstaande koelkasten, 4*, 2 temperatuurregelaars,
volumecategorie 301 t/m 450 liter

VRIJSTAANDE KOELKASTEN 90-91, 201 T/M 300 LITER

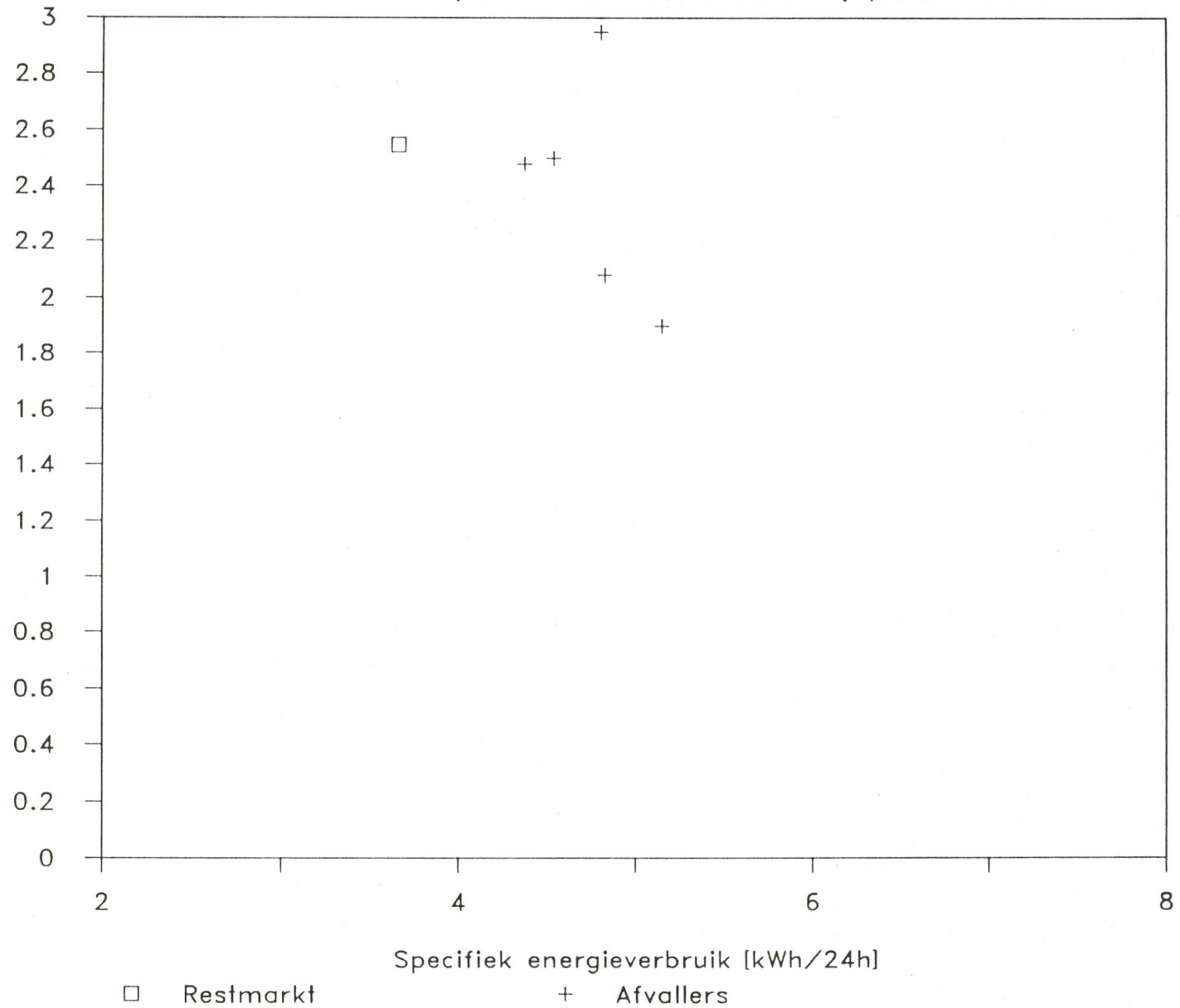
VIER STERREN, 2 TEMPERATUURREGELAARS, GRENSLIJN 2



Figuur 63 Economisch gevolg van grenslijn 2
 Vrijstaande koelkasten, 4*, 2 temperatuurregelaars,
 volumecategorie 201 t/m 300 liter

ONDERBOUW KOELKASTEN 90-91, 201 T/M 300 LITER VIER STERREN, 2 TEMPERATUURREGELAARS, GRENSLIJN 2

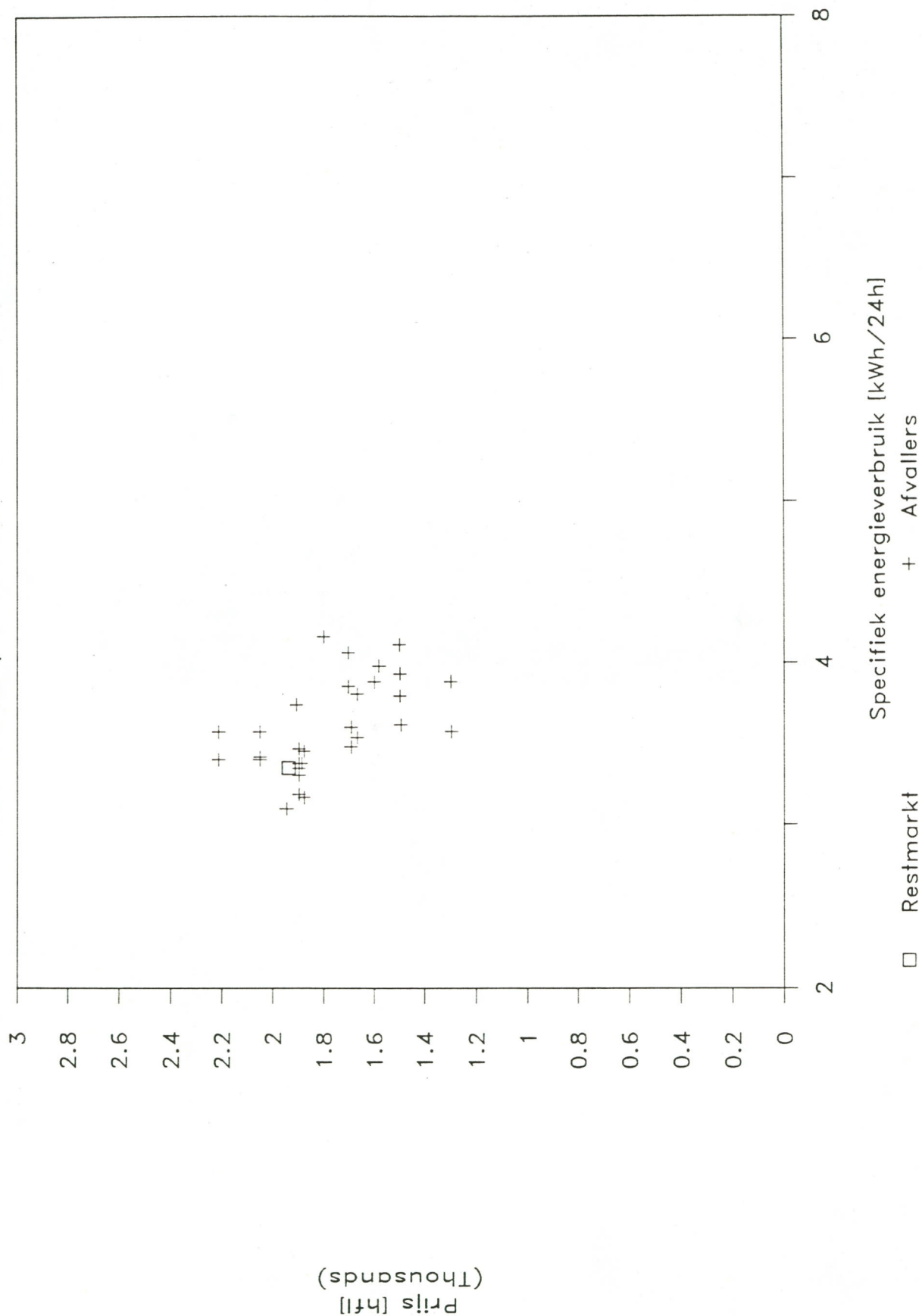
Prijs [hfl]
 (Thousands)



Figuur 64 Economisch gevolg van grenslijn 2
 Onderbouw koelkasten, 4*, 2 temperatuurregelaars,
 volumecategorie 201 t/m 300 liter

VRIJSTAANDE KOELKASTEN 90-91, 301 T/M 450 LITER

VIER STERREN, 2 TEMPERATUURREGELAARS, GRENSLIJN 2

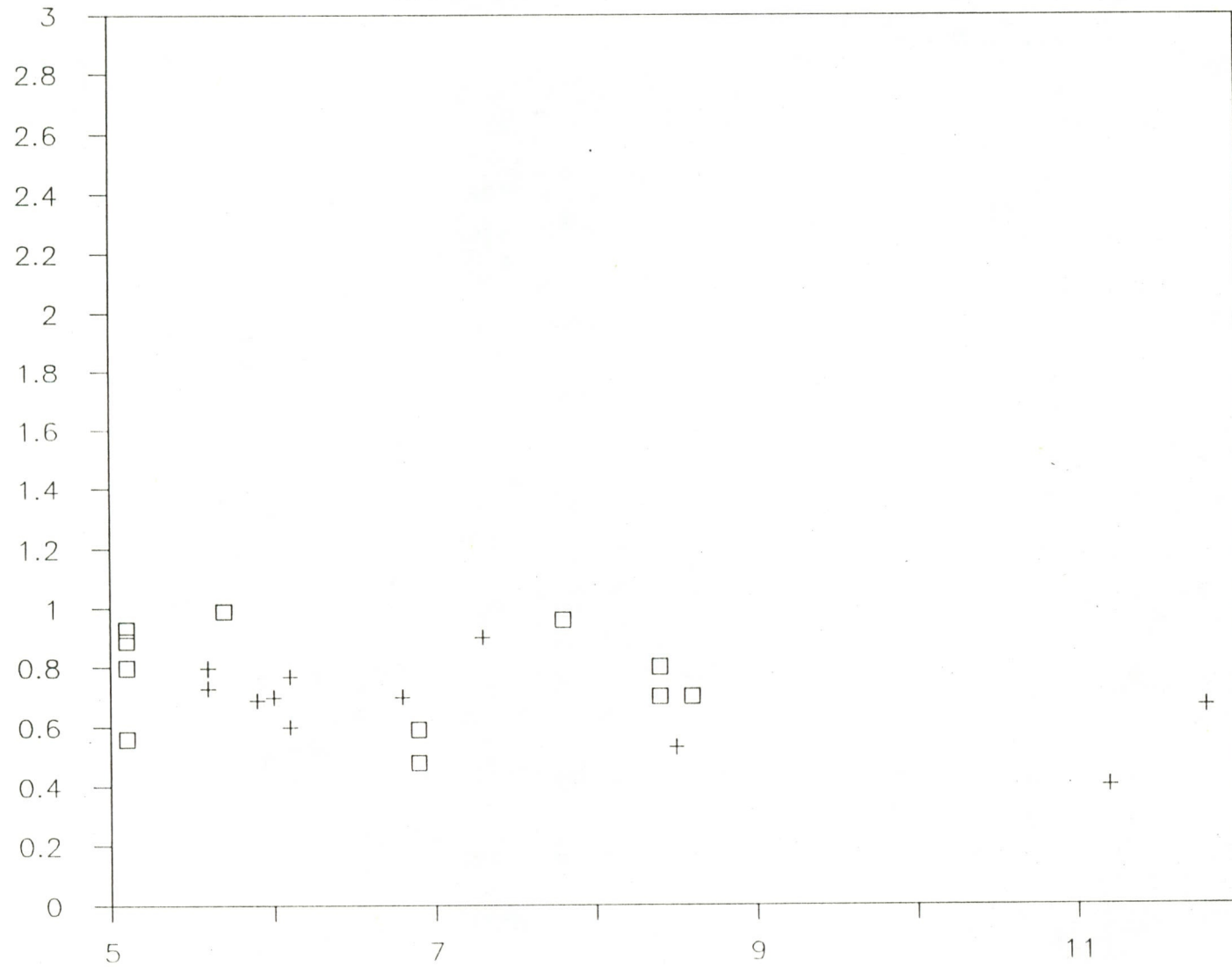


Figuur 65 Economisch gevolg van grenslijn 2
 Vrijstaande koelkasten, 4*, 2 temperatuurregelaars,
 volume categorie 301 t/m 450 liter

VRIJSTAANDE DIEPVRIEZERS 90-91, 0 TOT 100 LITER

GRENSLIJN 1

Prijs [hfl]
(Thousands)



Specifiek energieverbruik [kWh/24h.m3]

□ Restmarkt

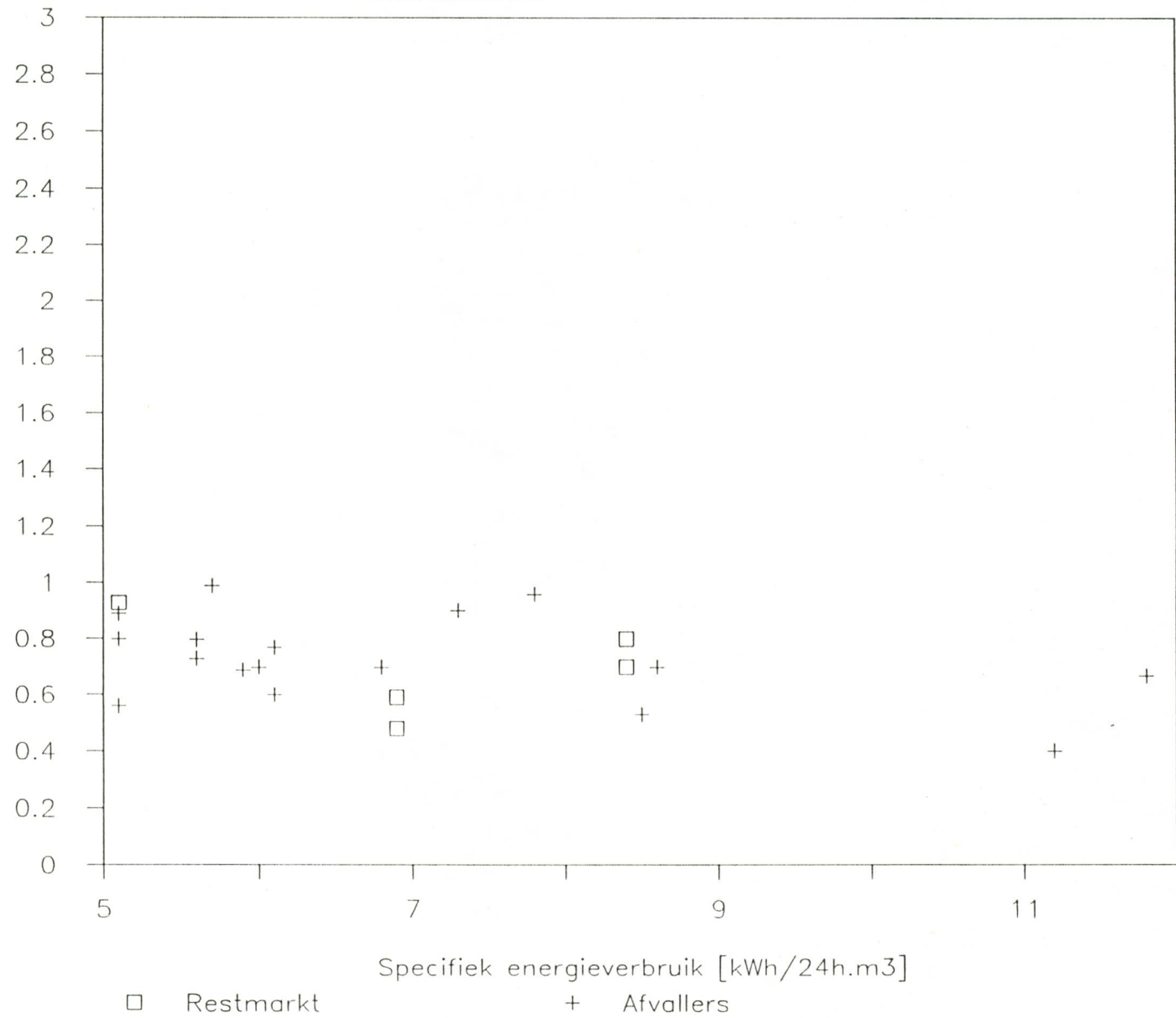
+ Afvallers

Figuur 67 Economisch gevolg van grenslijn 1
Vrijstaande diepvriezers, volumecategorie 0 tot 100 liter

VRIJSTAANDE DIEPVRIEZERS 90-91, 0 TOT 100 LITER

GRENSLIJN 2

Prijs [hfl]
(Thousands)

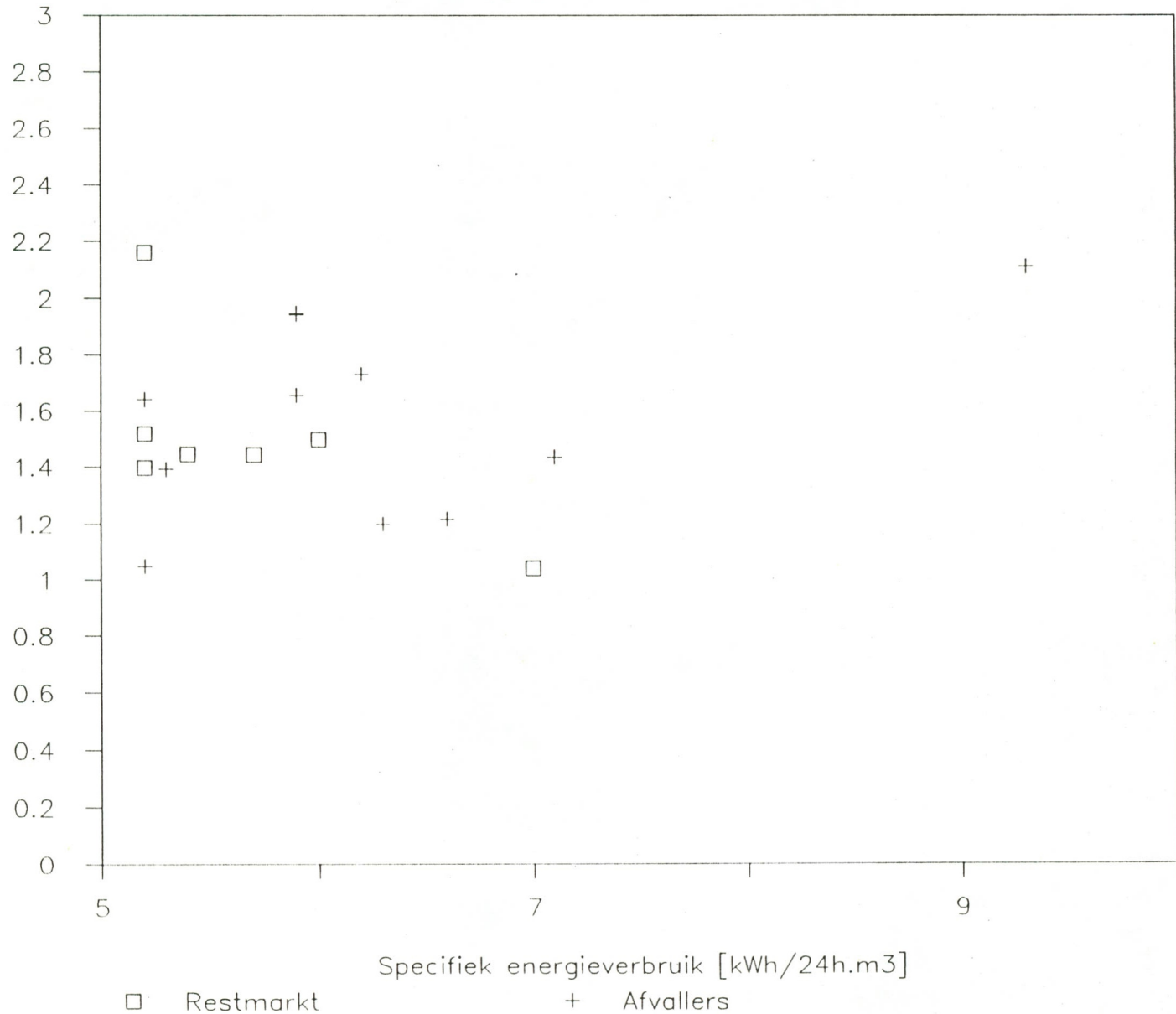


Figuur 76 Economisch gevolg van grenslijn 2
Vrijstaande diepvriezers, volumecategorie 0 tot 100 liter

ONDERBOUW DIEPVRIEZERS 90-91, 0 TOT 100 LITER

GRENSLIJN 1

Prijs [hfl]
(Thousands)

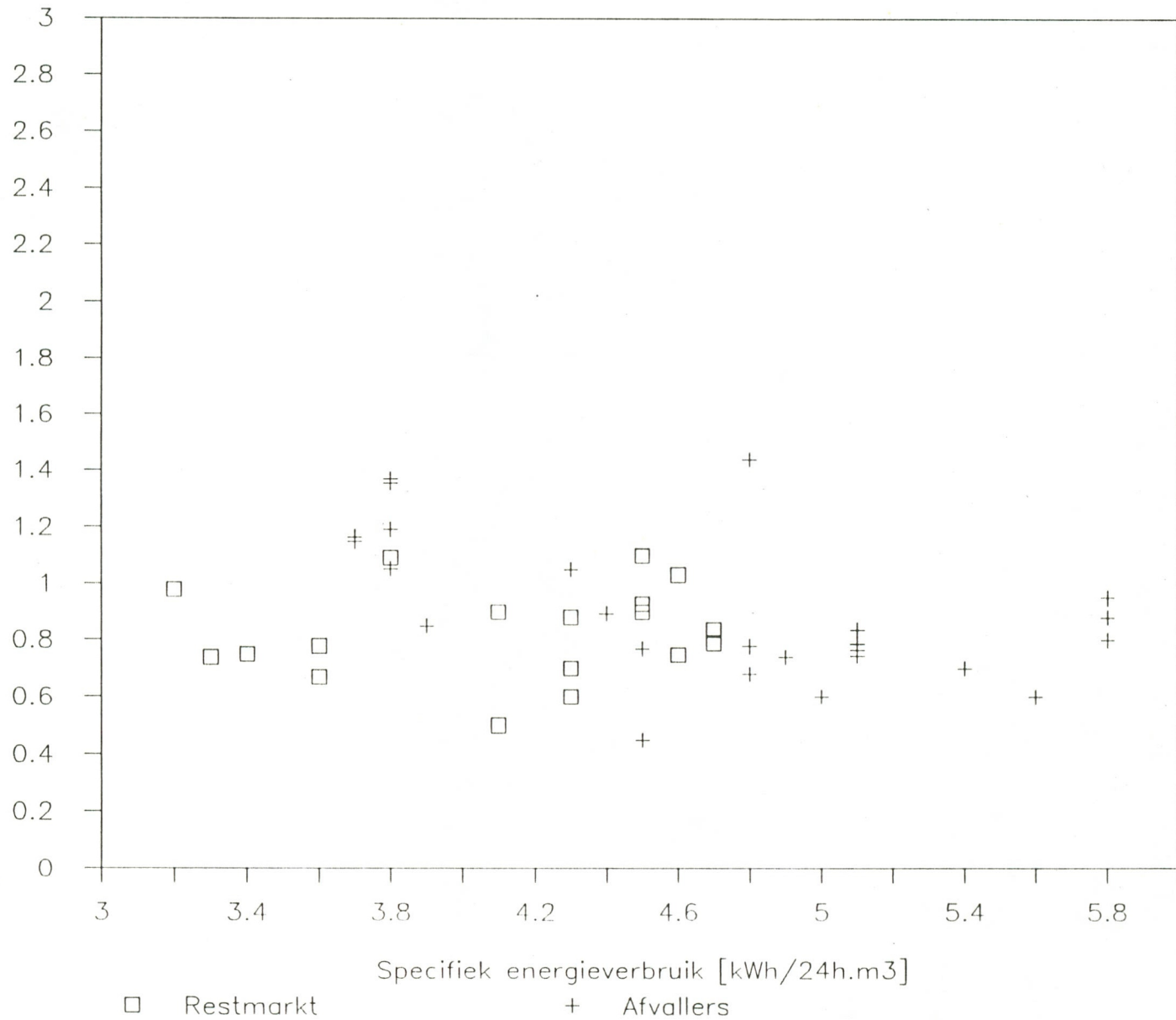


Figuur 68 Economisch gevolg van grenslijn 1
Onderbouw diepvriezers, volumecategorie 0 tot 100 liter

VRIJSTAANDE DIEPVRIEZERS 90-91, 100 T/M 150 LITER

GRENSLIJN 1

Prijs [hfl]
(Thousands)

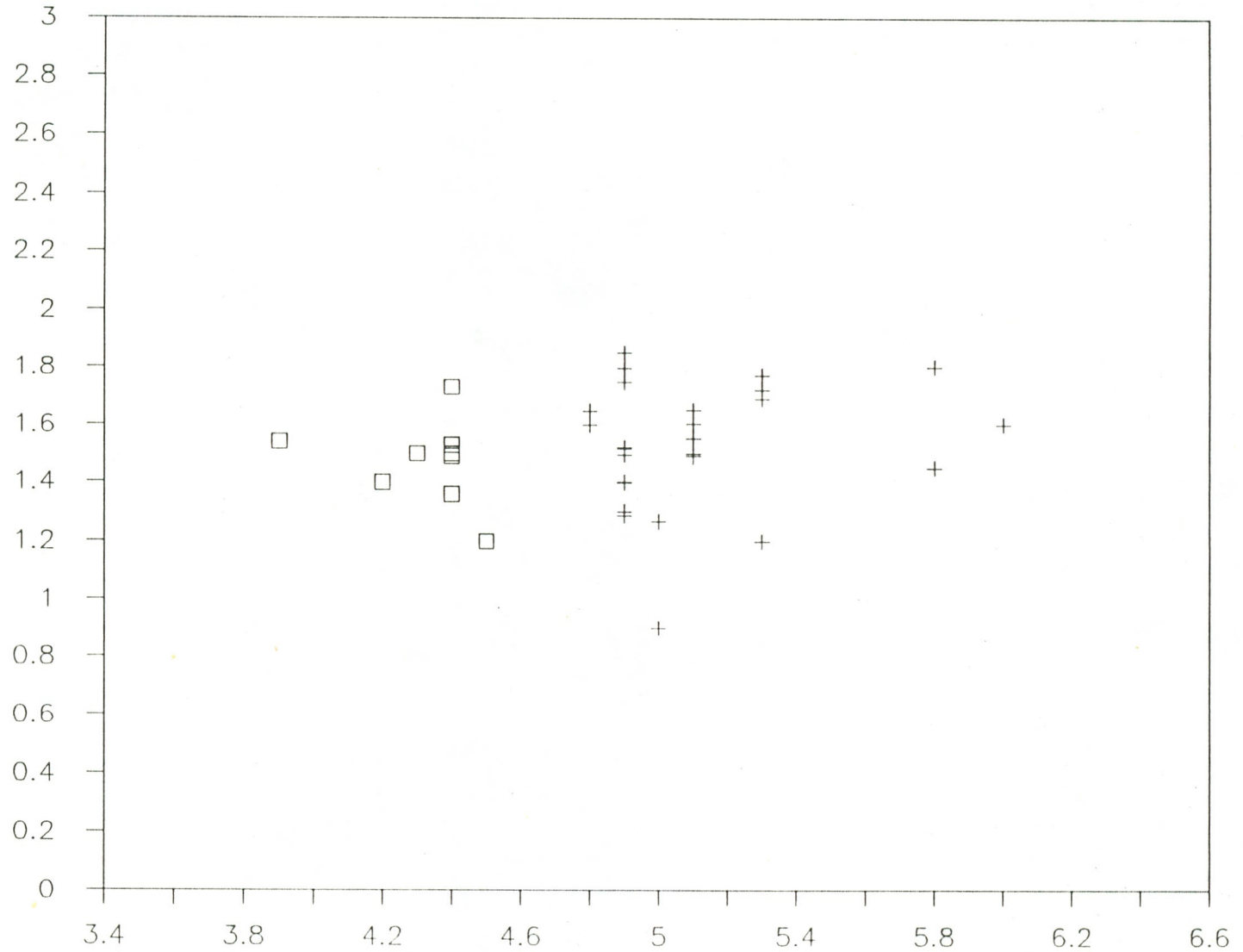


Figuur 69 Economisch gevolg van grenslijn 1
Vrijstaande diepvriezers, volumecategorie 100 t/m 150 liter

ONDERBOUW DIEPVRIEZERS 90-91, 100 T/M 150 LITER

GRENSLIJN 1

Prijs [hfl]
(Thousands)



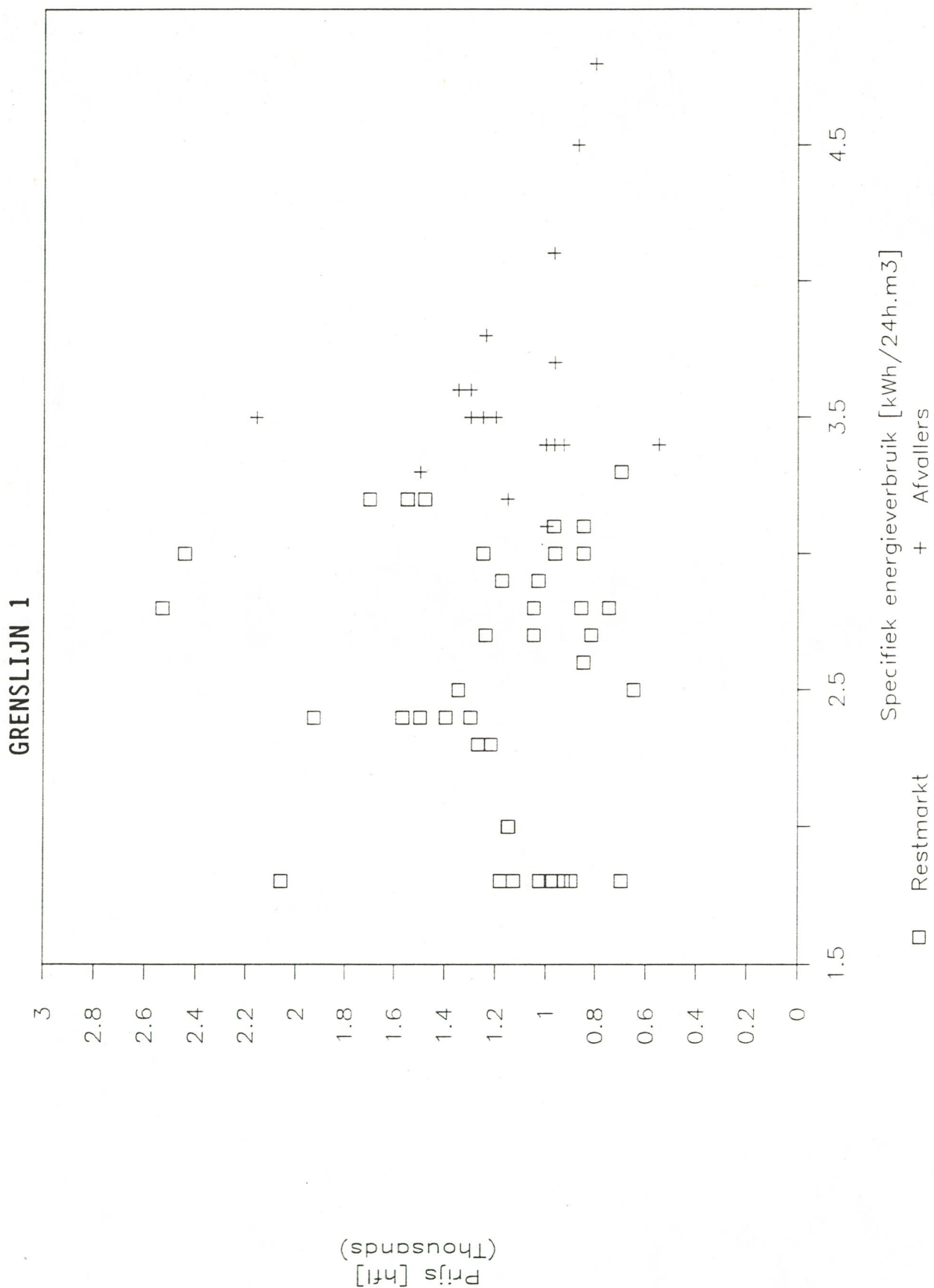
□ Restmarkt

+ Afvallers

Specifiek energieverbruik [kWh/24h.m3]

Figuur 70 Economisch gevolg van grenslijn 1
Onderbouw diepvriezers, volumecategorie 100 t/m 150 liter

VRIJSTAANDE DIEPVRIEZERS 90-91, 151 T/M 200 LITER

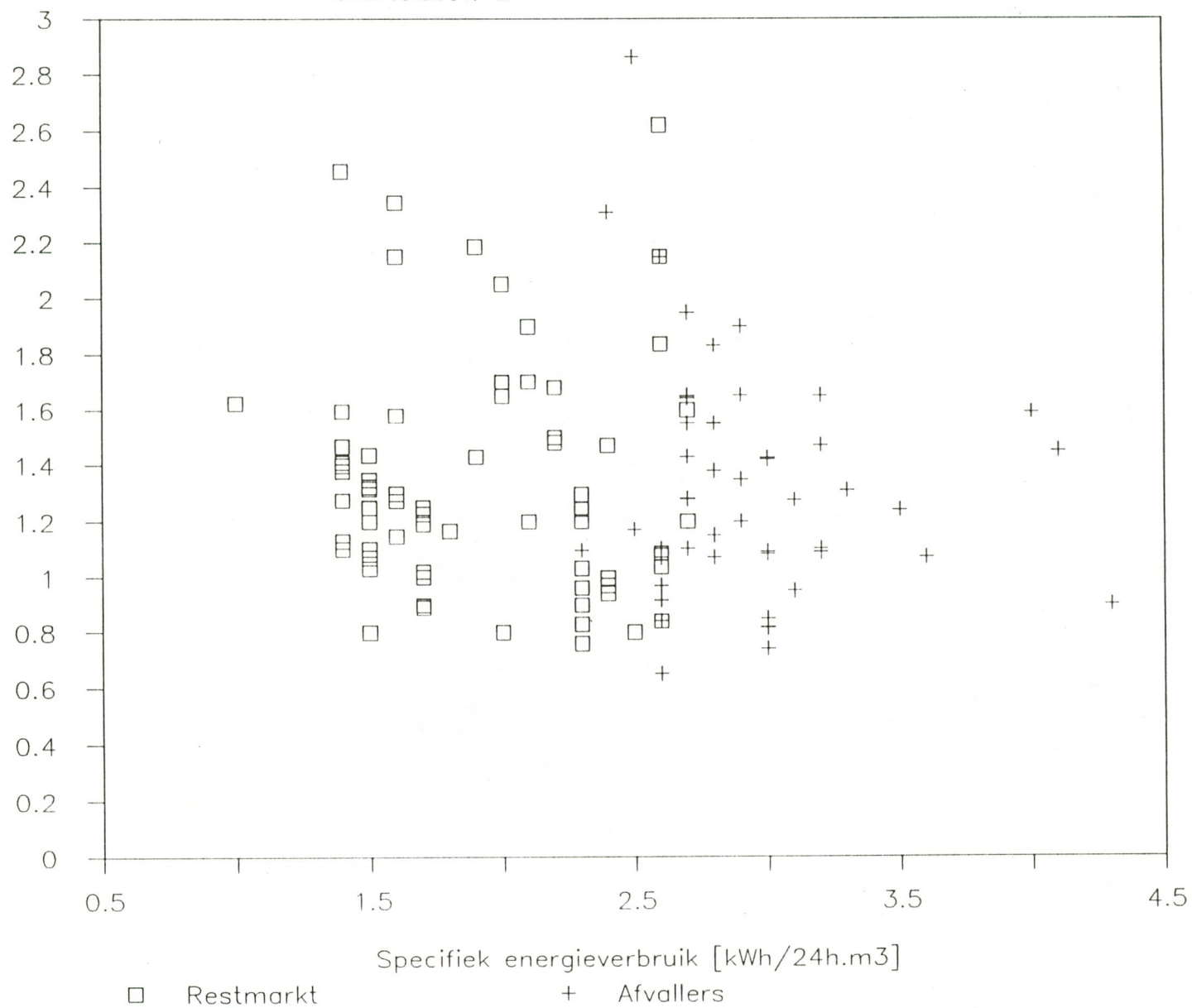


Figuur 71 Economisch gevolg van grenslijn 1
Vrijstaande diepvriezers, volumecategorie 151 t/m 200 liter

VRIJSTAANDE DIEPVRIEZERS 90-91, 201 T/M 300 LITER

GRENSLIJN 1

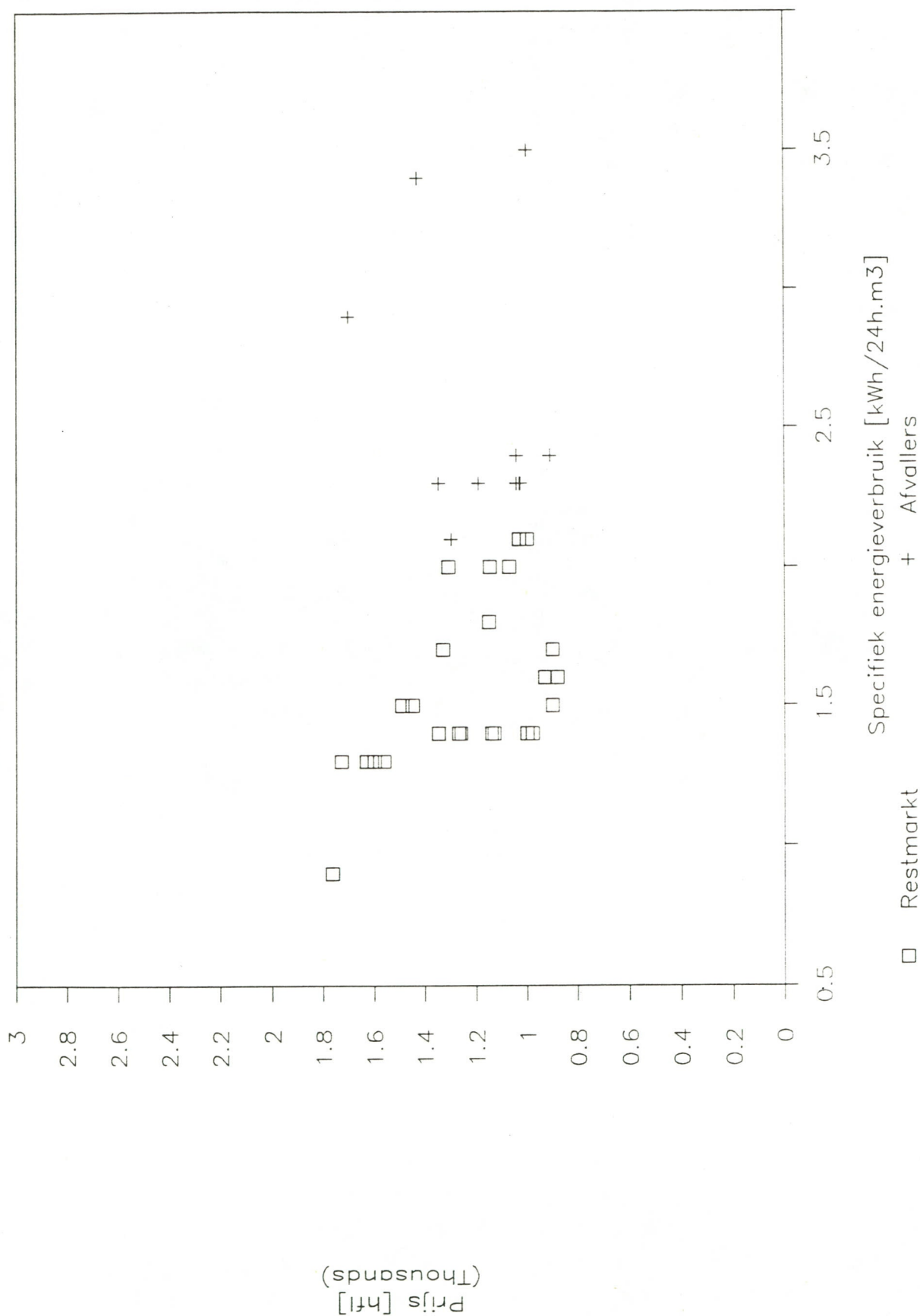
Prijs
[hfl]
(Thousands)



Figuur 72 Economisch gevolg van grenslijn 1
Vrijstaande diepvriezers, volumecategorie 201 t/m 300 liter

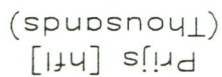
VRIJSTAANDE DIEPVRIEZERS 90-91, 301 T/M 450 LITER

GRENSLIJN 1



Figuur 73 Economisch gevolg van grenslijn 1
Vrijstaande diepvriezers, volumecategorie 301 t/m 450 liter,
 $0 \leq V_{gecorr.} \leq 803$ liter

GRENSLIJN 1

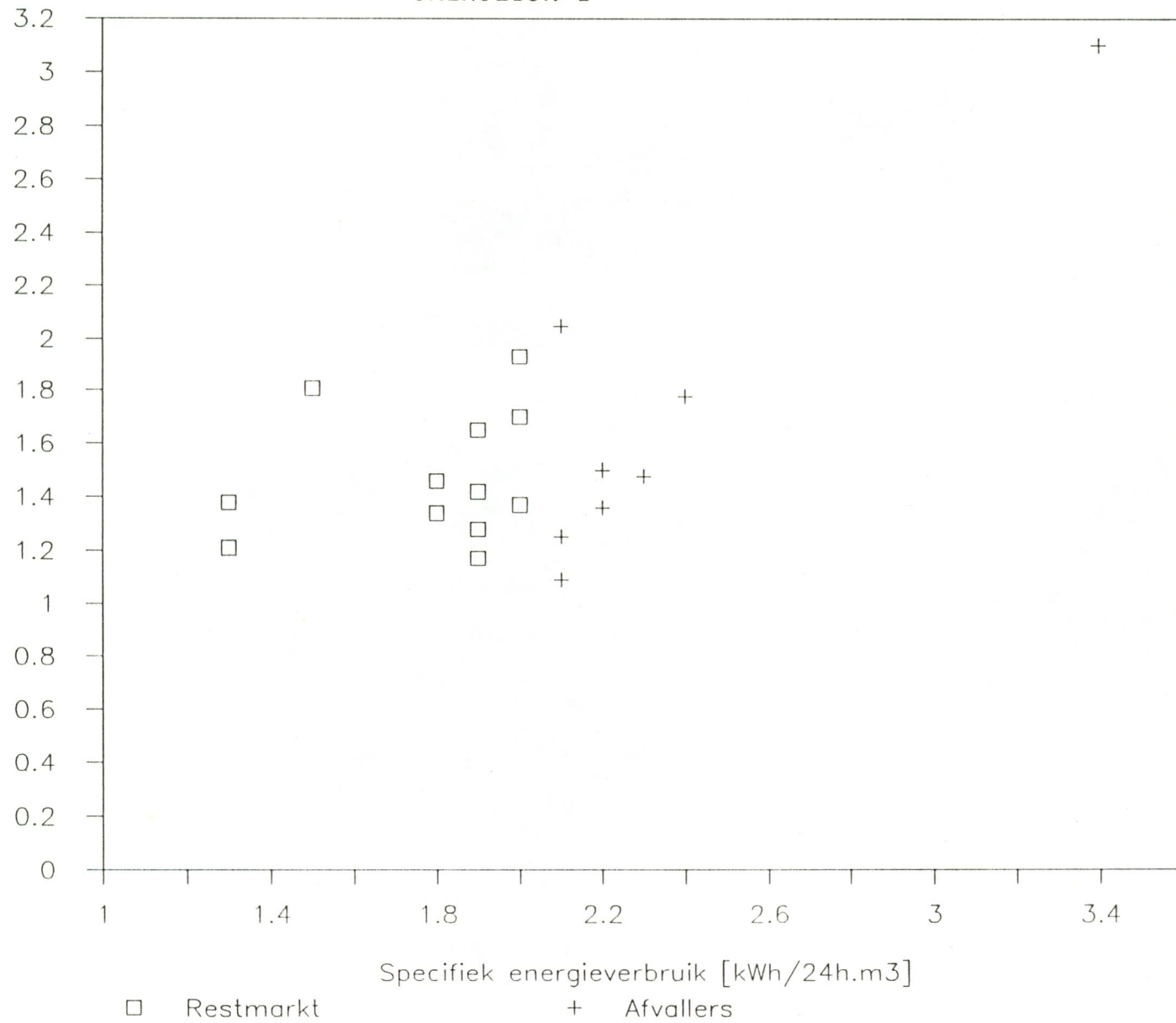


Figuur 74 Economisch gevolg van grenslijn 1
Vrijstaande diepvriezers, volumecategorie 301 t/m 450 liter
Vgecorr. $\geq$ 803 liter

VRIJSTAANDE DIEPVRIEZERS 90-91, > 450 LITER

GRENSLIJN 1

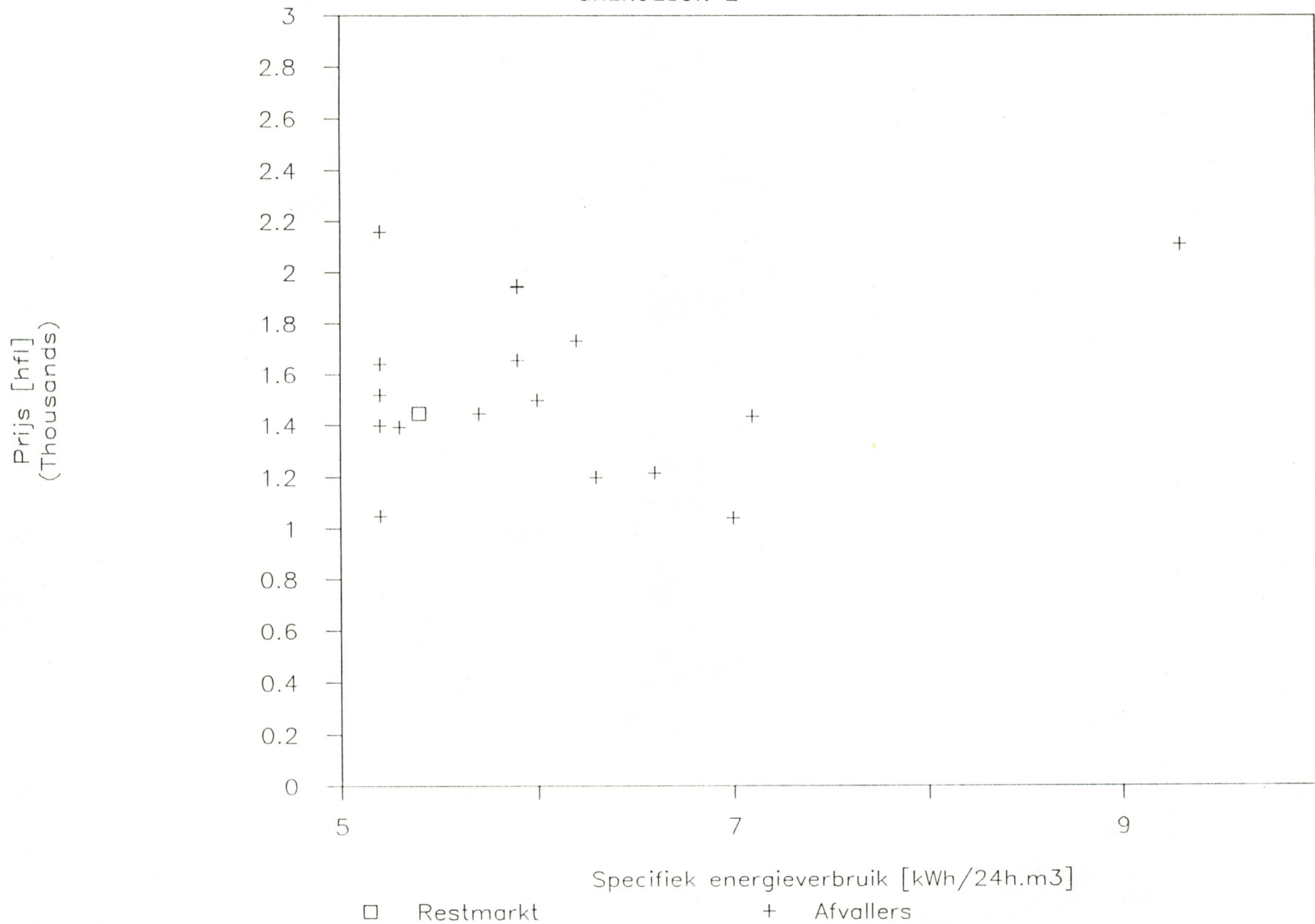
Prijs [hfl]
(Thousands)



Figuur 75 Economisch gevolg van grenslijn 1
Vrijstaande diepvriezers, volumecategorie > 450 liter

ONDERBOUW DIEPVRIEZERS 90-91, 0 TOT 100 LITER

GRENSLIJN 2

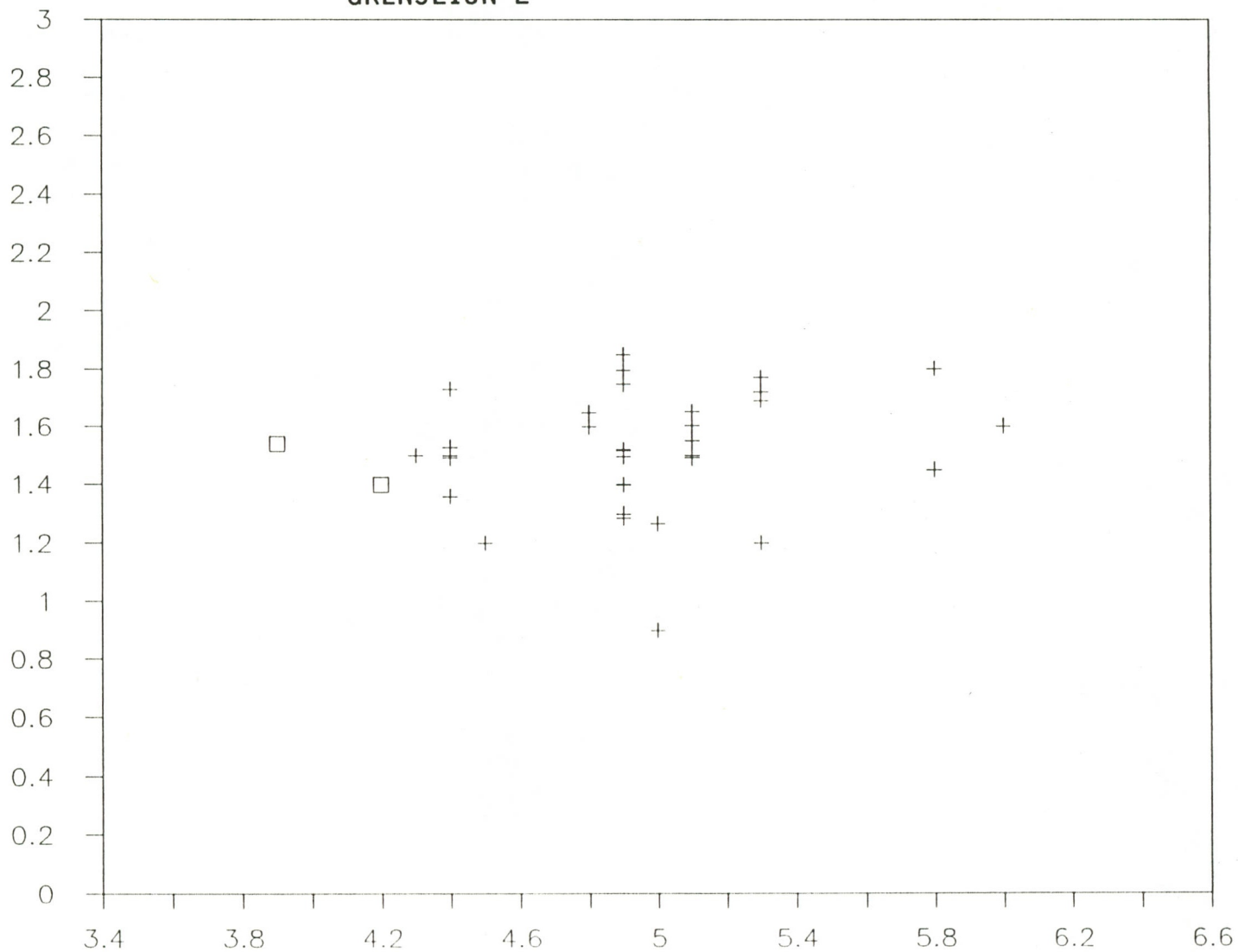


Figuur 77 Economisch gevolg van grenslijn 2
Onderbouw diepvriezers, volumecategorie 0 tot 100 liter

ONDERBOUW DIEPVRIEZERS 90-91, 100 T/M 150 LITER

GRENSLIJN 2

Prijs [hfl] (Thousands)



□ Restmarkt

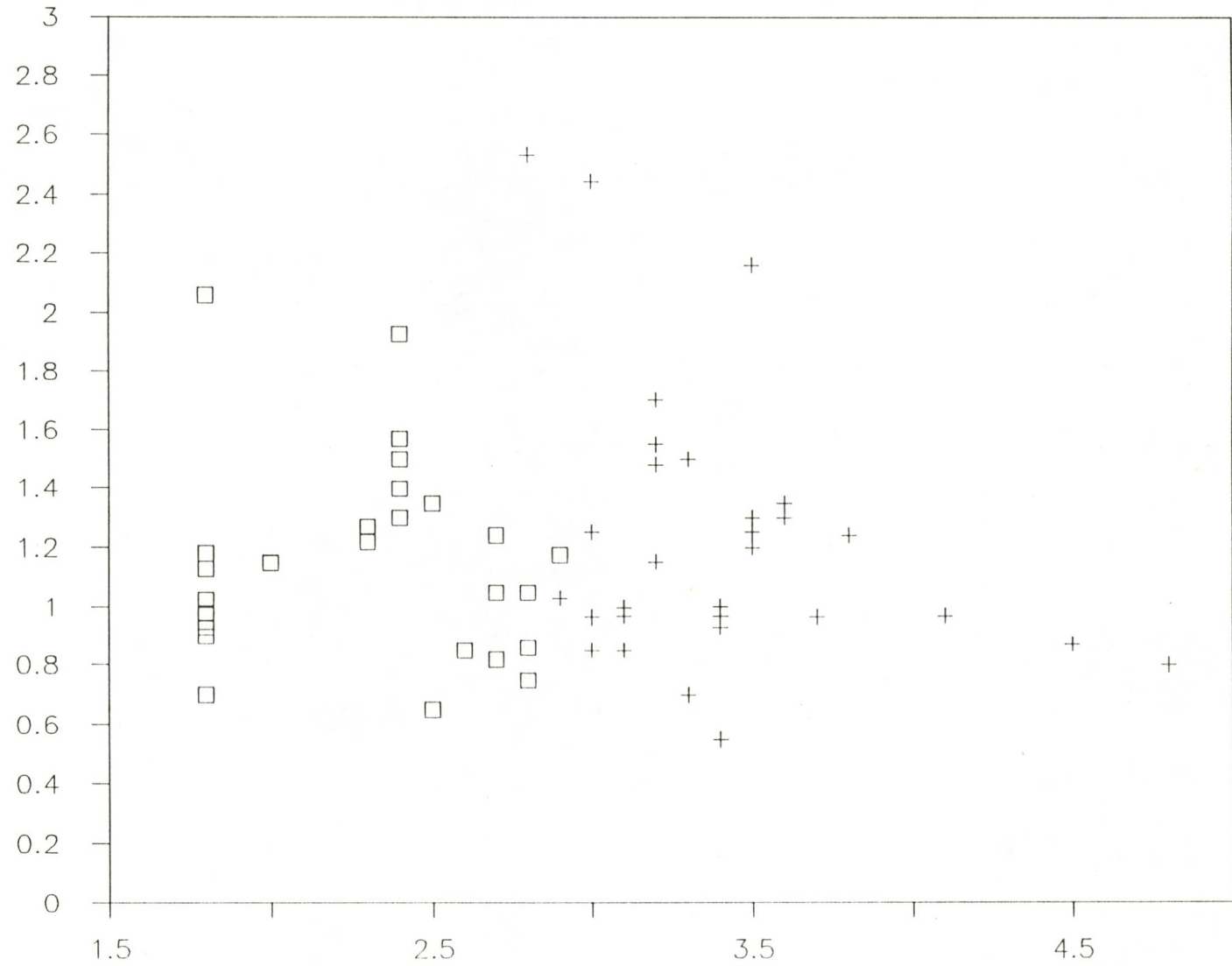
+ Afvallers

Figuur 79 Economisch gevolg van grenslijn 2
Onderbouw diepvriezers, volumecategorie 100 t/m 150 liter

VRIJSTAANDE DIEPVRIEZERS 90-91, 151 T/M 200 LITER

GRENSLIJN 2

Prijs [hfl]
(Thousands)



Specifiek energieverbruik [kWh/24h.m3]

□ Restmarkt

+ Afvallers

Figuur 80 Economisch gevolg van grenslijn 2
Vrijstaande diepvriezers, volumecategorie 151 t/m 200 liter

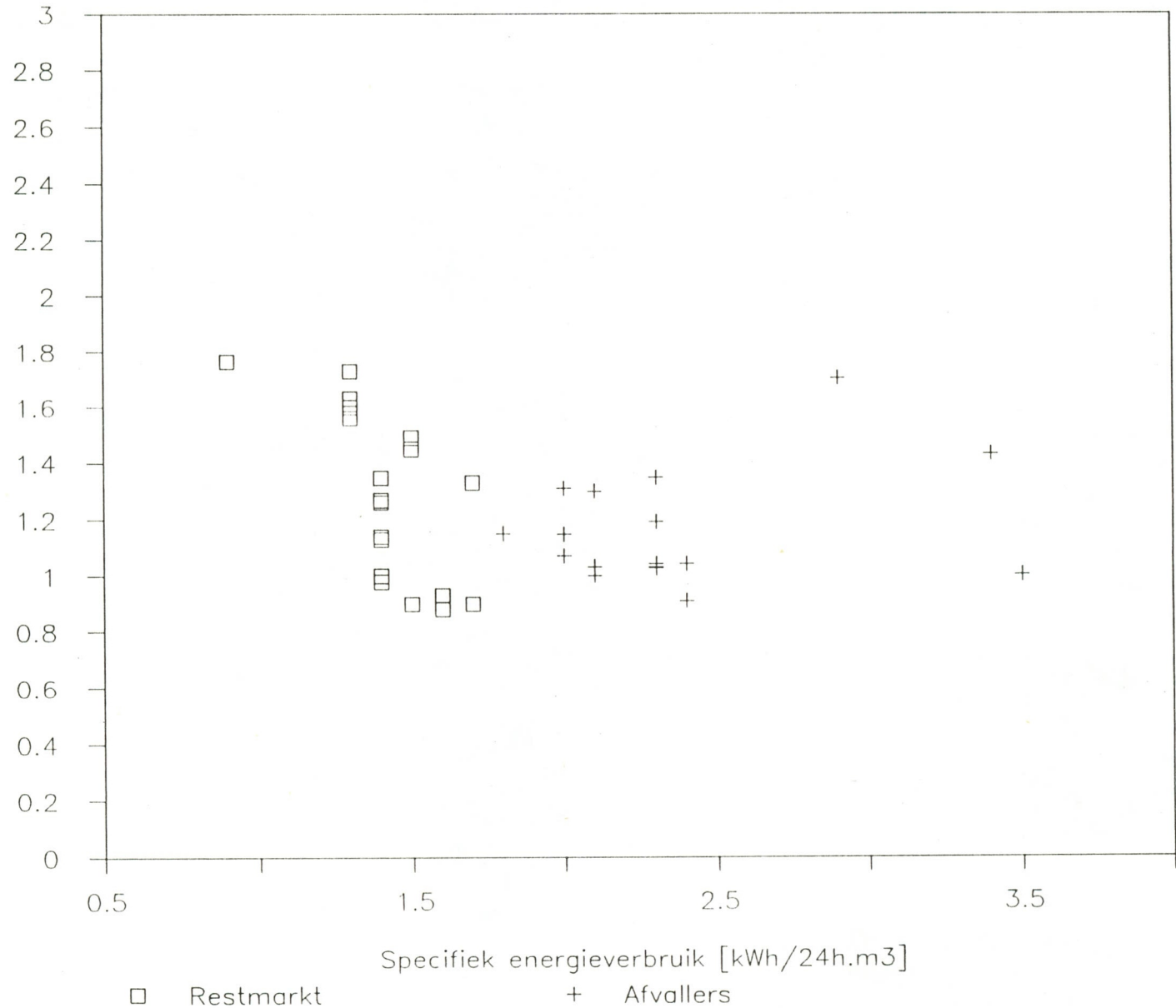
h

Prijs [hfl]
(Thousands)

VRIJSTAANDE DIEPVRIEZERS 90-91, 301 T/M 450 LITER

GRENSLIJN 2

(spausnqH)
[hf] sijn

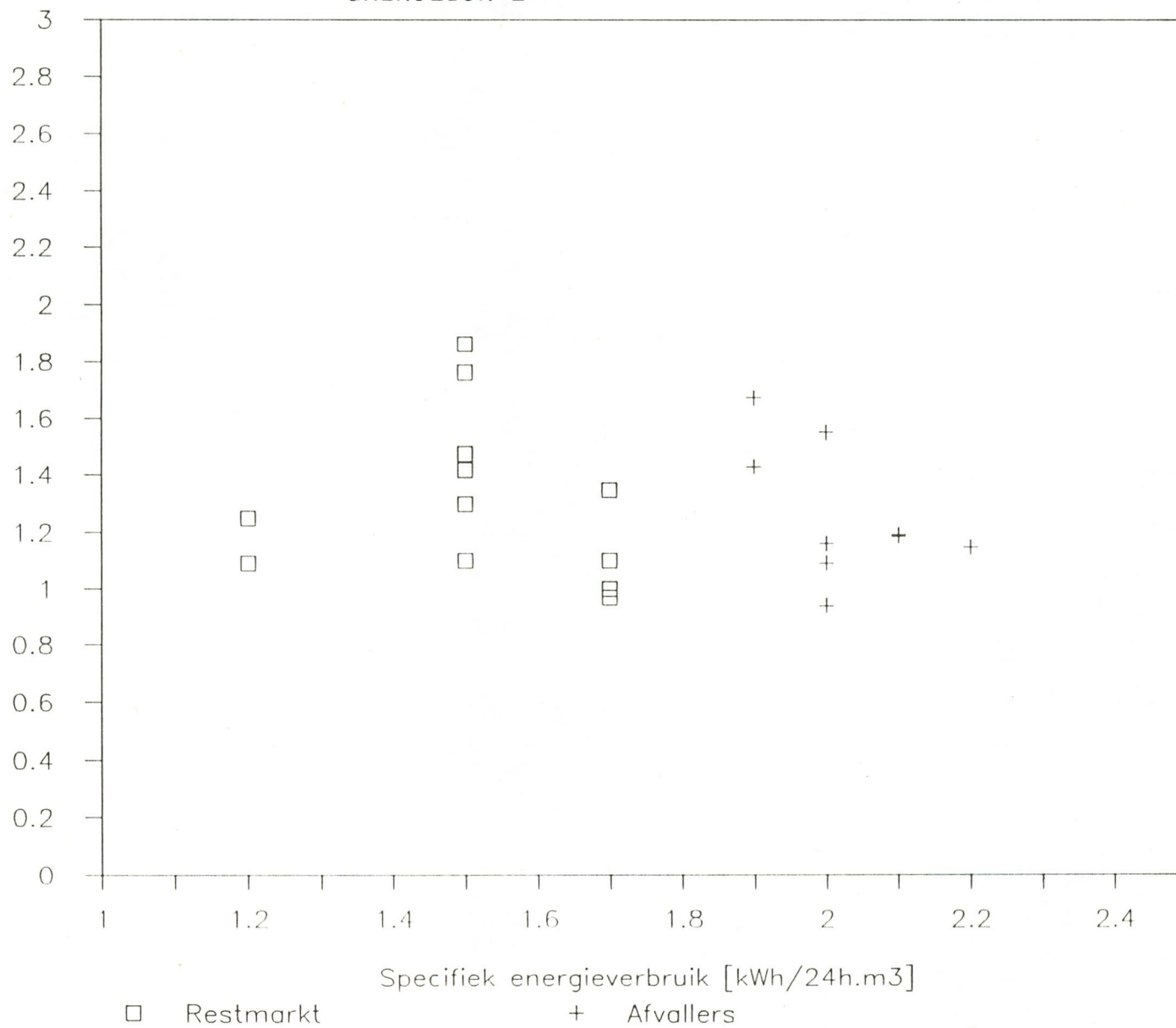


Figuur 82 Economisch gevolg van grenslijn 2
Vrijstaande diepvriezers, volumecategorie 301 t/m 450 liter
0 ≤ Vgecorr. ≤ 798 liter

VRIJSTAANDE DIEPVRIEZERS 90-91, 301 T/M 450 LITER

GRENSLIJN 2

Prijs [hfl]
(Thousands)

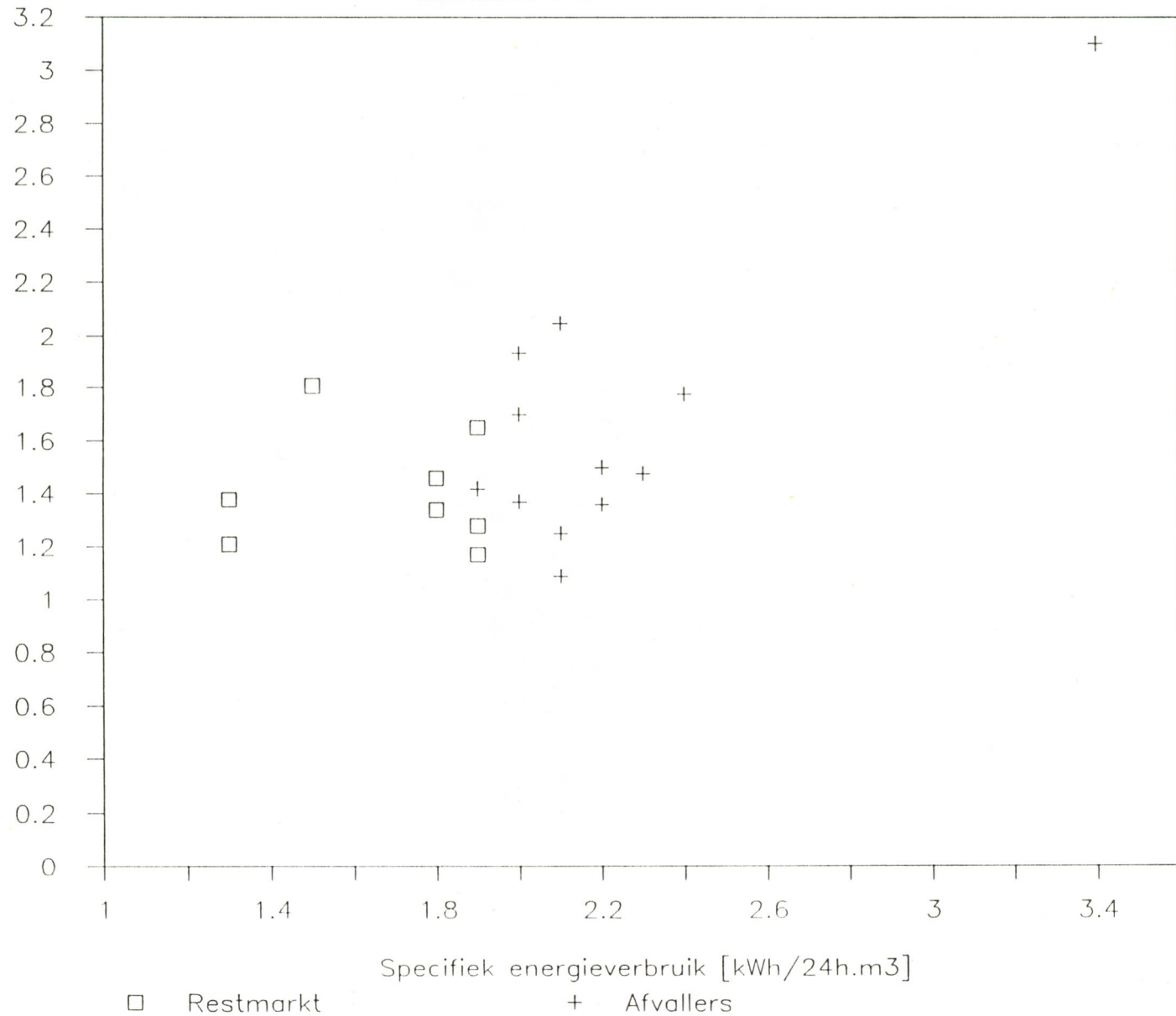


Figuur 83 Economisch gevolg van grenslijn 2
Vrijstaande diepvriezers, volumecategorie 301 t/m 450 liter
Vgecorr. $\approx$ 798 liter

VRIJSTAANDE DIEPVRIEZERS 90-91, > 450 LITER

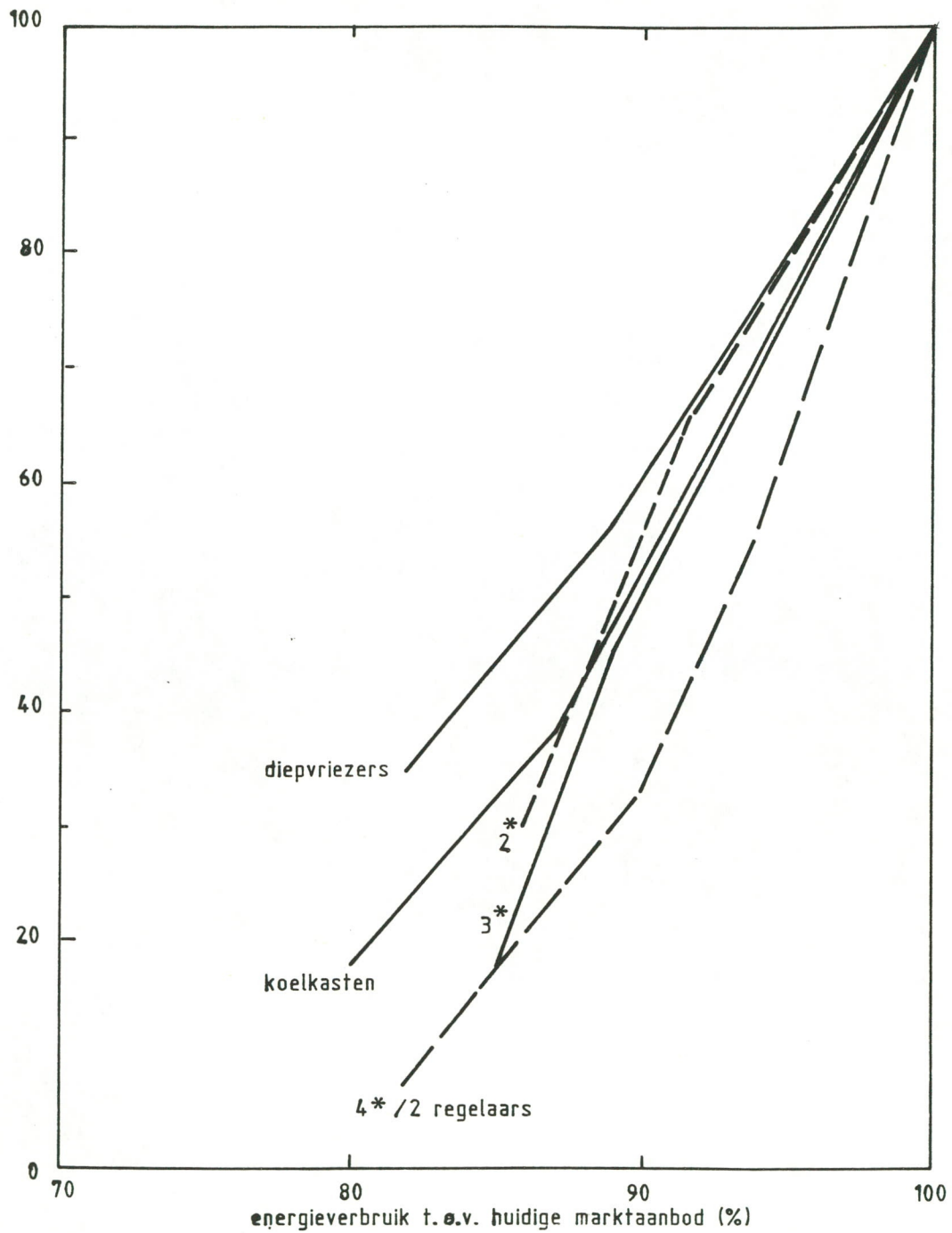
GRENSLIJN 2

Prijs [hfl]
(Thousands)



Figuur 84 Economisch gevolg van grenslijn 2
Vrijstaande diepvriezers volumecategorie > 450 liter

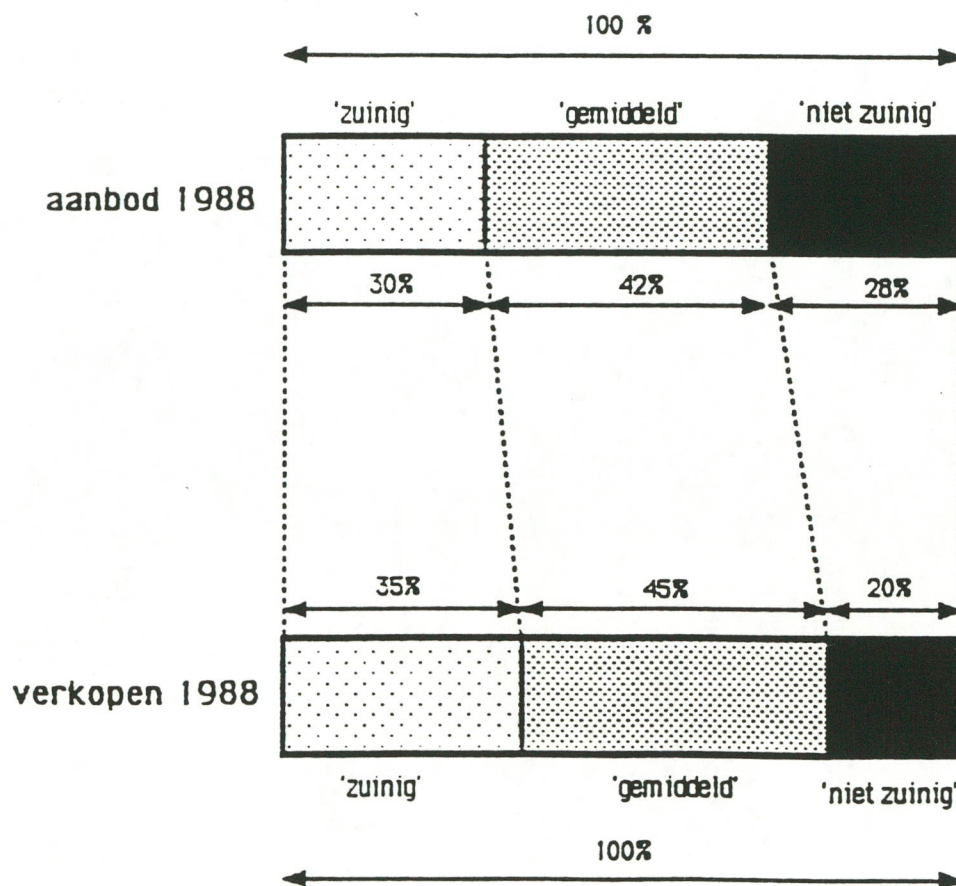
marktomvang t.o.v. huidig marktaanbod
(%)



Samenvatting marktreducties versus reducties in
energieverbruik.

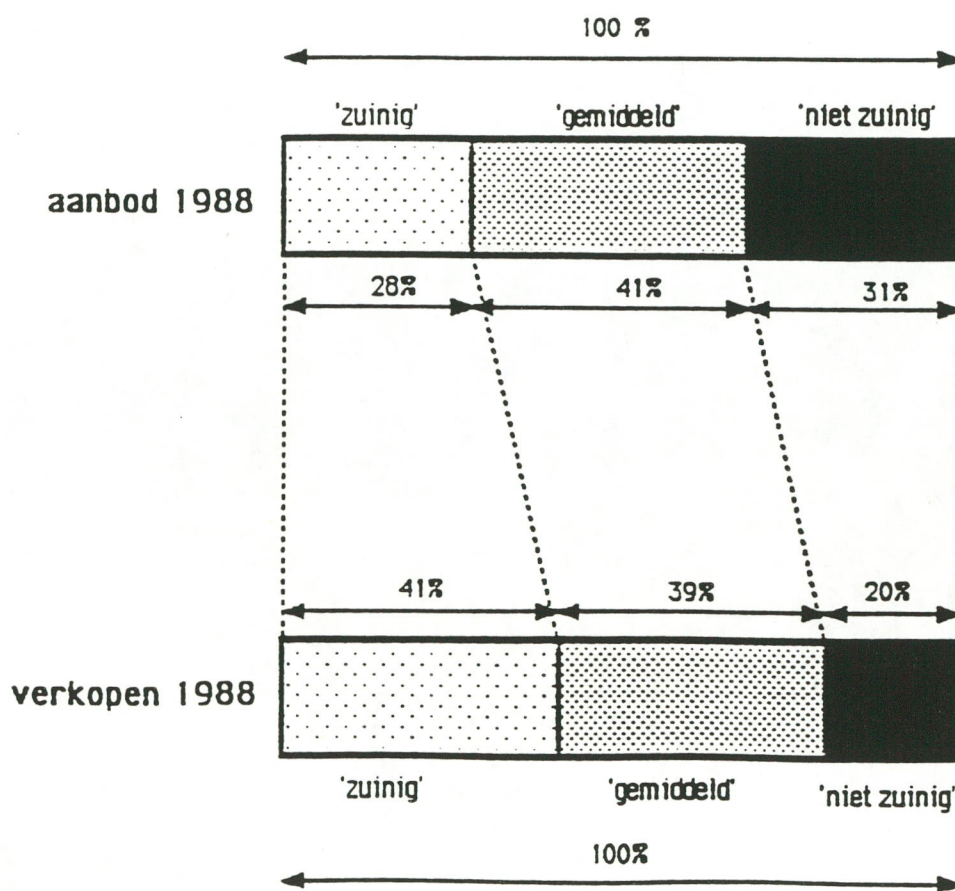
IMET - TNO
91 - 042
Fig. 85

energieverbruik aanbod en verkoop 1988 (totaal)



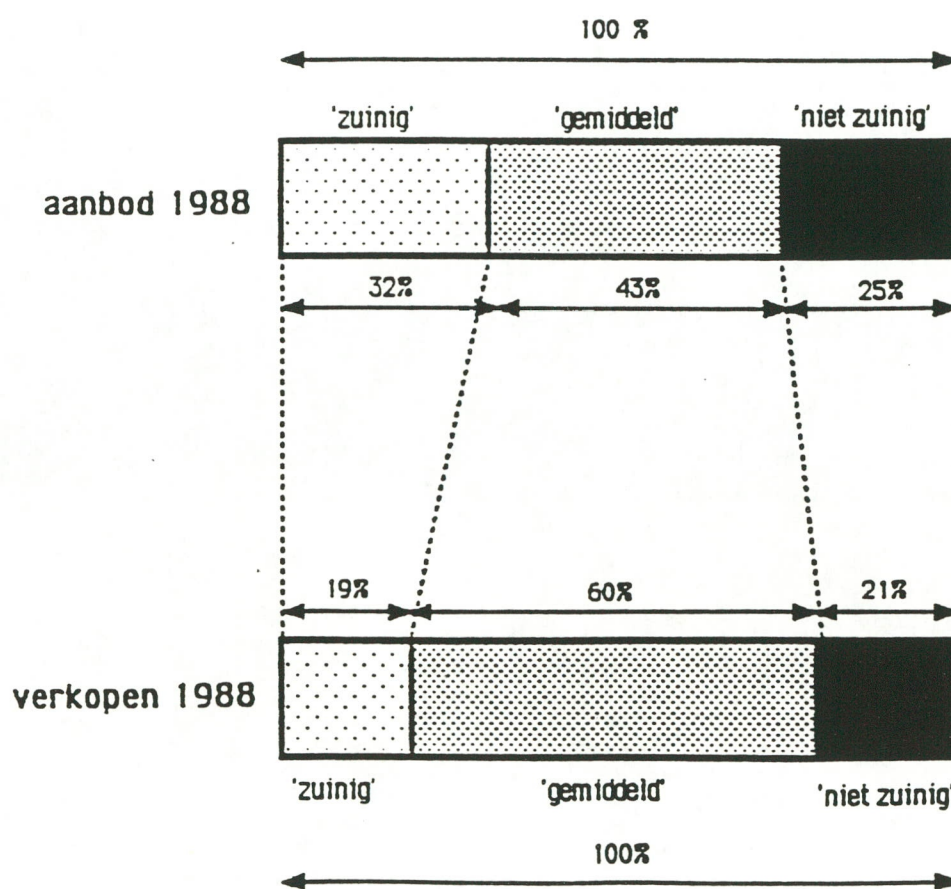
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energieverbruik aanbod en verkoop 1988 (koelkasten)



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energieverbruik aanbod en verkoop 1988 (diepvriezers)

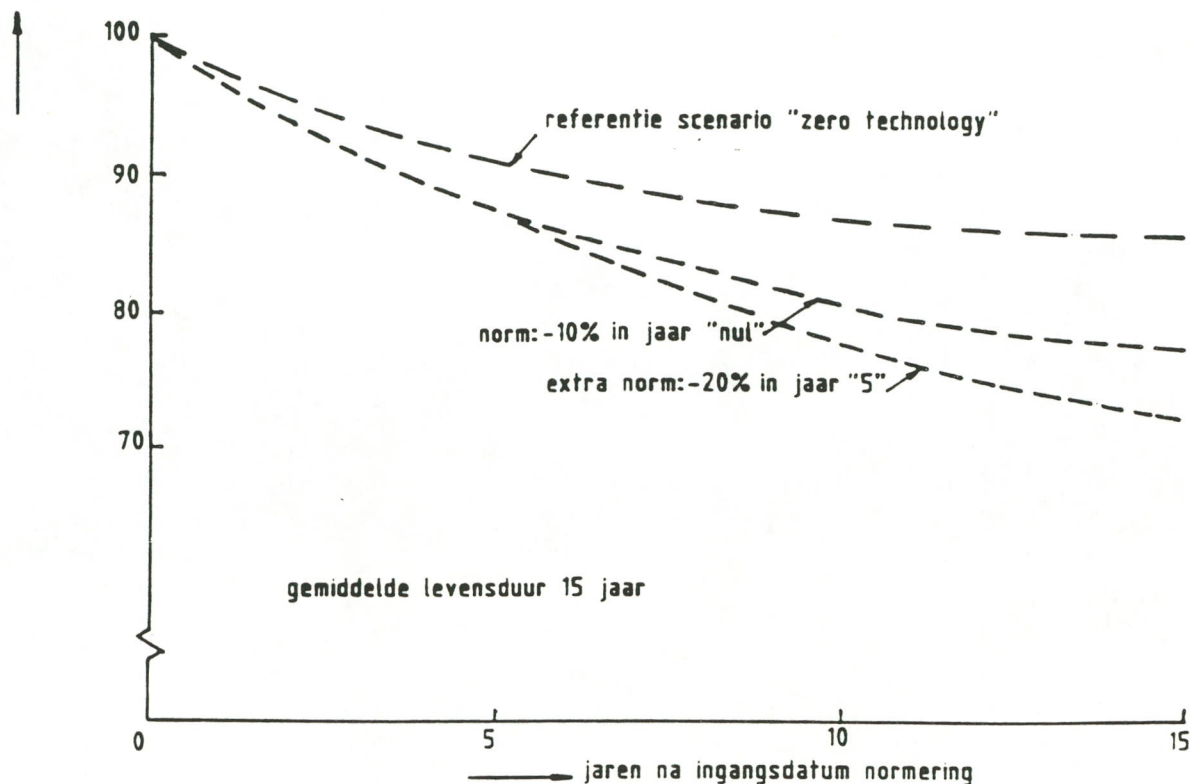


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Relatie tussen aantal aangeboden modellen en bijbehorende afzet voor diepvriezers.

IMET - TNO
91 - 042
Fig. 88

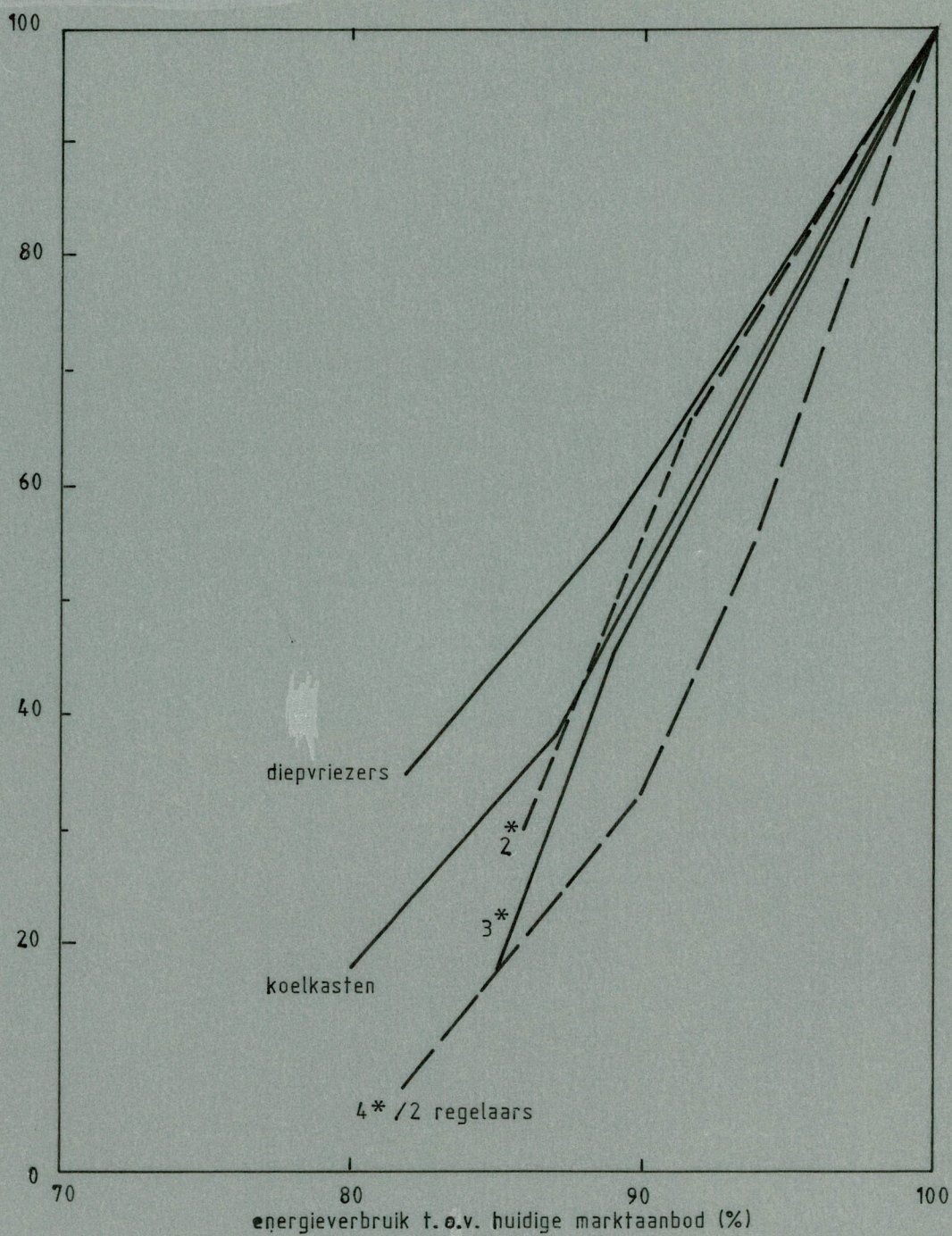
energieverbruik t.o.v. energieverbruik in jaar "nul" [%]



Schatting van het verloop van het, over de totale voorraad koelkasten en diepvriezers gemiddelde energieverbruik.

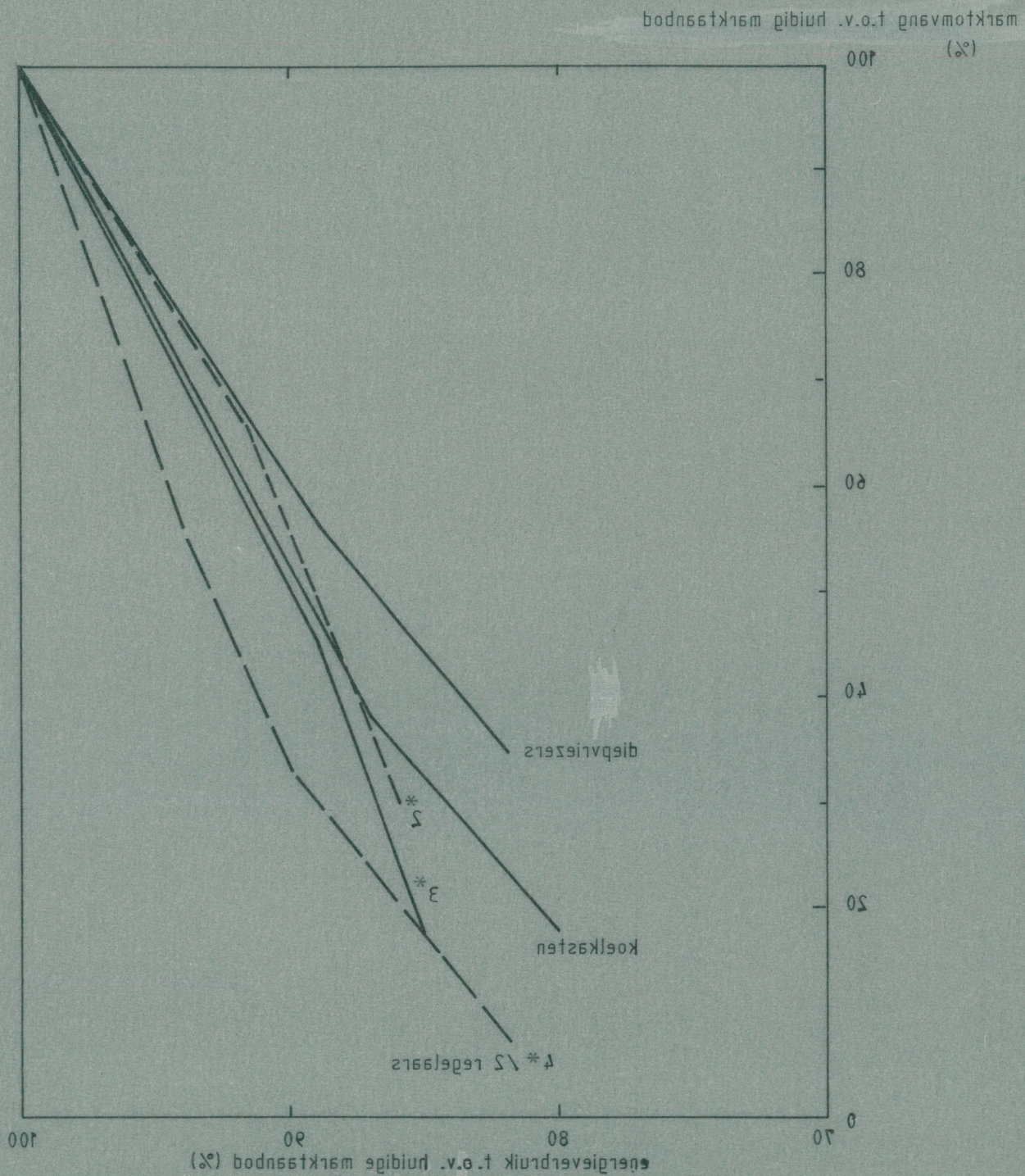
IMET - TNO
91 - 042
Fig. 89

marktomvang t.o.v. huidig marktaanbod
(%)

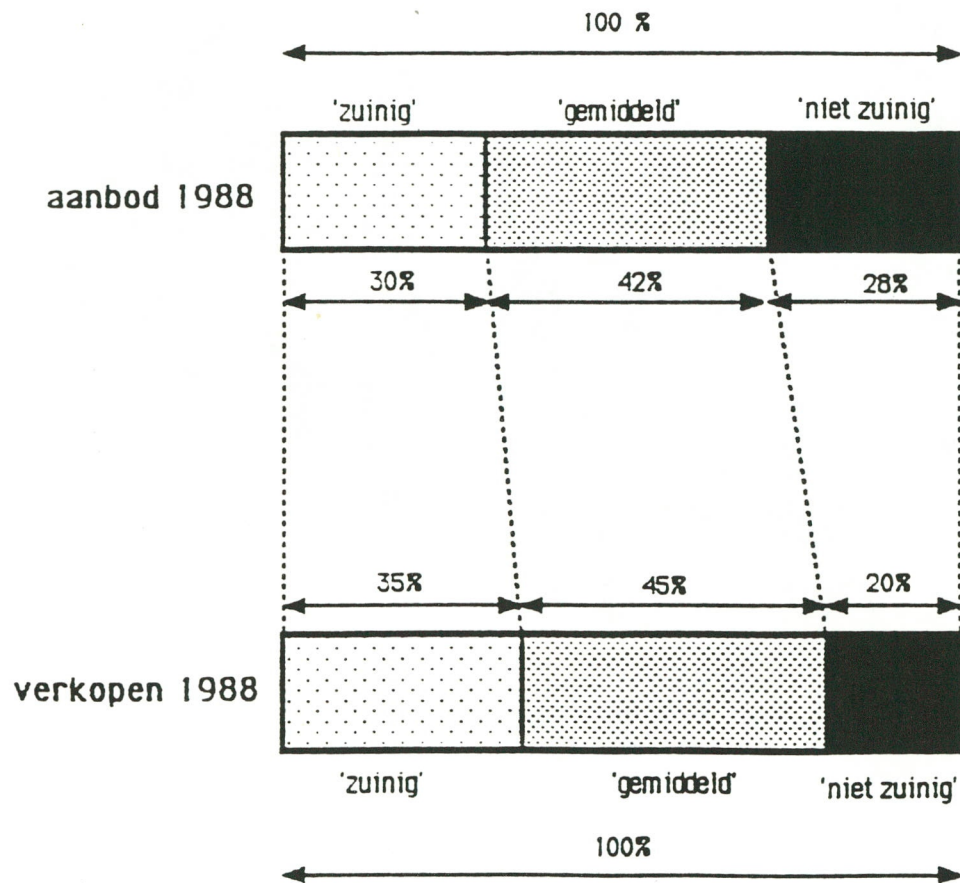


Samenvatting marktreducties versus reducties in
energieverbruik.

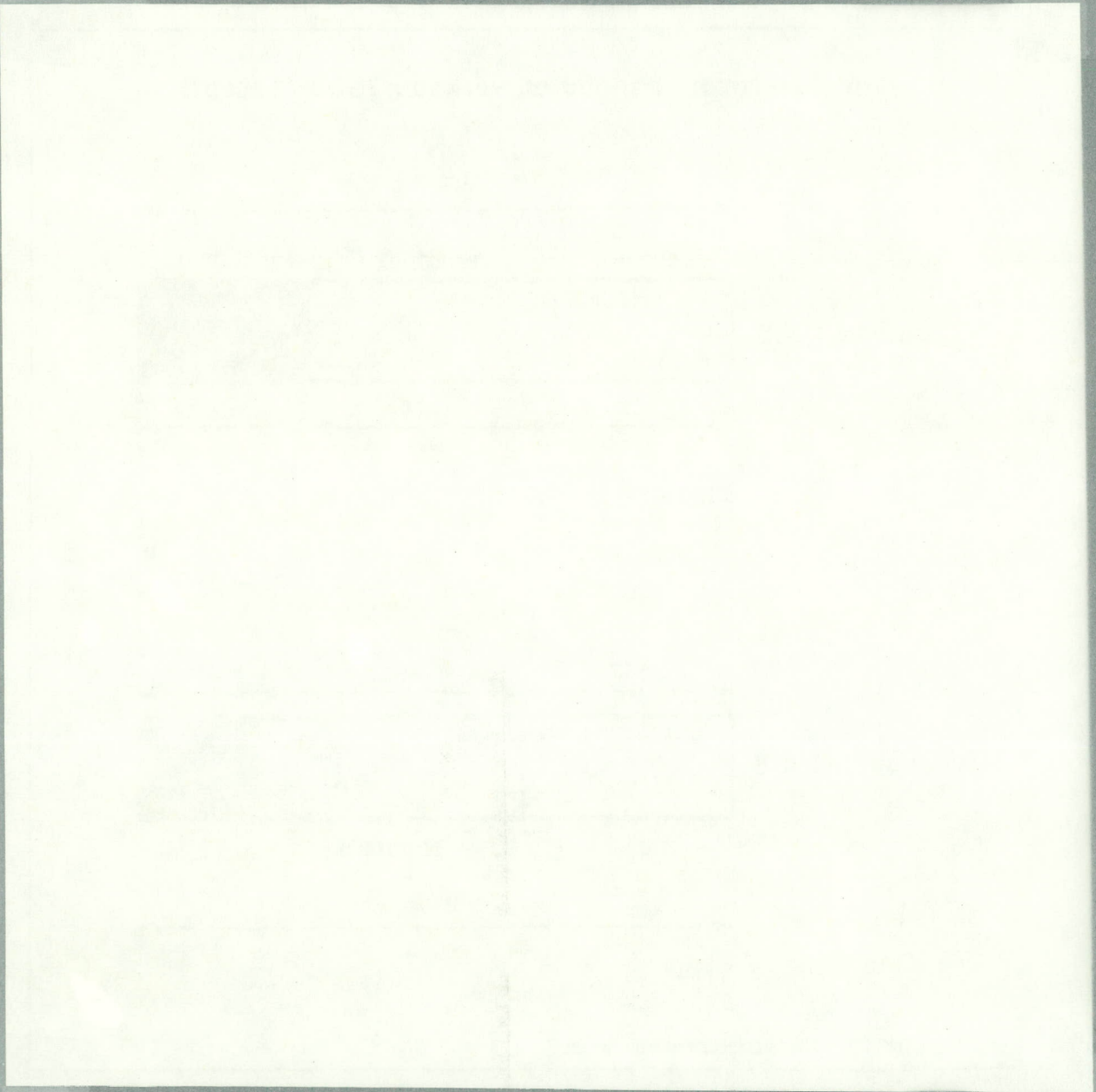
IMET - TNO
91 - 042
Fig. 85



energieverbruik aanbod en verkoop 1988 (totaal)



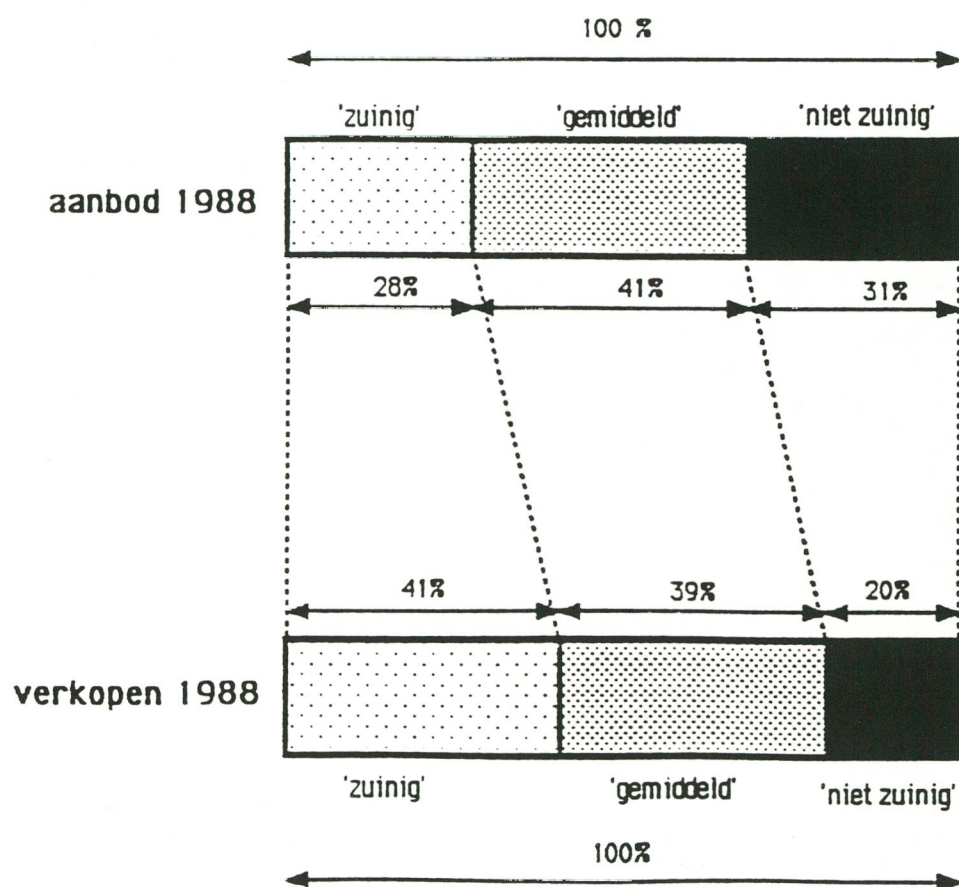
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Relatie tussen aantal aangeboden modellen en bijbehorende
aantal: totale markt.

Fig. 86
91 - 045
IMET - TNO

energieverbruik aanbod en verkoop 1988 (koelkasten)



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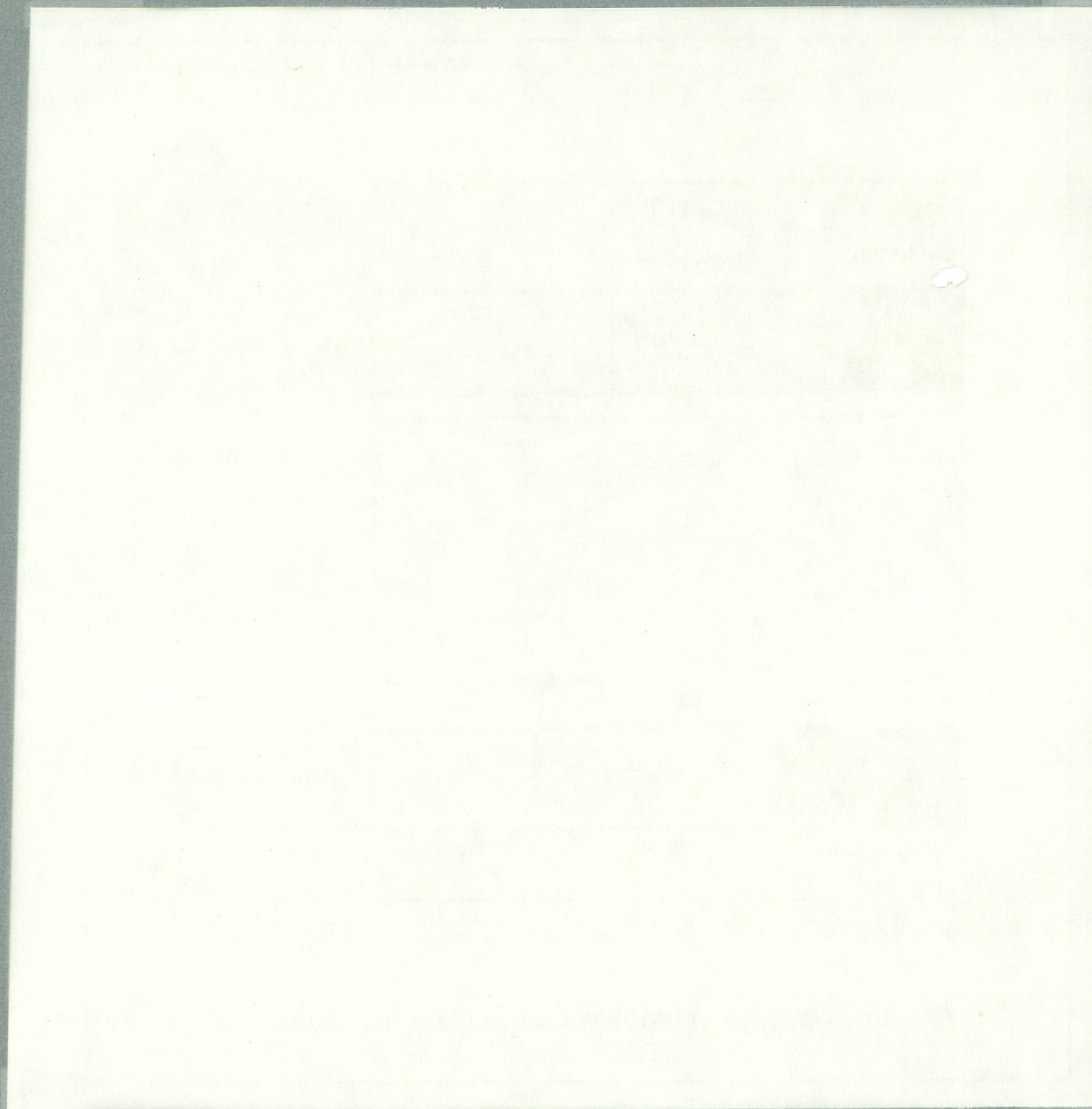
afzet voor koelkasten.

Relatie tussen aantal aangeboden modellen en bijbehorende

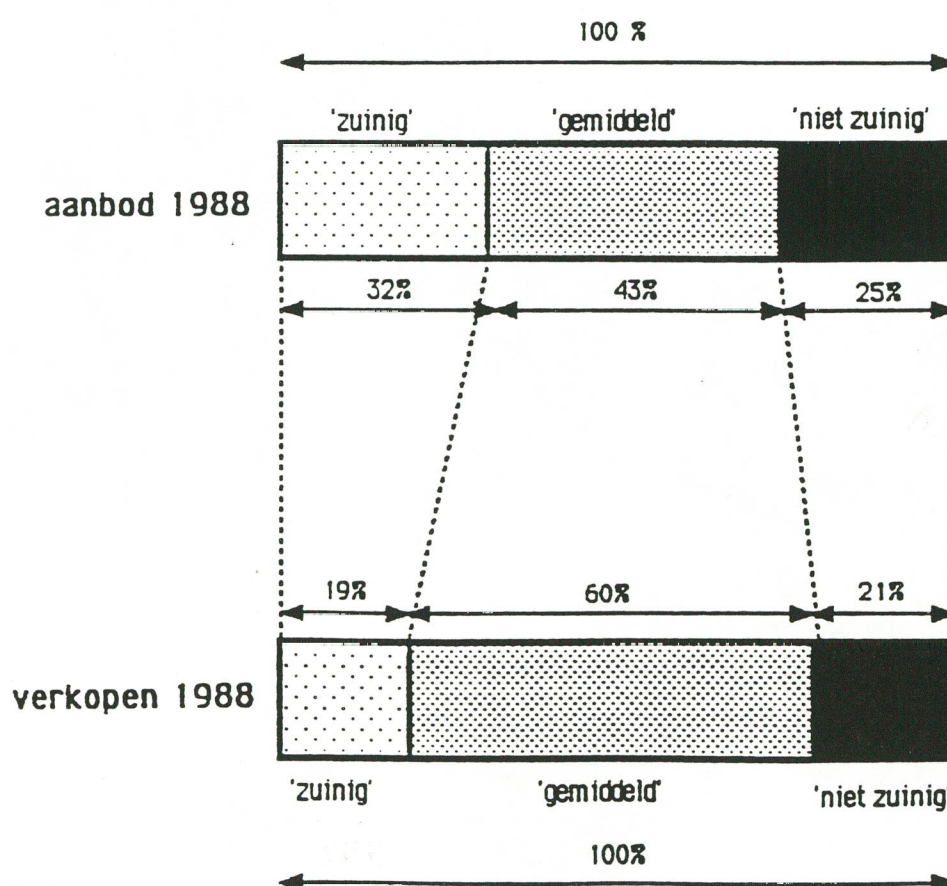
Fig. 81

81 - 045

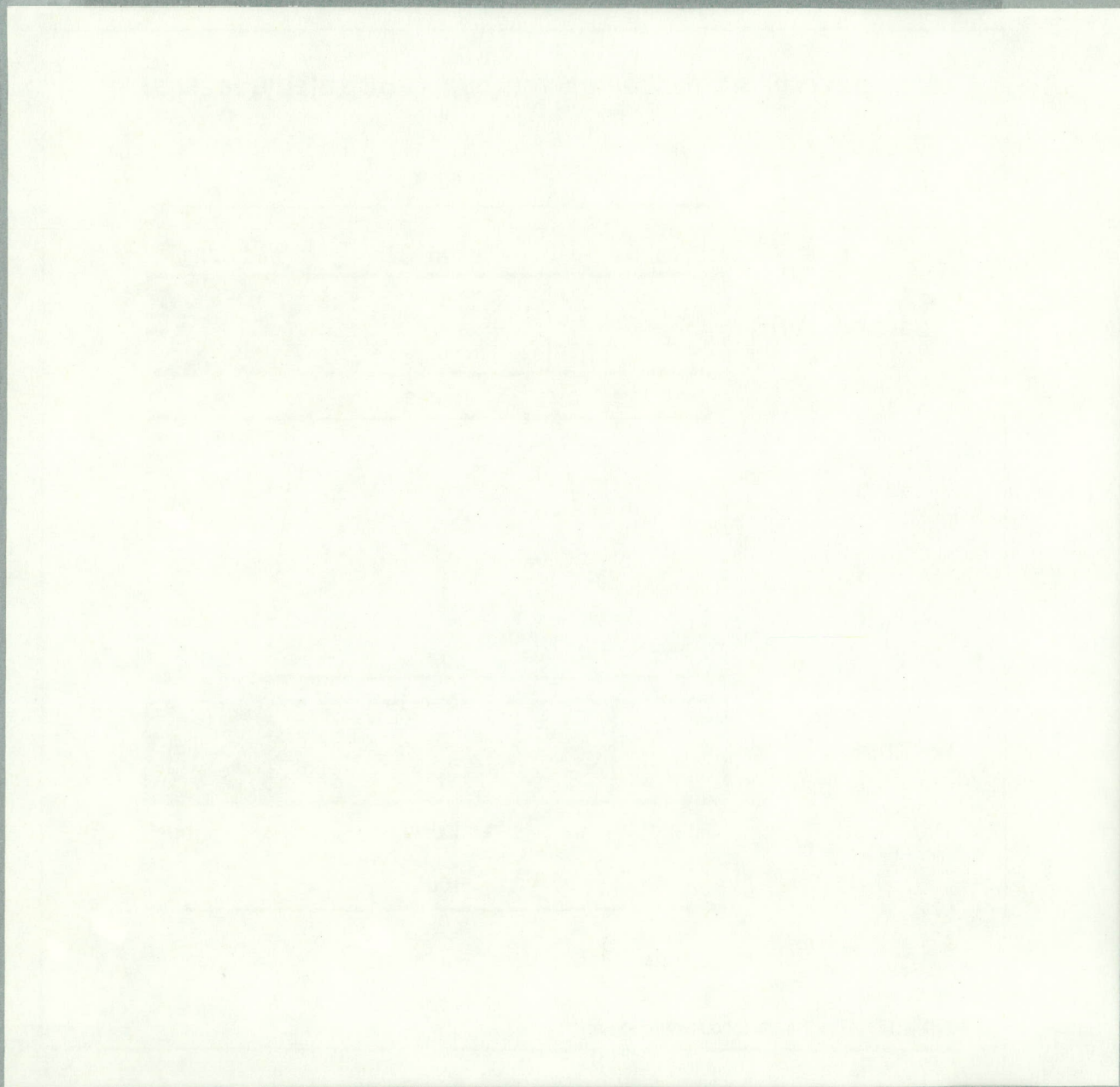
WET - TNO



energieverbruik aanbod en verkoop 1988 (diepvriezers)



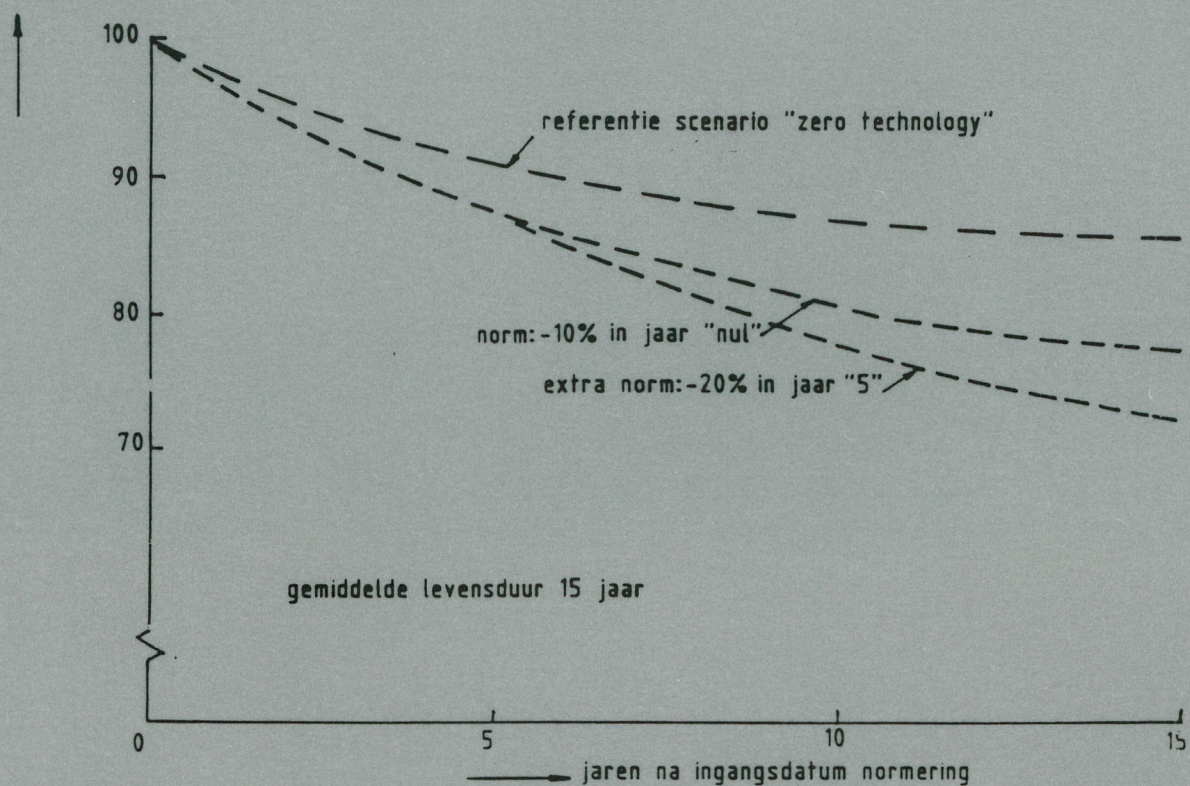
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Relatie tussen aantal aangeboden modellen en bijbehorende
afzet voor diepvriezers.

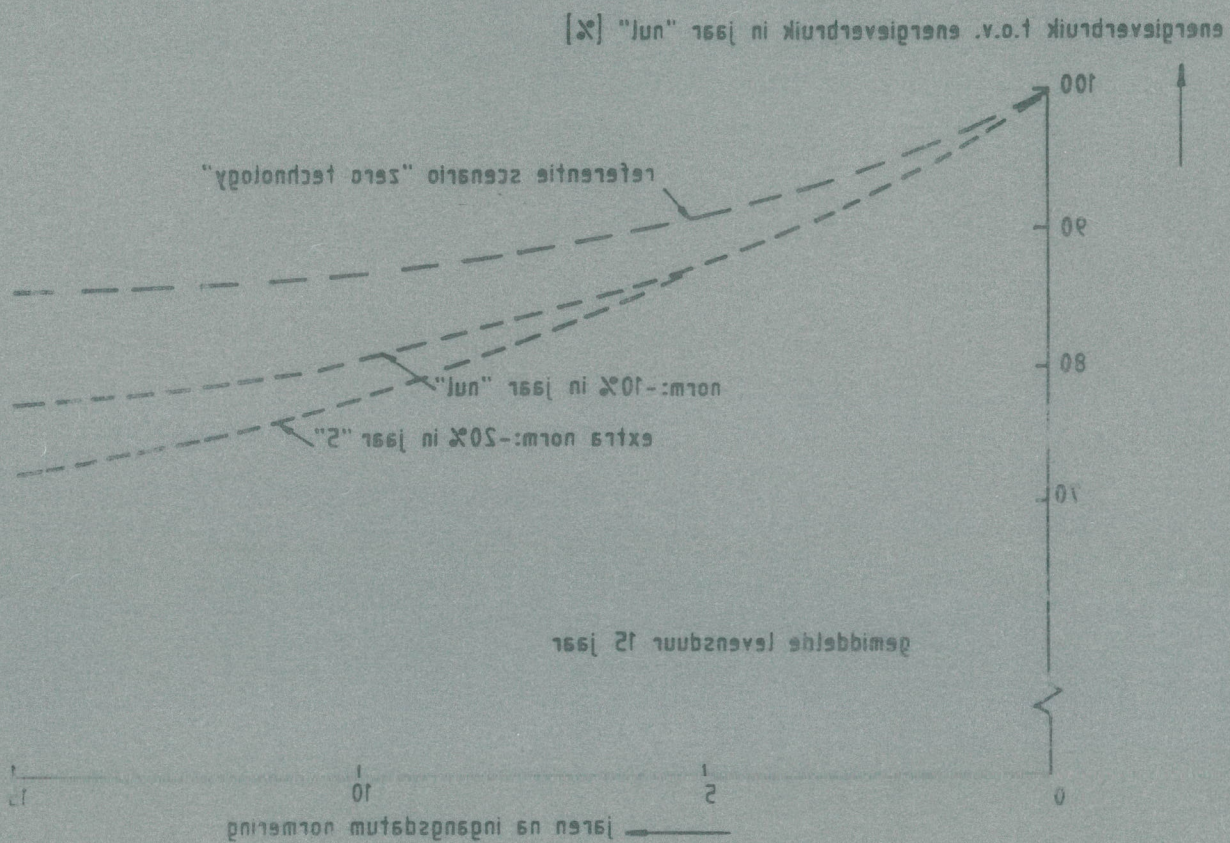
IMET - TNO
91 - 042
Fig. 88

energieverbruik t.o.v. energieverbruik in jaar "nul" [%]



Schatting van het verloop van het, over de totale voorraad koelkasten en diepvriezers gemiddelde energieverbruik.

IMET - TNO
91 - 042
Fig. 89



Schatting van het verloop van het, over de totale voorraad
koelkasten en diepvriezers gemiddelde energieverbruik.